Business
Department
School Administration Building
304 New York Ave
Oak Ridge, Tennessee 37830
Phone (865) 425-9005
Fax (865) 425-9060

Request for Proposal

Description of items/services requested:

The City of Oak Ridge and Oak Ridge Schools Board of Education is soliciting proposals for the following project: **Oak Ridge High School Softball Complex (RFP 25-002.1).**

General Requirements:

All interested vendors are encouraged to attend a Pre-Bid walk through that will take place on October 3, 2024, at 11:00am EDT at 15 Wilberforce Avenue, Oak Ridge, TN 37830. If a vendor is unable to attend the pre-bid meeting or needs to see the site again after the meeting, please contact the Maintenance and Operations office at (865) 425-3171 to schedule an appointment.

The awarded contractor will ensure that all personnel working on the project, even those of subcontractors, are qualified to work within the United States. The Oak Ridge Schools Board of Education will not allow for utilization of temporary personnel or day laborers to service this contract.

Proposals, bids, or responses will be accepted by the Oak Ridge Schools Business Department no later than **11:00 AM EDT, October 15, 2024.** Every document must be enclosed in an envelope clearly marked as a bid document. **Two full copies** of the proposal must be submitted each with original signatures on both Bid Forms (included in this packet).

Any response, bid, or proposal received after the above deadline shall be considered late and will not be opened or considered. Bid prices must be valid for no less than sixty (60) days from the date of the bid.

All documents shall be submitted to the following address:

Mary Ann Riley, Purchasing Specialist
Re: ORHS Softball Complex (RFP 25-002.1)
Oak Ridge Schools
304 New York Ave
Oak Ridge, TN 37830

Contract Time: Oak Ridge Schools requires the work to start on 11/4/24; substantial completion of finish grading by 1/10/25; substantial completion for installation of field sod, infield mix and warning track material by 1/31/25; and substantial completion of all remaining work by 2/28/25; and final completion by 3/28/25.

Scope of Work/General Specifications:

Proposal Preparation and Submission Requirements

To enable the Oak Ridge Schools Board of Education to conduct a uniform review of all proposals submitted in response to this solicitation, components of the proposal shall be submitted as set forth below. The Oak Ridge Schools Board of Education reserves the right to reject submittals that do not follow the requested format listed below.

Vendor Profile: Provide a vendor profile to include:

- An overview of the company
- The length of time the Vendor has been in business
- An outline of the Vendor's background and overall qualifications
- Provide a minimum of three client references, including complete addresses and telephone numbers and contact person

Provide a total cost for the entire project. Successful vendor will furnish a cost breakdown for accounting purposes.

Award Process: Upon award, the resulting contract:

Will be approved by the Oak Ridge Schools Purchasing Department.

Will be reviewed and approved by the Oak Ridge Schools' attorney.

Will be sent to the Oak Ridge Schools Board of Education for approval.

Will be sent to the Oak Ridge Schools Superintendent for signature.

Will be forwarded to the Oak Ridge Schools Purchasing Department, for obtaining the signature of the bidder(s).

Be fully executed.

Compliance with Instructions from Site-Based Administrators: Should a site-based administrator (typically a principal or assistant principal but also a maintenance supervisor or other designated persons) request a cessation of work, work shall immediately stop. Vendor is to immediately call the Oak Ridge Schools Maintenance and Operations Department administrator in charge of the project for further instruction. Should a site-based administrator request a change of scope, function, design, et cetera of the project, such request is to be reported to the Oak Ridge Schools Maintenance and Operations Supervisor prior to any changes being affected.

Entrance to Oak Ridge School Sites: Only authorized employees of the successful Vendor are allowed on the premises of Oak Ridge School buildings. Vendor employees are NOT to be accompanied in their work area by acquaintances, family members, assistants or any person unless said person is an authorized employee of the Vendor. All employees must wear a company uniform, have picture identification badges, or other Company Identification at all times.

Evaluation Review: Oak Ridge Schools reserves the right to use all pertinent information (also learned from sources other than disclosed in the bid process) that might affect the District's judgment as to the appropriateness of an award to the best evaluated bidder. This information may be appended to the bid evaluation process results. Information on a service provider from reliable sources, and not within the service provider's bid, may also be noted and made part of the evaluation file. ORS shall have sole responsibility for determining a reliable source. ORS reserves the right to conduct written and/or oral discussion/interviews after the bid opening. The purpose of such discussions/interviews is to provide clarification and/or additional information to make an award which is in the best interest of ORS.

Last day for questions: All questions regarding this bid must be submitted in writing to Mary Ann Riley, no later than August 29, 2024. You may submit questions by email to mriley@ortn.edu.

Licensing: Throughout the term of this contract, the Vendor shall maintain a current license issued by the State of Tennessee.

Open Bid Intended: It is the intent and purpose of Oak Ridge Schools that this Invitation to Bid promote competitive pricing. It shall be the BIDDERS responsibility to advise Purchasing Department, if any language, requirements, et cetera or any combination thereof, inadvertently restricts or limits this Invitation for Bid. Such notification must be submitted in writing and must be received by the Purchasing Department not less than ten (10) days prior to the bid closing date.

Price Reductions: By submitting a bid in response to this solicitation, Contractors agree to guarantee that the ORS is receiving the lowest price offered by your company to other customers for similar services at comparable volumes in a similar geographic area. If at any time during the contract period your company offers a lower price to another customer, notification not made of price reductions, upon discovery ORS shall reserve the right to take any or all of the following actions:

- Cancel the Contract
- Determine the amount which ORS was overcharged and submit a request for payment from the Contractor for that amount.
- Take the necessary steps to collect any performance surety provided on the applicable contract.
- ORS will be responsible for the monitoring and collection of any forfeitures resulting in violations of price reductions.

Removal of Vendor's Employees: The successful Vendor agrees to utilize only experienced responsible and capable people in the performance of the work. The ORS may require that the successful Vendor remove from the job covered by this contract, employees who endanger person or property or whose continued employment under this contract is inconsistent with the interest of ORS.

Scheduling of Work: Vendor shall cooperate with School officials in performing work so that interference with the normal program will be held to a minimum.

Subcontracting: Any subcontracting must be approved, in advance, by Oak Ridge Schools. ORS may terminate the contract if subcontracting is done without approval.

Use of Trash Containers: Vendors are advised that Oak Ridge School policy does not allow vendors to utilize on-site trash bins paid for by the Oak Ridge Schools. Vendors are responsible for removing and disposing of all debris associated with the work to be performed under this contract.

Value Added Relationship: Oak Ridge Schools intend for this bid to result in a relationship with a Vendor. Oak Ridge Schools desire a long-term relationship with a vendor in which common goals are shared. Among those goals are:

- Fair and equitable treatment of vendor and owner.
- Vendor expertise in methods of cost reduction. Vendors are encouraged to suggest ways in which costs can be reduced by substitutions or process modification.

Compliance with all Applicable Regulations: Vendor agrees and covenants that the company, its agents, and employees will comply with all County, State, and Federal laws, rules and regulations applicable to the business to be conducted under this contract. Vendor shall secure all necessary permits for the proper execution and completion of work. The Vendor shall give all notices in compliance with all the laws, ordinances, rules and regulations bearing on the conduct of work. All work shall conform to all applicable federal, state, and local regulations governing the same. Nothing in these plans and specifications is to be construed not to conform to codes and regulations. If the Vendor performs any work knowing it to be contrary to such laws, ordinances, rules and regulations, the Vendor shall bear all costs arising from them.

Safety and Protection: The contractor shall be solely and completely responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the work. The contractor shall take all necessary precautions for the safety of and shall provide the necessary protection to prevent injury to, all employees on the work site and other persons including but not limited to, the general public who may be affected thereby. The contractor shall be responsible for providing and for the placement of barricades, tarps, plastic flag tape, and other safety/traffic control equipment required to protect the public, surrounding areas, equipment and vehicles.

The flow of vehicular traffic shall not be impeded at any time during the project. The safety of the public is of prime concern to Oak Ridge Schools and all costs associated are the responsibility of the contractor. Oak Ridge Schools does not assume any responsibility, at any time, for the protection of or for loss of materials, acceptance of the work by the project manager.

Vendor Responsibilities: At their own expense, the Vendor shall:

- Provide competent supervision.
- Provide competent workers.
- Take precautions necessary to protect persons or property against injury or damage and be responsible for any such damage, or injury that occurs because of their faulty or negligence.
- Perform work without unnecessarily interfering with school activities or other vendor(s).
- The Vendor shall be responsible (daily) to maintain a clean work site, to remove debris, and to dispose of it properly at the Vendor's expense.
- The Vendor shall be responsible for maintaining the work area in such a manner that the public and Oak Ridge Schools Maintenance staff may continue to work in the facility.

Warranty and Guarantee:

1. A written warranty and guarantee is required from the contractor which shall be submitted with the final billing. A detailed statement should include the period of time involved as well as the specific details of the warranty.
2. The submitted warranty will include a detailed roster of maintenance and care instructions. The owner shall follow these instructions for the warranty to remain in force.
3. Contractor shall obtain and pay for all permits, licenses, etc., as required by the city and county where the work is to be performed and by the state of Tennessee and shall give all legal notices and pay all fees required for the work.
4. The successful bidder shall not assign this contract or any part thereof, or any money due or to become due hereunder, without the written approval of Oak Ridge Schools.
5. Oak Ridge Schools may require of the successful bidder sufficient information to establish financial responsibility; that he has adequate facilities and personnel; plus any other information which may be requested by Oak Ridge Schools which it deems necessary to establish the successful bidder's ability to perform this work.
6. Should any defective work be discovered, which, in the opinion of Oak Ridge Schools cannot be accepted, the same shall at once be removed and replaced at the Contractor's expense.

Site Clean-Up and Restoration:

1. The contractor will properly protect all school district property, structures, and equipment throughout the performance of the work.
2. The contractor will conduct daily clean-up of material and equipment, ensuring the work site is kept clean and safe at all times. Proper warning signs and barricades will be used to warn the public to remain clear of operations.
3. The contractor will restore all asphalt, grass, structures, and equipment to its pre-construction condition if damaged during construction operations.

Purchasing Terms:

Oak Ridge Schools will order by the following schedule: Board of Education approval and availability of funds.

Submission Requirements:

1. A detailed bid form, which includes quantity and unit cost must be included in the bid package.
2. Two full copies of the proposal must be submitted, with original Bid Forms included with each copy.
3. The amount listed on the Bid Form should reflect the total implementation costs of this service as submitted.

Contracted Service Insurance:

1. The successful bidder shall file with the Purchasing Department of Oak Ridge Schools, prior to commencing work, an appropriate certificate of insurance, in duplicate, evidencing compliance with the insurance requirements contained in the bid specifications.
2. Additional Insured – the certificate of insurance shall name Oak Ridge Schools as an additional insured under the required policies of liability insurance set forth in the insurance requirements of these specifications.
3. The insurance required hereunder naming Oak Ridge Schools as an additional insured shall be primary insurance to any and all insurance that might be in force for the benefit of Oak Ridge Schools
4. Insurance Requirements – The successful bidder who provides products and service to Oak Ridge Schools will provide the District with satisfactory evidence of the following insurance coverage:
    a. Workers compensation and industrial diseases insurance in the statutory amounts, and employer's liability in the amount of $500,000.
    b. General liability insurance or comprehensive general liability insurance, including contractual liability, product/completed operation, and Contractors broad form liability in an amount equal to $1,000,000 combined single limits of liability.
    c. Automobile liability insurance, including non-owned and hired automobiles, in an amount equal to $1,000,000 combined single limits of liability.

    Such insurance shall be written by insurers acceptable to Oak Ridge Schools. The certificate of insurance shall indicate whether the policy or policies of insurance are written on an claims-made or occurrence basis.

Specifications:

All work shall be as bid documents prepared by:

McCarty Holsaple McCarty, Inc.
550 W. Main Street, Suite 300
Knoxville, TN 37902
865-544-2000
www.mhminc.com

Project Number: MHM_24023

Schedule:

1. **A pre-bid walk through is scheduled for October 3, 2024, at 11:00am EDT at construction location: 15 Wilberforce Avenue, Oak Ridge, TN 37830.**

2. Sealed bids will be opened at the School Administration Building, 304 New York Avenue, Oak Ridge, TN 37830 at **11:00am EDT October 15, 2024.**

Bidding Procedures

Award of Contract: The owner (Oak Ridge Schools) further reserves the right to reject any and all bids, to waive any and all informalities and to negotiate contract terms with the successful bidder, and the right to disregard all non-conforming, non-responsive, or conditional bids. Oak Ridge Schools may conduct such investigations, as it deems necessary, to assist in the evaluation of any bid to establish the responsibility, qualifications, and financial ability of the bidder, proposed sub-contractors and other persons and organizations to perform the work in accordance with the contract documents to the bidder who does not pass any such evaluation to the owner's satisfaction. The contract shall be awarded to the bidder, whose evaluation by the owner indicates to the owner that the award will be in the best interest of Oak Ridge Schools. It is also understood that the "apparent low bidder" will be announced at the bid opening; however, the "successful bidder," who may or may not be the lowest bidder, will not be announced until all issues, which include, but are not limited to quality, service, conformity to specifications, etc. have been resolved and until a period of review has been completed by the owner. Price will be the primary factor when determining the successful bidder assuming all bid specifications are met. Oak Ridge Schools does not enter into contracts that provide for mediation or arbitration. The owner (Oak Ridge Schools) further reserves the right to reject any and all bids, to waive any and all informalities, and to negotiate contract terms with the successful bidder (e.g., product line-item deletions or adjustments), and the right to disregard all non-conforming, non- responsive, or conditional bids.

Bid Document: For certain projects the Owner will supply a bid form to be completed by the bidder. When such forms are issued, only bids returned with the proper forms will be accepted. Envelopes must be sealed and marked as a bid document. Any bid may be withdrawn prior to the date and time as set forth in the "bid invitation."

Completion: Furnish all materials, labor and equipment to complete the work, per Scope of Work.

Conflict of Interest: All bidders must disclose with their bid the name of any officer, director, or agent who is also an employee of the State of Tennessee, or any of its agencies (which includes Oak Ridge Schools). Further, all bidders must disclose the name of any state or Oak Ridge School employee who owns, directly or indirectly, an interest in the bidder's firm or any of its branches. Bidding by Oak Ridge School employees is prohibited.

Contractors, Subcontractors, and employees: If work is to be performed during regular school hours when children are present, the BOE reserves the right to require background checks, dress codes, and certain ethical standards of all employees on school property.

Controlling Documents: Compliance with Oak Ridge Schools' purchase order will be subject to all terms and conditions which comprise Oak Ridge Schools' General and Special Bid Conditions, if any, unless an exception is taken by the bidder to which Oak Ridge Schools has concurred in writing.

Criminal Background Compliance: Bidders shall be required to complete the attached Criminal Background Compliance Affidavit Form in compliance with the provisions of Tennessee Code Annotated 49-5-413.

Danger and Warning Signs: Danger warnings and safety signs where necessary shall be erected and maintained by the Contractor at his expense.

Default of the Contractor: In the event the Contractor defaults in performing this Contract, the Contractor agrees to pay Oak Ridge Schools all reasonable costs incurred in remedying such default, including a reasonable Attorney's fee.
Drug Free Work Place Affidavit: Bidders shall be required to complete the attached Drug Free Workplace Affidavit form in compliance with the provisions of Tennessee Code Annotated 50-9-113.

EDGAR Certification: The EDGAR certifications and provisions are required and applied when Oak Ridge Schools expends federal funds for any contract resulting from this procurement process. Pursuant to 2 C.F.R. § 200.326, all contracts, including small purchases, awarded by the District and the District's subcontractors shall contain the procurement provisions of Appendix II to Part 200, as applicable.

Errors in Bids: When an error is made in extending total prices, the unit bid price will govern. Carelessness in quoting prices or in preparation of bid otherwise, will not relieve the bidder. Erasures or changes to bids must be initialed. Any alteration, erasure, addition to or omission of required information, change of the specifications, or bidding schedule, is made at the risk of the bidder.

Exceptions: If the bidder takes exception to anything in the specifications or terms and conditions, the exception must be listed in the bid. If necessary, you may supplement with an attachment. If no exceptions are taken, mark the bid "No Exceptions are Taken". If no comments or exceptions are furnished, it will be assumed that no exceptions are being taken.

Facsimile transmissions: Electronic transmissions will not be accepted, except when in the course of the bidding process addendums or other notifications of errors on behalf of the owner places an undue hardship upon prospective bidders. Written notification by the owner must precede the acceptance of Facsimile transmissions.

Hold Harmless Agreement: Bidders shall be required to complete the attached Hold Harmless Agreement.

Laws and Regulations: The bidder's attention is directed to the fact that all applicable state laws, municipal ordinances, and the rules and regulations of all authorities having jurisdiction over construction of the project shall apply to the contract throughout, and they will be deemed to be included in the contract the same as though herein written out in full.

Legal Issues: Contracts with Oak Ridge Schools will be subject to the laws of Tennessee. Disputes will be tried in the State of Tennessee and in the Court of Anderson County. Bids will be denied if these provisions are not included in the contract.

Legal Requirements: The successful bidder shall be responsible for compliance with all federal, state, and local laws, ordinances, rules, and regulations that in any manner affect the items covered herein. Lack of knowledge by the bidder will in no way be a cause for relief from responsibility for their bid.

Location: All bids must be submitted to the Oak Ridge Schools Business Department at or before the announced deadline.

Mary Ann Riley,
Purchasing Specialist
ORHS Softball Complex
(RFP 25-002.1)
304 New York Ave.
Oak Ridge, TN 37830

Non-Boycott of Israel Affidavit: Concerning the Non-Boycott of Israel Act (TCA 12-4-1 et seq.), by submission of this bid/quote/proposal, each supplier and each person signing on behalf of any supplier certifies, and in the case of a joint bid/quote/proposal, each party thereto certifies as to its own organization, under penalty of perjury, that to the best of its knowledge and belief that each supplier is not boycotting Israel pursuant to TCA 12-4-1 and will not during the term of any award. Note: Applicable only to contracts of $250,000 or more and to suppliers with 10 or more employees.

Non-Collusion Affidavit: Bidder shall be required to complete the attached Non-Collusion Affidavit

Payments: Invoices that are submitted by the awarded bidder are required to provide accurate and current addresses. Payment terms shall be specified in the bid response, including any discounts for early payment. The Oak Ridge Schools Business Department discourages the practice of picking up checks in person unless there is an emergency situation.

Performance Bond: The awarded bidder will be required to post a performance and payment bond in the amount of 25% of the contract price if it exceeds $100,000 as stated by State of Tennessee Code Annotated 12-4-201.

Personnel Supervision: If shall be understood that the work required under this contract shall be under the supervision of properly qualified representative of the successful bidder. Work required shall be performed in the best and most workmanlike manner by the competent laborers.

Preserve Vegetation: The Contractor shall preserve and protect all existing vegetation such as trees, shrubs, flowers, and grass, on the site, which do not interfere with the services as determined by Oak Ridge Schools. The Contractor will be liable for all unauthorized cutting or damaging of trees and shrubs including damage due to careless operation of equipment or tracking of grass areas by equipment. The Contractor shall be required to replace or restore, at his own expense, all vegetation not protected and preserved as required herein.

Protect Oak Ridge Schools Property: The successful bidder will be held responsible for any damage to Oak Ridge Schools property caused by his work or workers. The property shall be restored to its original condition as required by Oak Ridge Schools.

Public Acts of 2006: In compliance with the requirements of Chapter 878, Public Acts of 2006, the Contractor hereby attests that the Contractor shall not knowingly utilize the services of an illegal immigrant in the performance of this contract and shall not knowingly utilize the services of any subcontractor who will utilize the services of an illegal immigrant in the performance of this contract.

Purchase: No purchase or contract is authorized or valid until the issuance of a Purchase Order from Oak Ridge Schools and the Board of Education approval of project in accordance with Oak Ridge Schools Policy. No employee is authorized to purchase equipment, supplies or services prior to the issuance of such Purchase Order and Board of Education approval**.**

Sub-contracts: The Bidder is specifically advised that any person, firm, or other party to whom it is proposed to award a sub-contract under this contract must be acceptable to the Owner.

Taxes: Oak Ridge Schools is exempt from federal excise taxes and from state sales taxes on purchases of tangible personal property. Copies of the appropriate exemption documentation will be provided upon request. Contractors are responsible for the payment of taxes on tangible personal property which they use in the completion of their contracts, for which sales taxes have not otherwise been paid, irrespective of who holds title to the property or for whom they work is done.

Tennessee Contractors License: In accordance with the Tennessee contractors licensing act of 1994, as amended, (t.c.a. sections 62-6-101, et seq.). For bids **of twenty-five thousand dollars ($25,000) or more**, the person or firm awarded this contract must have a current Tennessee contractor's license. In addition, subcontractors doing work covered by the act must also have a current Tennessee contractor's license. It is essential that the following information appear on the outside lower left corner of the envelope/package containing your bid:

1. **Date and closing time of bid.**
2. **The name, license number, expiration date thereof, and license classification for the bidder/prime contractor.**

For bids less than twenty-five thousand dollars ($25,000), no contractor's license is required, however, the bidders name and address should appear in the upper left corner of the envelope, with the collective number and due date and time of opening shown in the lower left corner of the envelope/package containing your bid. Bid opening shall be public, on the date and at the time specified on the bid form. It is the bidder's responsibility to assure that the written bid is delivered at the proper time and place of the bid opening. Bids which for any reason are not delivered at the proper time and place will be unopened.

Tie Bids: If two or more bidders submit identical bids and is equally qualified; selection shall be made at the discretion of the owner.

Title VI of the Civil Rights Act of 1964: All interested parties, without regard of race, color, or national origin, shall be afforded the opportunity to bid and shall receive equal consideration. Title VI states "No person in the United States shall, on the ground of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program activity receiving Federal financial assistance." Oak Ridge Schools strives to protect individuals' civil rights through active compliance with the requirements of Title VI.

Vendor Indemnify: Oak Ridge Schools will indemnify vendors to the extent Tennessee law allows.

Warranty: The vendor shall provide warranty information on the equipment, components and items bid with the bid submittal.

VENDOR INFORMATION AND PRICING FOR ORHS SOFTBALL COMPLEX
RFP 25-002.1

Vendor Name:	
Vendor Address:	
City:	
State:	
Telephone:	
Fax:	
Contact Person:	
Contact Person's email:	
Authorizing Signature:	
(Sign in blue ink.)	
Do you accept the Terms and Conditions of the bid? Yes ☐ No ☐	
With Exceptions:	
Did you include Criminal History Records Check? Yes ☐ No ☐	
Have you included copies of Licenses? Yes ☐ No ☐	
Total Local Staff Size:	Technicians:
Helpers:	
Number of Years in Business:	
Locally:	

CRIMINAL BACKGROUND COMPLIANCE AFFIDAVIT

STATE OF _____

COUNTY OF _____

The undersigned, principal officer of _____, an Employer contracting with the Oak Ridge School Board of Education to provide services having direct contact with children or access to grounds of an Oak Ridge public school while students are on grounds, hereby states under oath as follows:

1. The undersigned is a principal officer of_____(hereafter referred to as the "Company") and is duly authorized to execute this Affidavit on behalf of the Company.

2. The Company submits this Affidavit pursuant to T.C.A. § 49-5-413 as amended effective September 1, 2007, for entities entering into contracts with a local board of education where the Company's employees will have direct contact with school children or access to the grounds of a school when children are present. It is the duty of the Company to require applicants supply a fingerprint sample and submit to a criminal history records check to be conducted by the Tennessee Bureau of Investigation and the Federal Bureau of Investigation prior to permitting the person to have contact with such children or enter school grounds and to take certain other actions based upon the results of the records check.

3. The Company also affirms that no employee or applicant to be hired by the company appear on the Tennessee Sex Offender Registry or the Dru Sjodin National Sex Offender Public Website.

4. The Company is in compliance with the terms of T.C.A. § 49-5-413.C

Further affiant saith naught.

Principal Officer

STATE OF _____

COUNTY OF _____

Before me personally appeared_____ _____with whom I am personally acquainted (or proved to me on the basis of satisfactory evidence), and who acknowledged that he/she is the_____of _____and is authorized to execute this instrument on behalf of the principal for the purposes therein contained.

Witness my hand and seal at office this_____day of_____, 20_____.

Notary Public

My commission expires: _____

DRUG-FREE WORKPLACE AFFIDAVIT

STATE OF_____ COUNTY OF_____

The undersigned, principal officer of_____, an employer of five (5) or more employees contracting with Oak Ridge School District to provide construction services, hereby states under oath as follows:

1. The undersigned is a principal officer of _____ (hereafter referred to as the "Company") and is duly authorized to execute this Affidavit on behalf of the Company.
2. The Company submits this Affidavit pursuant to T.C.A. § 50-9-113 which requires each employer with no less than five (5) employees receiving pay who contracts with the state or any local government to provide construction services to submit an affidavit stating that such employer has a drug-free workplace program that complies with Title 50, Chapter 9, of the Tennessee Code Annotated.
3. The Company is in compliance with the terms of T.C.A. § 50-9-113.

Further affiant saith naught.

Principal Officer: _____

STATE OF

_____

COUNTY OF

_____

Before me personally appeared_____ _____with whom I am personally acquainted (or proved to me on the basis of satisfactory evidence), and who acknowledged that he/she is the _____of _____ and is authorized to execute this instrument on behalf of the principal for the purposes therein contained.

Witness my hand and seal at office this_____day of _____, 20_____.

Notary Public: _____

My commission expires _____

HOLD HARMLESS AGREEMENT

This Hold Harmless Agreement is between _____

Name of Contractor

(Hereinafter Contractor), and Oak Ridge Schools named in this bid.

Contractor agrees that as a condition precedent to "Contractor" being awarded a contract from Oak Ridge Schools, "Contractor" agrees to indemnify, protect, defend, and hold harmless Oak Ridge Schools, its Board Members, agents, and employees from all judgments, claims, demands for payment, suits or actions of every nature and description brought against Oak Ridge Schools, its Board Members, agents, and employees alleging injuries or damages sustained by any person arising out of or in the course of "Contractor's" providing goods or services to Oak Ridge Schools.

Name of Contractor: _____

By: _____

Title: _____

STATE OF_____

County of _____

_____personally appeared before me, the undersigned, with whom I am personally acquainted and who, upon oath, acknowledged that he/she/it executed the within instrument for the purposes therein contained, and who further acknowledge that he/she/it is authorized to execute this interment on behalf of

_____.

_____

Signature

Witness by hand and Notaries seal at office this_____day of_____, year of_____.

_____

Notary Public

My Commission Expires: _____

IRAN DIVESTMENT ACT REQUIREMENTS

Pursuant to Tennessee Code Annotated § 12-12-106 (as enacted by Chapter 817 of the Public Acts of 2016) the chief procurement officer for the State of Tennessee shall publish a list of persons determined to be engaging in investment activities in Iran. The list is posted on the website of the Tennessee General Services Department's Central Procurement Office*. When competitive bidding is required, Tennessee Code Annotated § 12-12-111 requires every bid or proposal submitted to a local government for goods or services to include the following statement, subscribed or affirmed by the bidder as true under the penalty of perjury:

CERTIFICATION

By submission of this bid, each bidder and each person signing on behalf of any bidder certifies, and in the case of a joint bid each party thereto certifies as to its own organization, under penalty of perjury, that to the best of its knowledge and belief that each bidder is not on the list created pursuant to *T.C.A.* § 12-12-106.

Signature	Date
Printed Name	Title
Name of Firm/Company	

*https://tn.gov/assets/entities/generalservices/cpo/attachments/List_of_persons_pursuant_to_Tenn._Code_An n._12-12-106._Iran_Divestment_Act-July.pdf

NON-COLLUSION AFFIDAVIT

NON-COLLUSION AFFIDAVIT TO BE EXECUTED
BY CONTRACTOR

State of _____

County of _____

_____, being first duly sworn, deposes and says that he or she is of the party making the foregoing bid is not made in the interest of, or on behalf of, any undisclosed person, partnership, company, association, organization, or corporation; that the bid is genuine and not collusive or sham; that the bidder neither possesses a business relationship with any employee of the District which may be involved in the award or administration of the project nor has received or solicited either directly or indirectly any inside information from an employee of the District which would give the bidder an advantage over any other bidder; that the bidder has not directly or indirectly induced or solicited any other bidder to put in a false or sham bid, and has not directly or indirectly colluded, conspired, connived, or agreed with any bidder or anyone else to put in a sham bid, or that anyone shall refrain from bidding; that the bidder has not in any manner, directly or indirectly, sought by agreement, communication, or conference with anyone to fix the bid price of the bidder or any other bidder, or to fix any overhead, profit, or cost element of the bid price, or of that of any other bidder, or to secure any advantage against the public body awarding the contract or any interested in the proposed contract; that all statements contained in the bid are true; and, further, that the bidder has not, directly or indirectly, submitted his or her bid price of any breakdown thereof, or the contents thereof, or divulged information or data relative thereto, or paid, and will not pay, any fee to any corporation, partnership, company, association, organization, bid depository, or to any member or agent thereof to effectuate a collusive or sham bid.

Subscribed and sworn to (or affirmed) before me this_____day

of_____,_____.

_____ _____

Signature of Officer Notary Signature

_____

Typed Name of Officer

_____

Office Notary Seal

WARNING! PROPOSALS WILL NOT BE CONSIDERED UNLESS THIS AFFIDAVIT IS COMPLETED AND EXECUTED, INCLUDING THE AFFIDAVIT OF THE NOTARY AND THE NOTORIAL SEAL.

MHM

24023

OAK RIDGE HIGH SCHOOL SOFTBALL COMPLEX

OAK RIDGE, TENNESSEE

OAK RIDGE SCHOOLS
304 NEW YORK AVENUE
OAK RIDGE, TN 37830

CONSTRUCTION DOCUMENTS
05 AUGUST 2024

PROJECT MANUAL

McCARTY HOLSAPLE McCARTY

DOCUMENT 00 01 01 - PROJECT TITLE PAGE

1.1 PROJECT MANUAL

A. Project:
1. Oak Ridge High School Softball Complex Oak Ridge High School Softball
2. 15 Wilberforce Avenue .
3. Oak Ridge, TN 37830 . (Anderson County).
4. Architect Project No. 24023 .

B. Owner:
1. Oak Ridge Schools (on behalf of the City of Oak Ridge)
2. 304 New York Avenue
3. Oak Ridge, TN 37830
4. Phone: (865) 425-9001
5. Website: www.ortn.edu

C. Architect:
1. McCarty Holsaple McCarty, Inc..
2. 550 W. Main Street, Suite 300 .
3. Knoxville, TN 37902 .
4. Phone: (865) 544-2000 .
5. Website: www.mhminc.com .
6.

D. Consultants:
1. Civil Engineer - Allmon Engineering .
2. Structural Engineer: Haines Structural Group .
3. Plumbing Engineer: Engineering Services Group, Inc .
4. Mechanical Engineer: Engineering Services Group, Inc .
5. Electrical Engineer: Engineering Services Group, Inc .

END OF DOCUMENT 00 01 01

SECTION 00 01 07 – SEALS PAGE

PART 1 - GENERAL

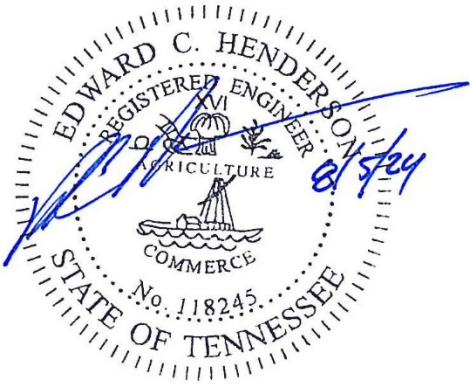
1.1 DESIGN PROFESSIONALS OF RECORD

A. Architect:
1. R. Aaron Miller – McCarty Holsaple McCarty, Inc.
2. License # 102575.
3. Responsible for Divisions 01-49 Sections except where indicated as prepared by other design professionals of record.

B. Civil Engineer:
1. David Allmon – Allmon Engineering.
2. License # 016223.
3. Responsible for Sections 31 11 00, 31 20 00, 31 23 33, 31 25 00, 32 13 13, 32 92 00, 33 10 00, 33 30 00, 33 40 00.

C. Structural Engineer:
1. Casey Brown – Haines Structural Group.
2. License # 120071.
3. Responsible for Specifications on Drawings.

D. Plumbing and Mechanical Engineer:
1. Jeffery Whillock – Engineering Services Group, Inc.
2. License # 104864.
3. Responsible for Divisions 22 and 23.



E. Electrical Engineer:
1. Edward C. Henderson – Engineering Services Group, Inc.
2. License # 118245.
3. Responsible for Divisions 26, 27, and 28.

END OF SECTION

SECTION 00 01 10 – TABLE OF CONTENTS

DIVISION 00 PROCUREMENT AND CONTRACTING REQUIREMENTS

DIVISION 01 GENERAL REQUIREMENTS

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END OF SECTION 00 01 10

DOCUMENT 00 01 15 - LIST OF DRAWING SHEETS

1.1 LIST OF DRAWINGS

A. Drawings: Drawings consist of the Contract Drawings and other drawings listed on the Sheet Index page of the separately bound drawing set titled Oak Ridge High School Softball Complex , dated August 5, 2024 , as modified by subsequent Addenda and Contract modifications.

END OF DOCUMENT 00 01 15

DOCUMENT 00 31 19 - EXISTING CONDITION INFORMATION

1.1 EXISTING CONDITION INFORMATION

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

B. Survey information that includes information on existing conditions, prepared by Professional Land Systems , dated July 11, 2024 , is available for viewing as part of Drawings.

END OF DOCUMENT 00 31 19

SECTION 00 41 13 – BID FORM

PROJECT: Oak Ridge High School Softball Complex

This BID is submitted on behalf of _____
(insert the name of "a corporation" or "a partnership" doing business as)
(hereinafter referred to as "BIDDER"), organized and existing under the laws of the State of Tennessee.

This BID is submitted to Oak Ridge Schools on behalf of the City of Oak Ridge (hereinafter referred to as "OWNER").

In compliance with the Advertisement for Bids and Instructions to Bidders, BIDDER hereby proposes to perform all the WORK for the construction of the above referenced project in strict accordance with the Contract Documents, as amended via Addenda, within the time set forth therein, and at the price(s) stated below which include all sales taxes, other applicable taxes, fees, and the Allowances listed in Section 01 21 00.

By submission of this BID, the BIDDER understands and certifies, and in the case of a joint BID each party thereto understands and certifies as to its own organization, the following:

1. The BIDDER having carefully familiarized themselves with the existing and local conditions at the Project Site under which the WORK is to be performed, and have correlated their observations with the requirements of the Contract Documents (Drawings, Specifications, and Addenda) for the above referenced project, this BID has been arrived at independently, without consultation, communication, or agreement as to any matter relating to this BID with any other BIDDER or with any competitor.
2. The BIDDER has received, read, and understand the Contract Documents and that the BID amounts entered below are based on the Contract Documents as specified and amended via Addenda, and are made in strict accordance therewith;
3. The BID will not be withdrawn within the period of sixty (60) calendar days following the BID receipt date and opening thereof;
4. Upon receipt of the Notice of Award for this BID, the BIDDER shall execute an Agreement for the WORK within ten (10) calendar days after such notification;
5. The right is reserved by the OWNER to reject any or all BIDS, for any or no reason, and to waive any informalities in BIDS received;
6. Upon receipt of the Notice to Proceed for this BID, the BIDDER shall plan for a commencement date as indicated in Section 01 10 00 – Summary and proceed with the WORK in a timely fashion to reach Substantial Completion within the allotted time stipulated in the Contract Documents;
7. The Regulatory Requirement documents are included with this BID;
8. All the Lump-Sum and Quantity Allowances listed in Section 01 21 00 including the Contingency Allowance, if applicable, are included in the BASE BID amount entered below and it is understood that these Allowances cannot be used without prior written approval from the OWNER, and that all unused amounts of these Allowances will be credited back to the OWNER via a Change Order at the end of the project;

The BIDDER hereby agrees to furnish, perform, and commence all the WORK under this Agreement on or before a date to be specified in the Notice to Proceed and to fully complete the PROJECT within the amount of time allotted in the Contract Documents. BIDDER further agrees to pay as liquidated damages the sum(s) per calendar day as stipulated in the Contract Documents.

BASE BID (Including ALL Allowances listed in Section 01 21 00)**:**

_____ Dollars
(in words)

($_____), hereinafter referred to as the **BASE BID**.
(in numbers)

ALTERNATE NO. 01:
If this Alternate, for the Work associated with the Athletic Field Lighting is accepted, the BASE BID will be modified as follows:

ADD / DEDUCT _____ Dollars
(circle one above) (in words)

($_____) to / from the BASE BID, hereinafter referred to as the **ALTERNATE NO. 01**.
(in numbers)

ALTERNATE NO. 02:
If this Alternate, for the Work associated with the Scorer's Booth / Concessions Mechanical Systems is accepted, the BASE BID will be modified as follows:

ADD / DEDUCT _____ Dollars
(circle one above) (in words)

($_____) to / from the BASE BID, hereinafter referred to as the **ALTERNATE NO. 02**.
(in numbers)

ALTERNATE NO. 03:
If this Alternate, for the Work associated with the Batting Cage Artificial Turf is accepted, the BASE BID will be modified as follows:

ADD / DEDUCT _____ Dollars
(circle one above) (in words)

($_____) to / from the BASE BID, hereinafter referred to as the **ALTERNATE NO. 03**.
(in numbers)

ALTERNATE NO. 04:
If this Alternate, for the Work associated with the Softball Field Infield Mix and Warning Track is accepted, the BASE BID will be modified as follows:

ADD / DEDUCT _____ Dollars
(circle one above) (in words)

($_____) to / from the BASE BID, hereinafter referred to as the **ALTERNATE NO. 04**.
(in numbers)

ALTERNATE NO. 05:
If this Alternate, for the Work associated with the Softball Field HGT Bluegrass Sod is accepted, the BASE BID will be modified as follows:

ADD / DEDUCT _____ Dollars
(circle one above) (in words)

($_____) to / from the BASE BID, hereinafter referred to as the **ALTERNATE NO. 05**.
(in numbers)

ALTERNATE NO. 06:
If this Alternate, for the Work associated with the Softball Field Kentucky 31 Fescue Sod is accepted, the BASE BID will be modified as follows:

ADD / DEDUCT _____ Dollars
(circle one above) (in words)

($_____) to / from the BASE BID, hereinafter referred to as the **ALTERNATE NO. 06**.
(in numbers)

ALTERNATE NO. 07:
If this Alternate, for the Work associated with the Softball Dugouts Length Reduction is accepted, the BASE BID will be modified as follows:

ADD / DEDUCT _____ Dollars
(circle one above) (in words)

($_____) to / from the BASE BID, hereinafter referred to as the **ALTERNATE NO. 07**.
(in numbers)

ALTERNATE NO. 08:
If this Alternate, for the Work associated with the Painting is accepted, the BASE BID will be modified as follows:

ADD / DEDUCT _____ Dollars
(circle one above) (in words)

($_____) to / from the BASE BID, hereinafter referred to as the **ALTERNATE NO. 08**.
(in numbers)

UNIT PRICE ALLOWANCES:
The undersigned BIDDER proposes the Unit Price Allowances below which are included in the lump sum BASE BID above and are subject to adjustment based on the proposed Unit Prices listed below. The Unit Price Allowances below shall be added to or deducted from the Contract Sum based on the performance and measurement of the individual items of Work and for adjustment of the quantity given in the Unit Price Allowance for the actual measurement of individual items of the Work. All unused portions of Allowances shall be credited back to the Owner. If a calculation discrepancy is present below, the total dollar amount of the Unit Price Allowance divided by the quantity given below shall determine the actual Unit Price for that item.

UNIT PRICE & ALLOWANCE NO. 01: Removal of unsatisfactory soil and replacement with satisfactory soil material.

Quantity of 100 cubic yards x _____ Dollars ($_____) per cubic yard
(unit price in words) (unit price in numbers)

equals an Allowance of _____ Dollars ($_____)
(total allowance in words) (total allowance in numbers)

UNIT PRICE & ALLOWANCE NO. 02: Mass rock excavation and replacement with satisfactory soil material.

Quantity of 100 cubic yards x _____ Dollars ($_____) per cubic yard
(unit price in words) (unit price in numbers)

equals an Allowance of _____ Dollars ($_____)
(total allowance in words) (total allowance in numbers)

UNIT PRICE & ALLOWANCE NO. 03: Trench rock excavation and replacement with satisfactory soil material.

Quantity of 25 cubic yards x _____ Dollars ($_____) per cubic yard
(unit price in words) (unit price in numbers)

equals an Allowance of _____ Dollars ($_____)
(total allowance in words) (total allowance in numbers)

UNIT PRICE & ALLOWANCE NO. 04: Trench rock excavation and replacement with stone material.

Quantity of 25 cubic yards x _____ Dollars ($_____) per cubic yard
(unit price in words) (unit price in numbers)

equals an Allowance of _____ Dollars ($_____)
(total allowance in words) (total allowance in numbers)

UNIT PRICE & ALLOWANCE NO. 05: Brick Veneer.

Unit Price of $600 per thousand x quantity of _____ Brick (_____)
(quantity in words) (quantity in numbers)

equals an Allowance of _____ Dollars ($_____)
(total allowance in words) (total allowance in numbers)

THIS BID IS SUBMITTED BY:

BIDDER: _____
(insert the name of "a corporation" or "a partnership" doing business as)

Authorized Signature: _____ Date: _____

Name: _____ Title: _____

Address: _____
(street & mailing address) (city, state, zip code)

Telephone #: _____ Cell #: _____ Email: _____

Federal Employer Identification Number (EIN): _____

License Number: _____

RECEIPT OF DOCUMENTS:

BIDDER: _____
(insert the name of "a corporation" or "a partnership" doing business as)

Authorized Signature: _____ Date: _____

Name: _____ Title: _____

State of Incorporation: _____

Note: If this BID is submitted by a corporation, this BID shall have the signature of the Officer(s) required by its governing document.

ADDENDA RECEIPT FORM:

PROJECT: Oak Ridge High School Softball Complex

By submission of this Form, the undersigned BIDDER acknowledges that they have received, reviewed, read, and understand each of the Addenda listed below for the above referenced project and further understands that failure to acknowledge the receipt of all Addenda within the list below may result in rejection of their BID.

Number:	Description:	Date Received:
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

BIDDER: _____
(insert the name of “a corporation” or “a partnership” doing business as)

Authorized Signature: _____ Date: _____

Name: _____ Title: _____

END OF SECTION

SECTION 00 41 14 – BID ENVELOPE

PART 1 - GENERAL

1.1 PREPARATION

A. The Bid Envelope mentioned in the Instructions to Bidders and Advertisement for Bids, shall be furnished by the Contractor. The Bid Envelope shall be of sufficient size (9” x 12” or larger) to accommodate all required documents without bending or folding thereof. The Bid Envelope shall be completed as required per the Instruction to Bidders and the Advertisement for Bids with the Bid Envelope Cover, provided in the Project Manual, securely affixed to the outside face of the Bid Envelope.

B. Assemble the following required documents and place two (2) copies of each in the Bid Envelope in the following order:
   1. Bid Form (refer to Section 00 43 13)
   2. Addenda Receipt Form (refer to Section 00 43 13)
   3. Vendor Information Worksheet (refer to Owner’s RFP)
   4. Criminal Background Compliance Affidavit (refer to Owner’s RFP)
   5. Drug-Free Workplace Affidavit (refer to Owner’s RFP)
   6. Hold Harmless Agreement (refer to Owner’s RFP)
   7. Iran Divestment Act Requirements (refer to Owner’s RFP)
   8. Non-Collusion Affidavit (refer to Owner’s RFP)
   9. Form W-9 – Request for Taxpayer Identification Number and Certification

C. Do not include any letters, statements or qualifications relating to the Base Bid or Alternate amount(s) in the Bid Envelope. Any such letters, statements, or qualifications shall be the basis for rejection of the Bid.

END OF SECTION 00 41 14

SEALED BID

BID ENVELOPE COVER SHEET

OAK RIDGE HIGH SCHOOL SOFTBALL COMPLEX

15 WILBERFORCE AVENUE | OAK RIDGE, TN 37830

This Bid Envelope Cover Sheet shall be firmly affixed to the outside of the Bidder's sealed opaque Bid Envelope, which shall be submitted by the Bidder as set forth in the Instructions to Bidders.

BIDDER _____

(accurately list Bidder's name as licensed)

ADDRESS _____

_____

TN LICENSE NUMBER _____

CLASSIFICATION(S) _____

(accurately list all classifications under which Bidder is licensed)

MONETARY LIMITATION _____ **EXPIRATION DATE** _____

SUBCONTRACTORS' INFORMATION

- If **any** work, regardless of dollar value, is required for any of the below Subcontractor categories, accurately list the name, as licensed, of the Subcontractor that will perform that Work. If the Bidder intends to self-perform the Work in any of the below categories with Bidder's own forces, fill in the Bidder's name, as licensed.
- If **no** Work is required in a Subcontractor category, write "None Required". A blank category below will be considered as incomplete and subject to envelope not being opened.
- If the monetary amount of a Subcontractor's Work is such that no license is required, "N/A" may be written in the license number column, but still write the Subcontractor's name in the space provided. A blank category below will be considered as incomplete and subject to envelope not being opened.
- All Subcontractor spaces below must be accurately filled in or the envelope may not be opened.
- Accurately list BOTH the Subcontractor's license classification(s) AND the monetary limits of its license.

PLUMBING _____

TN License Number _____

Classification _____

Monetary Limitation _____ Expiration Date _____

HVAC _____

TN License Number _____

Classification _____

Monetary Limitation _____ Expiration Date _____

ELECTRICAL _____

TN License Number _____

Classification _____

Monetary Limitation _____ Expiration Date _____

GEOTHERMAL _____

TN/TDEC License Number _____

TN/TDEC Classification _____ Expiration Date _____

MASONRY _____

TN License Number _____ Classification _____

Monetary Limitation _____ Expiration Date _____

Any blank spaces, incomplete or incorrect information above may cause the enclosed Bid to be returned to the Bidder unopened.

MHM

McCARTY HOLSAPLE McCARTY

ARCHITECTS & INTERIOR DESIGNERS

_____

(signature approving this Bid Envelope for public opening)

SECTION 01 10 00 - SUMMARY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
1. Project information.
2. Work covered by Contract Documents.
3. Work performed by Owner.
4. Owner-furnished/Contractor-installed (OFCI) products.
5. Owner-furnished/Owner-installed (OFOI) products.
6. Contractor's use of site and premises.
7. Coordination with occupants.
8. Work restrictions.
9. Specification and Drawing conventions.

B. Related Requirements:
1. Section 01 50 00 "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.
2. Section 01 73 00 "Execution" for coordination of Owner-installed products.

1.3 DEFINITIONS

A. Work Package: A group of specifications, drawings, and schedules prepared by the design team to describe a portion of the Project Work for pricing, permitting, and construction.

1.4 PROJECT INFORMATION

A. Project Identification: 24023.
1. Project Location: 15 Wilberforce Avenue, Oak Ridge, Tennessee, 37830, United States.

B. Owner: Oak Ridge Schools, 304 New York Avenue, Oak Ridge, Tennessee, 37830, United States.
1. On behalf of the City of Oak Ridge.

C. Architect: McCarty Holsaple McCarty, Inc., 550 W. Main Street, Suite 300, Knoxville, Tennessee, 37902.
1. Architect's Representative: McCarty Holsaple McCarty, Inc..

D. Architect's Consultants: Architect has retained the following design professionals, who have prepared designated portions of the Contract Documents:
1. Civil Engineering: Allmon Engineering
2. Structural Engineering: Haines Structural Group
3. Plumbing Engineering: Engineering Services Group, Inc.
4. Mechanical Engineering: Engineering Services Group, Inc.
5. Electrical Engineering: Engineering Services Group, Inc.

E. Web-Based Project Software: Project software will be used for purposes of managing communication and documents during the construction stage.
1. See Section 01 31 00 "Project Management and Coordination." for requirements for using web-based Project software.

1.5 WORK COVERED BY CONTRACT DOCUMENTS

A. The Work of Project is defined by the Contract Documents and includes, but is not limited to, the following:
   1. Construction of a new softball field with associated field and perimeter fencing, athletic equipment, athletic field lighting, site utilities, stormwater improvements, concrete sidewalks, and ancillary structures including two masonry dugouts, masonry backstop walls with netting system, two masonry and wood framed scorer's booths / concession stands, and other Work indicated in the Contract Documents.

B. Type of Contract:
   1. Project will be constructed under a single prime contract.

1.6 CONSTRUCTION SCHEDULE

A. Construction of the Work in scheduled to be performed in a single phase, with the Work being substantially complete as indicated below.
   1. Commencement of Construction:
      a. Notice to Proceed: Work shall commence within seven (7) days after the Notice to Proceed.
      b. Start Date: Work is estimated to commence by Monday, November 4, 2024 .
   2. Substantial Completion No. 01: All finish grading to proposed subgrade elevation for softball infield, softball outfield, softball tarp storage area, and two softball bullpen areas shall be completed and ready to receive infield mix, warning track material, and sod. This includes complete installation of softball infield underground storm water piping system (French drain and perforated pipe). This includes concrete sidewalks and masonry backstop wall adjacent to areas to receive infield mix.
      a. By Friday, January 10, 2025.
   3. Substantial Completion No. 02: Installation of all sod within softball outfield and tarp storage area, infield mix, and warning track material.
      a. By Friday, January 31, 2025.
   4. Substantial Completion No. 03: All remaining scope of Work.
      a. By Friday, February 28, 2025 .

B. Before commencing Work, submit an updated copy of Contractor's construction schedule, showing the sequence, commencement and completion dates for all the Work.

1.7 WORK PERFORMED BY OWNER

A. Cooperate fully with Owner, so work may be carried out smoothly, without interfering with or delaying Work under this Contract or work by Owner. Coordinate the Work of this Contract with work performed by Owner.

B. Preceding Work: Owner will perform the following construction operations at Project site. Those operations are scheduled to be substantially complete before Work under this Contract begins.
   1. Demolition of the existing baseball pressbox / storage building, the two existing softball field dugouts, and existing softball field scorer's booth, including disposal of demolition waste . Contractor shall be responsible for demolition and disposal of below grade concrete foundations.
   2. Removal of existing marble monument behind the softball field backstop.

C. Concurrent Work: Owner will perform the following construction operations at Project site. Those operations will be conducted simultaneously with Work under this Contract.
   1. Softball Field Irrigation System: Modifications to existing irrigation system for new softball field and addition of water hydrant installed behind pitcher's plate.
   2. Athletic Field Lighting - If Alternate is not accepted, installation of Owner-furnished athletic field light poles and light fixtures, including demolition of existing wooden light poles and fixtures. Contractor shall be responsible for providing electrical power to each light pole location and

making final electrical connections at each light pole location which shall be included in the Base Bid of Contract Sum .

3. Softball Field Infield Mix and Warning Track - If Alternate is not accepted, installation of Owner-furnished infield mix and warning track material for softball infield, outfield, and both bullpen areas.
4. Softball Field Sod - If Alternate is not accepted, installation of Owner-furnished sod for softball outfield and tarp storage area.
5. Painting - If Alternate is not accepted, application of Owner-furnished painting of all exterior and interior surfaces scheduled to receive a paint finish.

D. Subsequent Work: Owner will perform the following additional work at site after Substantial Completion. Completion of that work will depend on successful completion of preparatory Work under this Contract.
1. Softball Aluminum Bleachers - Installation of Owner-furnished aluminum bleacher systems for new softball field on concrete matte slab foundation installed by Contractor.
2. IT / AV Low Voltage Systems - Installation of low voltage wiring, equipment, and systems including IT network and audio equipment within each scorer's booth / concessions areas .
3. Fire Extinguishers - Installation of Owner-furnished fire extinguishers for the two concessions areas.
4. Scorer's Booth Countertops - Installation of Owner-furnished countertops in the two scorer's booth areas.

1.8 OWNER-FURNISHED/CONTRACTOR-INSTALLED (OFCI) PRODUCTS

A. Owner's Responsibilities: Owner will furnish products indicated and perform the following, as applicable:
1. Provide to Contractor Owner-reviewed Product Data, Shop Drawings, and Samples.
2. Provide for delivery of Owner-furnished products to Project site.
3. Upon delivery, inspect, with Contractor present, delivered items.
   a. If Owner-furnished products are damaged, defective, or missing, arrange for replacement.
4. Obtain manufacturer's inspections, service, and warranties.
5. Inform Contractor of earliest available delivery date for Owner-furnished products.

B. Contractor's Responsibilities: The Work includes the following, as applicable:
1. Designate delivery dates of Owner-furnished products in Contractor's construction schedule, utilizing Owner-furnished earliest available delivery dates.
2. Review Owner-reviewed Product Data, Shop Drawings, and Samples, noting discrepancies and other issues in providing for Owner-furnished products in the Work.
3. Receive, unload, handle, store, protect, and install Owner-furnished products.
4. Make building services connections for Owner-furnished products.
5. Protect Owner-furnished products from damage during storage, handling, and installation and prior to Substantial Completion.
6. Repair or replace Owner-furnished products damaged following receipt.

C. Owner-Furnished/Contractor-Installed (OFCI) Products:
1. Softball Scoreboard - Installation of Owner-furnished scoreboard on Contractor provided steel posts and concrete foundations. Contractor will be responsible for providing electrical power and making final electrical connections .

1.9 OWNER-FURNISHED/OWNER-INSTALLED (OFOI) PRODUCTS

A. The Owner will furnish and install products indicated.

B. Owner-Furnished/Owner-Installed (OFOI) Products:
1. Softball Aluminum Bleachers - Installation of new aluminum bleacher system on Contractor provided concrete matte foundations .

1.10 CONTRACTOR'S USE OF SITE AND PREMISES

A. Restricted Use of Site: Contractor shall have limited use of Project site for construction operations as indicated on Drawings by the Contract limits and as indicated by requirements of this Section.

B. Limits on Use of Site: Limit use of Project site to Work in areas indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.
   1. Driveways, Walkways and Entrances: Keep driveways and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or for storage of materials.
      a. Schedule deliveries to minimize use of driveways and entrances by construction operations.
      b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

C. Condition of Existing Grounds: Maintain portions of existing grounds, landscaping, and hardscaping affected by construction operations throughout construction period. Repair damage caused by construction operations.

1.11 COORDINATION WITH OCCUPANTS

A. Partial Owner Occupancy: Owner will occupy the premises during entire construction period, with the exception of areas under construction. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's operations. Maintain existing exits unless otherwise indicated.
   1. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from Owner and authorities having jurisdiction.
   2. Provide not less than 72 hours' notice to Owner of activities that will affect Owner's operations.

1.12 WORK RESTRICTIONS

A. Comply with restrictions on construction operations.
   1. Comply with limitations on use of public streets, work on public streets, rights of way, and other requirements of authorities having jurisdiction.

B. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging for temporary utility services according to requirements indicated:
   1. Notify Owner not less than two days in advance of proposed utility interruptions.
   2. Obtain Owner's written permission before proceeding with utility interruptions.

C. Smoking and Controlled Substance Restrictions: Use of tobacco products , alcoholic beverages, and other controlled substances on Project site is not permitted.

1.13 SPECIFICATION AND DRAWING CONVENTIONS

A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
   1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
   2. Text Color: Text used in the Specifications, including units of measure, manufacturer and product names, and other text may appear in multiple colors or underlined as part of a hyperlink; no emphasis is implied by text with these characteristics.

3. Hypertext: Text used in the Specifications may contain hyperlinks. Hyperlinks may allow for access to linked information that is not residing in the Specifications. Unless otherwise indicated, linked information is not part of the Contract Documents.
4. Specification requirements are to be performed by Contractor unless specifically stated otherwise.

B. Division 00 Contracting Requirements: General provisions of the Contract, including General and Supplementary Conditions, apply to all Sections of the Specifications.

C. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.

D. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:
1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
2. Abbreviations: Materials and products are identified by abbreviations scheduled on Drawings and published as part of the U.S. National CAD Standard.
3. Keynoting: Materials and products are identified by reference keynotes referencing Specification Section numbers found in this Project Manual.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 10 00

SECTION 01 21 00 - ALLOWANCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements governing allowances.
   1. Certain items are specified in the Contract Documents by allowances. Allowances have been established in lieu of additional requirements and to defer selection of actual materials and equipment to a later date when direction will be provided to the Contractor. If necessary, additional requirements will be issued by Change Order.
   2. Use of any allowance shall only be as directed by the Owner and Architect for the Owner's purposes and after a Change Order has been processed and approved by the Owner and Architect that indicate specific amounts to be charged towards each of the applicable allowances. At Project closeout, all unused amounts remaining in all allowances shall be credited back to the Owner by Change Order.

B. Types of allowances include the following:
   1. Unit-cost allowances.
   2. Quantity allowances.

C. Related Requirements:
   1. Section 01 22 00 "Unit Prices" for procedures for using unit prices, including adjustment of quantity allowances when applicable.
   2. Section 01 26 00 "Contract Modification Procedures" for procedures for submitting and handling Change Orders.
   3. Section 01 40 00 "Quality Requirements" for procedures governing the use of allowances for field testing by an independent testing agency.

1.3 DEFINITIONS

A. Allowance: A quantity of work or dollar amount included in the Contract, established in lieu of additional requirements, used to defer selection of actual materials and equipment to a later date when direction will be provided to Contractor. If necessary, additional requirements will be issued by Change Order.

1.4 SELECTION AND PURCHASE

A. At the earliest practical date after award of the Contract, advise Architect of the date when final selection, or purchase and delivery, of each product or system described by an allowance must be completed by the Owner to avoid delaying the Work.

B. At Architect's request, obtain proposals for each allowance for use in making final selections. Include recommendations that are relevant to performing the Work.

C. Purchase products and systems selected by Architect from the designated supplier.

1.5 ACTION SUBMITTALS

A. Submit proposals for purchase of products or systems included in allowances in the form specified for Change Orders.

1.6 INFORMATIONAL SUBMITTALS

A. Submit invoices or delivery slips to show actual quantities of materials delivered to the site for use in fulfillment of each allowance.

B. Submit time sheets and other documentation to show labor time and cost for installation of allowance items that include installation as part of the allowance.

C. Coordinate and process submittals for allowance items in same manner as for other portions of the Work.

1.7 UNIT-COST ALLOWANCES

A. Allowance shall include cost to Contractor of specific products and materials ordered by Owner or selected by Architect under allowance and shall include taxes, freight , and delivery to Project site.

B. Unless otherwise indicated, Contractor's costs for receiving and handling at Project site, labor, installation, overhead and profit, and similar costs related to products and materials ordered by Owner or selected by Architect under allowance shall be included as part of the Contract Sum and not part of the allowance.

C. Unused Materials: Return unused materials purchased under an allowance to manufacturer or supplier for credit to Owner, after installation has been completed and accepted.
   1. If requested by Architect, retain and prepare unused material for storage by Owner. Deliver unused material to Owner's storage space as directed.

D. All unit-cost allowances shall be included in the Contractor's Base Bid on the Bid Form.

1.8 QUANTITY ALLOWANCES

A. Allowance shall include cost to Contractor of specific products and materials ordered by Owner or selected by Architect under allowance and shall include taxes, freight , and delivery to Project site.

B. Unless otherwise indicated, Contractor's costs for receiving and handling at Project site, labor, installation, overhead and profit, and similar costs related to products and materials ordered by Owner or selected by Architect under allowance shall be included as part of the Contract Sum and not part of the allowance.

C. Unused Materials: Return unused materials purchased under an allowance to manufacturer or supplier for credit to Owner, after installation has been completed and accepted.
   1. If requested by Architect, retain and prepare unused material for storage by Owner. Deliver unused material to Owner's storage space as directed.

D. All quantity allowances shall be included in the Contractor's Base Bid on the Bid Form.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine products covered by an allowance promptly on delivery for damage or defects. Return damaged or defective products to manufacturer for replacement.

3.2 PREPARATION

A. Coordinate materials and their installation for each allowance with related materials and installations to ensure that each allowance item is completely integrated and interfaced with related work.

3.3 SCHEDULE OF ALLOWANCES

A. Allowance No. 01: Quantity Allowance: Include one hundred (100) cubic yards of unsatisfactory soil excavation and disposal off-site and replacement with satisfactory soil material from off-site.
   1. Coordinate quantity allowance adjustment with unit price requirements in Section 01 22 00 "Unit Prices."

B. Allowance No. 02: Quantity Allowance: Include one hundred (100) cubic yards of mass rock removal and replacement with satisfactory soil material from off-site.
   1. Coordinate quantity allowance adjustment with unit price requirements in Section 01 22 00 "Unit Prices."

C. Allowance No. 03: Quantity Allowance: Include twenty-five (25) cubic yards of trench rock removal and replacement with satisfactory soil material from off-site.
   1. Coordinate quantity allowance adjustment with unit price requirements in Section 01 22 00 "Unit Prices."

D. Allowance No. 04: Quantity Allowance: Include twenty-five (25) cubic yards of trench rock removal and replacement with stone material.
   1. Coordinate quantity allowance adjustment with unit price requirements in Section 01 22 00 "Unit Prices."

E. Allowance No. 05: Unit-Cost Allowance: Include the sum of $600.00 per thousand for brick veneer, as specified in Section 04 26 13 "Masonry Veneer" and as shown on Drawings.
   1. Coordinate unit-cost allowance adjustment with unit price requirements in Section 01 22 00 "Unit Prices."

END OF SECTION 01 21 00

SECTION 01 22 00 - UNIT PRICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for unit prices.

B. Related Requirements:
1. Section 01 21 00 "Allowances" for procedures for using unit prices to adjust quantity allowances.
2. Section 01 26 00 "Contract Modification Procedures" for procedures for submitting and handling Change Orders.
3. Section 01 40 00 "Quality Requirements" for field testing by an independent testing agency.
4. Section 01 45 29 "Testing Laboratory Services" for testing and inspecting requirements.
5. Section 31 20 00 "Earth Moving" for the definition and requirements associated with suitable soils, subgrade, and earth moving.

1.3 DEFINITIONS

A. Unit price is an amount incorporated into the Agreement, applicable during the duration of the Work as a price per unit of measurement for materials, equipment, and/or services, or a portion of the Work, added to or deducted from the Contract Sum by appropriate modification, if the scope of Work or estimated quantities of Work required by the Contract Documents are increased or decreased. Unit prices shall apply only in the event of additional Work performed pursuant to a Change Order.

1.4 PROCEDURES

A. Unit prices are considered complete and full compensation and shall include all necessary material, required labor, products, tools, equipment, plant, transportation, fuel, cost for delivery, services and incidentals, excavation, erection, application, proper and legal disposal, installation, insurance, applicable taxes, overhead, profit, and any other costs or expenses in connection with, or incidental to, the performance of the Work to which such unit prices apply.

B. Measurement:
1. Contractor shall take all measurement and compute quantities. Measurements and quantities shall be verified by the Owner's Testing and Inspecting agency before and after the Work is complete, and prior to payment.
2. Contractor shall assist by providing necessary equipment, labor, and survey personnel as required by the Owner's Testing and Inspecting agency.
3. Perform surveys required to determine quantities, including control surveys to establish measurement reference lines. Notify Architect prior to starting Work.

C. Payment of Work governed by unit prices shall be made on the basis of the actual measurements and quantities of Work which is incorporated in or made necessary by the Work and verified by the Owner's Testing and Inspecting agency, multiplied by the unit price.

D. Payment shall not be made for any of the following:
1. Products wasted or disposed of in a manner that is not acceptable.
2. Products determined as unacceptable before or after placement.
3. Products placed beyond the lines and levels of the required Work.
4. Loading, hauling, removal, and disposal of rejected products.

E. Owner reserves the right to reject Contractor's measurement of work-in-place that involves use of established unit prices and to have this work measured, at Owner's expense, by an independent surveyor acceptable to Contractor.

F. List of Unit Prices: A schedule of unit prices is included in Part 3. Specification Sections referenced in the Part 3 "Schedule of Unit Prices" Article contain requirements for materials described under each unit price.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF UNIT PRICES

A. Unit Price No. 01: Removal of unsatisfactory soil and replacement with satisfactory soil material.
   1. Description: Removal of unsatisfactory soil excavation below subgrade and disposal off-site and replacement with satisfactory soil material as defined in the specifications from off-site, as required, in accordance with Section 31 20 00 "Earth Moving."
   2. Include the following in Unit Price:
      a. Excavation, loading, equipment, fuel, transport, and legal disposal of unsuitable soil material off-site.
      b. Excavation, loading, equipment, fuel, transport, placement, and compaction of satisfactory soil material from off-site source.
      c. Overhead and profit.
   3. Unit of Measurement: Cubic yard of soil excavated, based on in-place surveys of volume before and after removal.
   4. Method of Measurement: Quantities shall be verified by the Owner's Testing and Inspecting agency.
   5. Quantity Allowance: Coordinate unit price with allowance adjustment requirements in Section 01 21 00 "Allowances."

B. Unit Price No. 02: Mass rock excavation and replacement with satisfactory soil material.
   1. Description: Mass rock excavation below subgrade and disposal off-site and replacement with satisfactory soil material as defined in the specifications from off-site, as required, in accordance with Section 31 20 00 "Earth Moving."
   2. Include the following in Unit Price:
      a. Excavation, loading, equipment, fuel, transport, and legal disposal of rock material off-site.
      b. Excavation, loading, equipment, fuel, transport, placement, and compaction of satisfactory soil material from off-site source.
      c. Overhead and profit.
   3. Unit of Measurement: Cubic yard of rock excavated, based on in-place surveys of volume before and after removal.
   4. Method of Measurement: Quantities shall be verified by the Owner's Testing and Inspecting agency.
   5. Quantity Allowance: Coordinate unit price with allowance adjustment requirements in Section 01 21 00 "Allowances."

C. Unit Price No. 03: Trench rock excavation and replacement with satisfactory soil material.
   1. Description: Trench rock excavation below subgrade and disposal off-site and replacement with satisfactory soil material as defined in the specifications from off-site, as required, in accordance with Section 31 20 00 "Earth Moving."
   2. Include the following in Unit Price:
      a. Excavation, loading, equipment, fuel, transport, and legal disposal of rock material off-site.
      b. Excavation, loading, equipment, fuel, transport, placement, and compaction of satisfactory soil material from off-site source.
      c. Overhead and profit.
   3. Unit of Measurement: Cubic yard of rock excavated, based on survey of in-place surveys volume of before and after removal.

4. Method of Measurement: Quantities shall be verified by the Owner's Testing and Inspecting agency.
5. Quantity Allowance: Coordinate unit price with allowance adjustment requirements in Section 01 21 00 "Allowances."

D. Unit Price No. 04: Trench rock excavation and replacement with stone material.
1. Description: Trench rock excavation below subgrade and disposal off-site and replacement with a dense graded aggregate (Type A, Class, A, and Grading D in accordance with Section 903.05 of the Tennessee Department of Transportation specifications).
2. Include the following in Unit Price:
   a. Excavation, loading, equipment, fuel, transport, and legal disposal of rock material off-site.
   b. All costs associated with delivery of stone material from off-site source.
   c. Loading, transport, placement, and compaction of stone material.
   d. Overhead and profit.
3. Unit of Measurement: Cubic yard of rock excavated, based on survey of in-place surveys volume of before and after removal.
4. Method of Measurement: Quantities shall be verified by the Owner's Testing and Inspecting agency.
5. Quantity Allowance: Coordinate unit price with allowance adjustment requirements in Section 01 21 00 "Allowances."

E. Unit Price No. 05: Brick veneer material.
1. Description: Refer to Section 04 26 31 "Masonry Veneer".
2. Unit Price is provided in Section 01 20 00 "Allowances" and shall include the brick veneer material.
   a. All other costs for other related and requirement masonry materials, including but not limited to, mortar, masonry accessories, veneer ties, flashing, weeps, etc.), receiving and handling at Project site, equipment, labor, installation, setup, cleaning, overhead and profit, etc. shall be included in the Contractor's Base Bid.
3. Unit of Measurement: Per thousand of brick veneer units.
4. Method of Measurement: Contractor shall take-off material quantities from Contract Documents and include 5% additional brick veneer for Owner's attic stock.
5. Unit-Cost Allowance: Coordinate unit price with allowance adjustment requirements in Section 01 21 00 "Allowances."

END OF SECTION 01 22 00

SECTION 01 23 00 - ALTERNATES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for alternates.

1.3 DEFINITIONS

A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the bidding requirements that may be added to or deducted from the base bid amount if the Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.
   1. Alternates described in this Section are part of the Work only if enumerated in the Agreement.
   2. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternates into the Work. No other adjustments are made to the Contract Sum.

1.4 PROCEDURES

A. Coordination: Revise or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.
   1. Include, as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation, whether or not indicated as part of alternate.

B. Execute accepted alternates under the same conditions as other Work of the Contract.

C. Schedule: A Part 3 "Schedule of Alternates" Article is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF ALTERNATES

A. Alternate No. 01: Athletic Field Lighting.
   1. Base Bid: Contractor to provide and install all electrical and controls connections associated with the Owner-furnished and Owner-installed athletic field lighting and poles. Owner to remove existing athletic lighting and wood poles.
   2. Alternate: Contractor to provide and install athletic field lighting and poles, including all scope described in the Base Bid for this Alternate. Owner to remove existing athletic lighting and wood poles.

B. Alternate No. 02: Scorer's Booth / Concessions Mechanical Systems.
   1. Base Bid: Owner to furnish and install all the mechanical systems included in the scope of Work for this Project. Contractor to provide all electrical, controls connections, and rough-in including pipe sleeves in masonry walls for exterior units. Contractor to install all concrete pads for exterior mechanical units.

2. Alternate: Contractor to provide and install all the mechanical systems included in the scope of Work for this Project, including all scope described in the Base Bid for this Alternate.

C. Alternate No. 03: Batting Cage Artificial Turf.
   1. Base Bid: Contractor to install topsoil without grass within the 15'x70' area of the softball batting cage. Owner to furnish and install softball batting cage and ground surface material.
   2. Alternate: Contractor to install perimeter concrete curb with composite nailer, perimeter perforated drain pipe, stone base, and complete artificial turf system within the 15'x70' area of the softball batting cage. Owner to furnish and install softball batting cage.

D. Alternate No. 04: Softball Field Infield Mix and Warning Track.
   1. Base Bid: Owner will furnish and install infield mix and warning track material for softball infield, outfield, and both bullpen areas as indicated on the Drawings. Contractor shall provide, install, and fine grade these areas to subgrade elevation to accommodate the depth of infield mix and warning track material as specified. Contractor shall provide and install infield storm water piping system (French drain and perforated pipe), including filter fabric, stone backfill, and fine washed pea gravel as indicated on the Civil Drawings.
   2. Alternate: Contractor to add to the Base Bid scope providing and installing infield mix and warning track material as specified and indicated on the Drawings.

E. Alternate No. 05: Softball Field HGT Bluegrass Sod.
   1. Base Bid: Owner will furnish and install HGT Bluegrass sod in softball outfield and tarp storage area as indicated on the Civil Drawings. Contractor to provide, install, and fine grade topsoil to subgrade elevation in these areas to accommodate the body depth of sod. Contractor shall also coordinate the installation of the Owner furnished and installed irrigation system with finish grading.
   2. Alternate: Contractor to add to the Base Bid scope providing and installing HGT Bluegrass sod in the softball outfield and tarp storage area as indicated on the Civil Drawings.

F. Alternate No. 06: Softball Field Kentucky 31 Fescue Sod.
   1. Base Bid: Owner will furnish and install Kentucky 31 Fescue sod in softball outfield and tarp storage area as indicated on the Civil Drawings. Contractor to provide, install, and fine grade topsoil to subgrade elevation in these areas to accommodate the body depth of sod. Contractor shall also coordinate the installation of the Owner furnished and installed irrigation system with finish grading.
   2. Alternate: Contractor to add to the Base Bid scope providing and installing Kentucky 31 Fescue sod in the softball outfield and tarp storage area as indicated on the Civil Drawings.

G. Alternate No. 07: Softball Dugouts Length Reduction.
   1. Base Bid: Both softball dugouts will remain the length as currently indicated on the Drawings.
   2. Alternate: Reduce the length of both softball dugouts by 10'-0" which will remove one column and its foundation in each dugout. The bullpen areas adjacent to each dugout, including their concrete sidewalks, fencing, infield mix, pitchers plates, and home plates will shift 10'-0" towards the dugout to retain their current relationship with the exterior end wall of the dugout. The tarp storage area on the 1st base side will grow by 10'-0" and the double leaf access gate will remain centered on this tarp storage area.

H. Alternate No. 08: Painting.
   1. Base Bid: Owner will furnish and apply all exterior and interior painting as specified. Contractor shall clean and remove all dust and debris from all surfaces scheduled to receive a paint finish.
   2. Alternate: Contractor will furnish and apply all exterior and interior painting as specified. Contractor shall clean and remove all dust and debris from all surfaces scheduled to receive a paint finish.

END OF SECTION 01 23 00

SECTION 01 25 00 - SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for substitutions.

B. Related Requirements:
1. Section 01 23 00 "Alternates" for products selected under an alternate.
2. Section 01 60 00 "Product Requirements" for requirements for submitting comparable product submittals for products by listed manufacturers.

C. Substitution Requests are not permitted to be submitted prior to or during Bidding.

D. By way of submitting a Bid, each Bidder represents that their Bid is based upon the materials and equipment as specified and documented within the Bidding and Contract Documents.
1. The Contractor shall not substitute materials, equipment, or methods unless such substitution has been specifically approved in writing for the Work by the Architect. Bidders submitting bids in reliance upon substitution when the substitution has not been approved do so at their own risk.

E. Substitutions may be submitted to the Architect after Bidding under the conditions as set forth in Divisions 00 and 01. All substitution requests shall be submitted through the General Contractor and only submitted to the Architect after their review. Architect will discard or return substitution requests, without review, if received from sources other than the General Contractor.

1.3 DEFINITIONS

A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents.
1. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.
2. Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required to meet other Project requirements but may offer advantage to Contractor or Owner.

1.4 ACTION SUBMITTALS

A. Substitution Requests: Submit documentation identifying product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
1. Substitution Request Form: Use form provided in Project Manual .
2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
a. Statement indicating why specified product or fabrication or installation method cannot be provided, if applicable.
b. Coordination of information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner and separate contractors that will be necessary to accommodate proposed substitution.
c. Detailed comparison of significant qualities of proposed substitutions with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes, such as performance, weight, size, durability, visual effect,

sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.

d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
e. Samples, where applicable or requested.
f. Certificates and qualification data, where applicable or requested.
g. List of similar installations for completed projects, with project names and addresses as well as names and addresses of architects and owners.
h. Material test reports from a qualified testing agency, indicating and interpreting test results for compliance with requirements indicated.
i. Research reports evidencing compliance with building code in effect for Project, from ICC-ES .
j. Detailed comparison of Contractor's construction schedule using proposed substitutions with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
k. Cost information, including a proposal of change, if any, in the Contract Sum.
l. Contractor's certification that proposed substitution complies with requirements in the Contract Documents, except as indicated in substitution request, is compatible with related materials and is appropriate for applications indicated.
m. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.

3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within seven days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.
   a. Forms of Acceptance: Change Order, Construction Change Directive, or Architect's Supplemental Instructions for minor changes in the Work.
   b. Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.

1.5 QUALITY ASSURANCE

A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage a qualified testing agency to perform compatibility tests recommended by manufacturers.

1.6 PROCEDURES

A. Coordination: Revise or adjust affected work as necessary to integrate work of the approved substitutions.

1.7 SUBSTITUTIONS

A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than 15 days prior to time required for preparation and review of related submittals.
   1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
      a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
      b. Substitution request is fully documented and properly submitted.
      c. Requested substitution will not adversely affect Contractor's construction schedule.
      d. Requested substitution has received necessary approvals of authorities having jurisdiction.
      e. Requested substitution is compatible with other portions of the Work.
      f. Requested substitution has been coordinated with other portions of the Work.
      g. Requested substitution provides specified warranty.

h. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 25 00

SECTION 01 25 33 – SUBSTITUTION REQUEST FORM

To:	**Project:** **Oak Ridge High School Softball Complex**
Attn:	
Specified Item:	**Proposed Substitute(s):**

1. The following are attached (mark all that apply):

   ☐ **Complete Description**
   ☐ **Laboratory Tests**
   ☐ Information on the availability of maintenance services and replacement materials for proposed substitute(s)

   ☐ **Catalog**
   ☐ **Spec Data**
   ☐ Names, addresses, and phone numbers of fabricators and suppliers for proposed substitute(s).

2. The substitute(s) will have the following effects on dimensions, gauges, weights, etc.:

3. The substitute(s) will have the following effects on wiring, piping, ductwork, etc.:

4. The substitute(s) will have the following effects on other trades:

5. The substitute(s) will have the following effects on the Construction Schedule:

6. The proposed substitute(s) differs from the specified product(s) in quality and performance as follows:

7. Manufacturers guarantees for the substitute(s) and the specified product(s) are (check one):

   ☐ **The same** ☐ **Different** (if different, explain below)

8. If the proposed substitute(s) is accepted, it will result in (check one):

   ☐ **No cost impact** ☐ **A cost increase of**
   ☐ **A cost decrease of**

(if change in cost is indicated, attach itemization on specified Cost Itemization Form)

9. License fees or royalties are pending on the proposed substitute(s):

   ☐ **No** ☐ **Yes** (if yes, explain below)

10. The undersigned or the firm represented shall pay for additional studies, investigations, submittals, redesign, and analysis by the Architect necessitated by this substitution request.

Substitutions must be requested in accordance with applicable Contract requirements. Substitutions are to be submitted only by the Contractor. Substitute products should not be ordered or installed without written acceptance by the Architect.

Submitted by: _____ **Date:** _____
(sign here)

Name: _____ **Telephone:** _____
(type or print)

for: _____
(name of firm)

Address: _____ **City, State & Zip:** _____
(street address)

Designer's Review Comments:

- ☐ **Accepted**
- ☐ **Accepted as Noted**
- ☐ **Rejected**
- ☐ **Rejected** (Received Too Late)
- ☐ **Rejected** (Submittal Incomplete)

Additional Comments:

Architect: _____ **Date:** _____
(sign here)

END OF SECTION 01 25 33

SECTION 01 26 00 - CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for handling and processing Contract modifications.

B. Related Requirements:
1. Section 01 25 00 "Substitution Procedures" for administrative procedures for handling requests for substitutions made after the Contract award.
2. Section 01 31 00 "Project Management and Coordination" for requirements for forms for contract modifications provided as part of web-based Project management software.

1.3 MINOR CHANGES IN THE WORK

A. Architect will issue supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on AIA Document G710 .

1.4 PROPOSAL REQUESTS

A. Owner-Initiated Proposal Requests: Architect will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.
1. Work Change Proposal Requests issued by Architect are not instructions either to stop work in progress or to execute the proposed change.
2. Within time specified in Proposal Request or 20 days, when not otherwise specified, after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.
    a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
    b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
    c. Include costs of labor and supervision directly attributable to the change.
    d. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
    e. Quotation Form: Use forms acceptable to Architect .

B. Contractor-Initiated Proposals: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to Architect .
1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
4. Include costs of labor and supervision directly attributable to the change.

5. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
6. Comply with requirements in Section 01 25 00 "Substitution Procedures" if the proposed change requires substitution of one product or system for product or system specified.
7. Proposal Request Form: Use form acceptable to Architect .

1.5 ADMINISTRATIVE CHANGE ORDERS

A. Allowance Adjustment: See Section 01 21 00 "Allowances" for administrative procedures for preparation of Change Order Proposal for adjusting the Contract Sum to reflect actual costs of allowances.

B. Unit-Price Adjustment: See Section 01 22 00 "Unit Prices" for administrative procedures for preparation of Change Order Proposal for adjusting the Contract Sum to reflect measured scope of unit-price work.

1.6 CHANGE ORDER PROCEDURES

A. On Owner's approval of a Work Change Proposal Request, Architect will issue a Change Order for signatures of Owner and Contractor on AIA Document G701 .

1.7 CONSTRUCTION CHANGE DIRECTIVE

A. Construction Change Directive: Architect may issue a Construction Change Directive on AIA Document G714 . Construction Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.
1. Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.

B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.
1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

1.8 WORK CHANGE DIRECTIVE

A. Work Change Directive: Architect may issue a Work Change Directive . Work Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.
1. Work Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.

B. Documentation: Maintain detailed records on a time and material basis of work required by the Work Change Directive.
1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 26 00

SECTION 01 26 10 – WEATHER DELAYS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for submitting request for extensions of Contract Time due to adverse weather conditions.

B. Related Sections include the following:
1. Division 1 Section "Payment Procedures" for submitting Applications for Payment and the Schedule of Values.
2. Division 1 Section "Construction Progress Documentation" for submitting schedules and reports, including Contractor's Construction Schedule and the Submittals Schedule.

1.3 DEFINITIONS

A. Delay: An adverse weather event that suspends or prevents scheduled construction activity from being performed in accordance with the Contractor’s schedule of the Work.

B. Extension of Time: Additional Contract Time, when approved by the Owner, granted to the Contractor to offset delay due to adverse weather conditions.

1.4 EXTENSIONS OF CONTRACT TIME

A. If the basis exists for an extension of time in accordance with Section 00 72 13 – General Conditions, Paragraph 4.3.7.2 and Paragraph 8.3, an extension of Time on the basis of adverse weather conditions may be granted only for the number of Weather Delay Days in excess of the number of days listed in the Standard Baseline for the month in which the delay occurred and then, only if construction activities were actually prevented or suspended by such weather conditions.

1.5 STANDARD BASELINE FOR AVERAGE CLIMATIC RANGE

A. Weather data available from the National Oceanic and Atmospheric Administration (NOAA) has been reviewed and a Standard Baseline of Average Climatic Range for the State of Tennessee has been established.

B. Standard Baseline shall be regarded as the number of calendar days reasonably anticipated for each month during which construction activity is normally expected to be prevented or suspended due to adverse weather conditions. Suspension of construction activity for the number of days each month as listed in the Standard Baseline is included in the Contract Time and shall not form the basis for an extension of Time.

C. Standard Baseline shall be as follows (the Standard Baseline number of adverse weather days is listed below the abbreviation for each month):

Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
12	11	8	7	7	6	7	5	4	5	6	11

D. Where partial months are included in the Contractor's construction schedule, the Standard Baseline shall be apportioned on a pro-rata basis rounded up to the nearest whole day.

1.6 ADVERSE WEATHER AND WEATHER DELAY DAYS

A. Adverse weather is defined as the occurrence of one or more of the following conditions that prevent or cause suspension of exterior construction activity or prevents access to the site within a twenty-four (24) hour period:
   1. Precipitation (rain, snow, or ice) at or in excess of one-tenth inch (.10") liquid measure.
   2. Temperature that does not rise above 32 degrees F by 10:00 a.m., local time, when exterior construction operations are scheduled for which temperature cannot be overcome by application of temporary heat or other reasonable means.
   3. Temperature that does not rise above that specified for the day's construction activity by 10:00 a.m., local time, if any is specified.
   4. Sustained wind in excess of twenty-five (25) m.p.h.
   5. Standing snow accumulation in excess of one inch (1") depth at the site (excluding drifts).

B. Drying days caused by excess precipitation may be granted under conditions as follows:
   1. Two or more consecutive days of precipitation at or in excess of the threshold levels stated above that prevents access to the site or prevents performance of schedule-critical exterior activity as follows:
      a. For rain days above the Standard Baseline.
      b. At a rate no greater than one additional day for each day or consecutive days of rain beyond the Standard Baseline that total one inch (1") or more, liquid measure, unless specifically recommended otherwise by the Architect.
      c. Drying days will be waived if the site is not properly graded and drained to prevent accumulation of water that prevents access to the site or that prevents performance of schedule-critical construction activity.

C. Weather Delay Days may be granted if access to the site is prevented or exterior schedule-critical activities cannot be performed for at least fifty percent (50%) of a scheduled work day, including weekends or holidays, if work is scheduled and would normally be performed on days when adverse weather occur. If work is not scheduled on days when adverse weather occurs, no extension of Time will be granted, except for drying days thus caused.

1.7 DOCUMENTATION AND SUBMITTALS FOR TIME EXTENSIONS

A. Claims for extensions of Time resulting from adverse weather conditions shall be submitted as follows:
   1. Submit daily reports showing which, and to what extent, construction activities were affected by adverse weather conditions.
   2. Submit weather data from a NOAA weather reporting station nearest to the site to support claim for an extension of Time.
   3. Use Standard Baseline data contained in this Section to document actual delays due to adverse weather conditions that were in excess of the average climatic range.
   4. Organize claim and supporting documentation on a basis of calendar month periods grouped into a single submittal, separate from other submittals and in accordance with the General Conditions.
   5. On a monthly basis, submit claims for extension of Time with a letter of transmittal setting forth the number of days construction activity was delayed due to adverse weather conditions, minus the number of days contained in the Standard Baseline, plus any drying days permitted under the conditions outline above, in accordance with the following formula:

a.	Number of days construction activity were delayed	XX
	Minus days in Standard Baseline above for month	- XX
	Plus drying days permitted	+ X
	Total delay days requested	X

6. Claims for delay not submitted timely, without proper documentation or not in proper form may be disallowed.

B. If an extension of the Contract Time is appropriate, it shall be implemented in accordance with the provisions of Article 7 of the Conditions, and the applicable General Requirements.

C. Extensions of Time must be requested in writing to the Architect within 60 calendar days of actual weather delay along with all required support information. Weather delays requested after the 60 calendar day limitation will not be granted.

D. Time required for Architect's review, evaluate and process requests for extensions of Time and time for preparation and processing of Change Orders for extensions of Time shall not form the basis for constructive acceleration of the Work.

E. Approved extensions of Time shall be included in the Contractor's construction schedule updates required by other Sections in the Project Manual.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 26 20 – WEATHER DELAY REPORT

Project Name:	**Project Number: 24023**	**Month and Year reported below:**
Oak Ridge High School Softball Complex		

Day of month	**"X" if Work delayed by cause below**				Refer to Section 01 26 10 for instructions on use of this form.
	Precip.	**Temp.**	**Wind**	**Drying**	**Description**
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					
31					
	Total number of Adverse Weather Days with delay to Work this month being requested				
	Total number of Drying Days being requested				
	Monthly Standard Baseline number of days from Section 01 26 10				
	Total number of days beyond Standard Baseline being requested for Contract Time extension				

END OF SECTION

SECTION 01 29 00 - PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements necessary to prepare and process Applications for Payment.

B. Related Requirements:
1. Section 01 21 00 "Allowances" for procedural requirements governing the handling and processing of allowances.
2. Section 01 22 00 "Unit Prices" for administrative requirements governing the use of unit prices.
3. Section 01 26 00 "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.
4. Section 01 32 00 "Construction Progress Documentation" for administrative requirements governing the preparation and submittal of the Contractor's construction schedule.

1.3 DEFINITIONS

A. Schedule of Values: A statement furnished by Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

1.4 SCHEDULE OF VALUES

A. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's construction schedule.
1. Coordinate line items in the schedule of values with items required to be indicated as separate activities in Contractor's construction schedule.
2. Submit the schedule of values to Architect at earliest possible date, but no later than fourteen (14) days before the date scheduled for submittal of initial Applications for Payment.
3. Subschedules for Separate Elements of Work: Where the Contractor's construction schedule defines separate elements of the Work, provide subschedules showing values coordinated with each element.

B. Format and Content: Use Project Manual table of contents as a guide to establish line items for the schedule of values. Provide at least one line item for each Specification Section.
1. Identification: Include the following Project identification on the schedule of values:
a. Project name and location.
b. Owner's name.
c. Owner's Project number.
d. Name of Architect.
e. Architect's Project number.
f. Contractor's name and address.
g. Date of submittal.
2. Arrange schedule of values consistent with format of AIA Document G703 .
3. Arrange the schedule of values in tabular form, with separate columns to indicate the following for each item listed:
a. Related Specification Section or division.
b. Description of the Work.
c. Name of subcontractor.

d. Name of manufacturer or fabricator.
e. Name of supplier.
f. Change Orders (numbers) that affect value.
g. Dollar value of the following, as a percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent. Round dollar amounts to whole dollars, with total equal to Contract Sum.
    1) Labor.
    2) Materials.
    3) Equipment.

4. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Provide multiple line items for principal subcontract amounts in excess of five percent of the Contract Sum.
5. Round amounts to the nearest whole dollar. Total shall equal the Contract Sum.
6. Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
    a. Differentiate between items stored on-site and items stored off-site.
7. Provide separate line items in the schedule of values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
8. Allowances: Provide a separate line item in the schedule of values for each allowance. Show line-item value of unit-cost allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.
9. Purchase Contracts: Provide a separate line item in the schedule of values for each Purchase contract. Show line-item value of Purchase contract. Indicate Owner payments or deposits, if any, and balance to be paid by Contractor.
10. Overhead Costs, Separate Line Items: Show cost of temporary facilities and other major cost items that are not direct cost of actual work-in-place as separate line items.
11. Temporary Facilities: Show cost of temporary facilities and other major cost items that are not direct cost of actual work-in-place as separate line items.
12. Documentation and Close-Out Costs. Include a separate line item for Project close-out requirements as outlined below.
    a. To protect the Owner from the significant liability and arduous accounting efforts required by lingering documentation and close-out Work, the Schedule of Values shall provide a separate line item titled "Documentation and Close-Out" to provide a value consistent with and appropriate to required documentation provisions throughout the Contract Documents. The value of the Documentation and Close-Out line item shall be based on the total Contract Sum and not be less than as scheduled below:
        1) Contract Sum less than $20,000 = Documentation and Close-Our Value of $200.
        2) Contract Sum between $20,001 and $75,000 = Documentation and Close-Our Value of $750.
        3) Contract Sum between $75,001 and $100,000 = Documentation and Close-Our Value of $1,000.
        4) Contract Sum between $100,001 and $200,000 = Documentation and Close-Our Value of $2,000.
        5) Contract Sum between $200,001 and $350,000 = Documentation and Close-Our Value of $3,500.
        6) Contract Sum between $350,001 and $500,000 = Documentation and Close-Our Value of $5,000.
        7) Contract Sum between $500,001 and $1,000,000 = Documentation and Close-Our Value of $10,000.
        8) Contract Sum between $1,000,001 and $1,500,000 = Documentation and Close-Our Value of $15,000.
        9) Contract Sum between $1,500,001 and $2,000,000 = Documentation and Close-Our Value of $20,000.
        10) Contract Sum between $2,000,001 and $3,000,000 = Documentation and Close-Our Value of $30,000.
        11) For each additional $1,000,000 in Contract Sum = add an additional $10,000.

13. Schedule of Values Revisions: Revise the schedule of values when Change Orders or Construction Change Directives result in a change in the Contract Sum. Include at least one separate line item for each Change Order and Construction Change Directive.

1.5 APPLICATIONS FOR PAYMENT

A. Each Application for Payment following the initial Application for Payment shall be consistent with previous applications and payments, as certified by Architect and paid for by Owner.

B. Payment Application Times: The date for each progress payment is indicated in the Owner/Contractor Agreement. The period of construction work covered by each Application for Payment is the period indicated in the Agreement.

C. Application for Payment Forms: Use AIA Document G702 and AIA Document G703 as form for Applications for Payment.

D. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect will return incomplete applications without action.
   1. Entries shall match data on the schedule of values and Contractor's construction schedule. Use updated schedules if revisions were made.
   2. Include amounts for work completed following previous Application for Payment, whether or not payment has been received. Include only amounts for work completed at time of Application for Payment.
   3. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
   4. Indicate separate amounts for work being carried out under Owner-requested project acceleration.

E. Stored Materials: Include in Application for Payment amounts applied for materials or equipment purchased or fabricated and stored, but not yet installed. Differentiate between items stored on-site and items stored off-site.
   1. Provide certificate of insurance, evidence of transfer of title to Owner, and consent of surety to payment for stored materials.
   2. Provide supporting documentation that verifies amount requested, such as paid invoices. Match amount requested with amounts indicated on documentation; do not include overhead and profit on stored materials.
   3. Provide summary documentation for stored materials indicating the following:
      a. Value of materials previously stored and remaining stored as of date of previous Applications for Payment.
      b. Value of previously stored materials put in place after date of previous Application for Payment and on or before date of current Application for Payment.
      c. Value of materials stored since date of previous Application for Payment and remaining stored as of date of current Application for Payment.

F. Transmittal: Submit an electronic PDF copy of signed and notarized Application for Payment to Architect by a method ensuring receipt within 24 hours. Include waivers of lien and similar attachments if required.
   1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.

G. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's lien from entities lawfully entitled to file a mechanic's lien arising out of the Contract and related to the Work covered by the payment .
   1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
   2. When an application shows completion of an item, submit conditional final or full waivers.
   3. Owner reserves the right to designate which entities involved in the Work must submit waivers.

4. Submit final Application for Payment with or preceded by conditional final waivers from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.
5. Waiver Forms: Submit executed waivers of lien on forms acceptable to Owner.

H. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:
1. List of subcontractors.
2. Schedule of values.
3. Contractor's construction schedule (preliminary if not final).
4. Products list (preliminary if not final).
5. Schedule of unit prices.
6. Submittal schedule (preliminary if not final).
7. List of Contractor's staff assignments.
8. List of Contractor's principal consultants.
9. Copies of building permits.
10. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
11. Initial progress report.
12. Report of preconstruction conference.
13. Certificates of insurance and insurance policies.
14. Performance and payment bonds.
15. Data needed to acquire Owner's insurance.

I. Application for Payment at Substantial Completion: After Architect issues the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.
1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
   a. Complete administrative actions, submittals, and Work preceding this application, as described in Section 01 77 00 "Closeout Procedures."
2. This application shall reflect Certificate(s) of Substantial Completion issued previously for Owner occupancy of designated portions of the Work.

J. Final Payment Application: After completing Project closeout requirements, submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:
1. Evidence of completion of Project closeout requirements.
2. Certification of completion of final punch list items.
3. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
4. Updated final statement, accounting for final changes to the Contract Sum.
5. AIA Document G706.
6. AIA Document G706A.
7. AIA Document G707.
8. Evidence that claims have been settled.
9. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.
10. Final liquidated damages settlement statement.
11. Proof that taxes, fees, and similar obligations are paid.
12. Waivers and releases.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 29 00

SECTION 01 31 00 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative provisions for coordinating construction operations on Project, including, but not limited to, the following:
   1. General coordination procedures.
   2. RFIs.
   3. Digital project management procedures.
   4. Web-based Project management software package.
   5. Project meetings.

B. Related Requirements:
   1. Section 01 32 00 "Construction Progress Documentation" for preparing and submitting Contractor's construction schedule.
   2. Section 01 73 00 "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
   3. Section 01 77 00 "Closeout Procedures" for coordinating closeout of the Contract.

1.3 DEFINITIONS

A. BIM: Building Information Modeling.

B. RFI: Request for Information. Request from Owner, Architect, or Contractor seeking information required by or clarifications of the Contract Documents.

1.4 INFORMATIONAL SUBMITTALS

A. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:
   1. Name, address, telephone number, and email address of entity performing subcontract or supplying products.
   2. Number and title of related Specification Section(s) covered by subcontract.
   3. Drawing number and detail references, as appropriate, covered by subcontract.

B. Key Personnel Names: Within 15 days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses, cellular telephone numbers, and e-mail addresses. Provide names, addresses, and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project.
   1. Post copies of list in Project meeting room, in temporary field office, and in prominent location in built facility. Keep list current at all times.

1.5 GENERAL COORDINATION PROCEDURES

A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations

included in different Sections that depend on each other for proper installation, connection, and operation.

1. Schedule construction operations in sequence required to obtain the best results, where installation of one part of the Work depends on installation of other components, before or after its own installation.
2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
3. Make adequate provisions to accommodate items scheduled for later installation.

B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.

1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.

C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:

1. Preparation of Contractor's construction schedule.
2. Preparation of the schedule of values.
3. Installation and removal of temporary facilities and controls.
4. Delivery and processing of submittals.
5. Progress meetings.
6. Preinstallation conferences.
7. Project closeout activities.
8. Startup and adjustment of systems.

1.6 REQUEST FOR INFORMATION (RFI)

A. General: Immediately on discovery of the need for additional information, clarification, or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.

1. Architect will return without response those RFIs submitted to Architect by other entities controlled by Contractor.
2. Coordinate and submit RFIs in a prompt manner to avoid delays in Contractor's work or work of subcontractors.

B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:

1. Project name.
2. Owner name.
3. Name of Architect.
4. Date.
5. Name of Contractor.
6. RFI number, numbered sequentially.
7. RFI subject.
8. Specification Section number and title and related paragraphs, as appropriate.
9. Drawing number and detail references, as appropriate.
10. Field dimensions and conditions, as appropriate.
11. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
12. Contractor's signature.
13. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.
    a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.

C. RFI Forms: Software-generated form with substantially the same content as indicated above, acceptable to Architect and submitted electronically in PDF format.

1. Attachments shall be electronic files in PDF format.

D. Architect's Action: Architect will review each RFI, determine action required, and respond. Allow seven working days for Architect's response for each RFI and ten working days for RFIs requiring multi-discipline review. RFIs received by Architect after 1:00 p.m. will be considered as received the following working day.
   1. The following Contractor-generated RFIs will be returned without action:
      a. Requests for approval of submittals.
      b. Requests for approval of substitutions.
      c. Requests for approval of Contractor's means and methods.
      d. Requests for coordination information already indicated in the Contract Documents.
      e. Requests for adjustments in the Contract Time or the Contract Sum.
      f. Requests for interpretation of Architect's actions on submittals.
      g. Incomplete RFIs or inaccurately prepared RFIs.
   2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt by Architect of additional information.
   3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Section 01 26 00 "Contract Modification Procedures."
      a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within 5 days of receipt of the RFI response.

E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log biweekly . Software log with not less than the following:
   1. Project name.
   2. Name and address of Contractor.
   3. Name and address of Architect.
   4. RFI number, including RFIs that were returned without action or withdrawn.
   5. RFI description.
   6. Date the RFI was submitted.
   7. Date Architect's response was received.
   8. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.

F. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within three days if Contractor disagrees with response.

1.7 DIGITAL PROJECT MANAGEMENT PROCEDURES

A. Architect's Data Files Not Available: Architect will not provide Architect's BIM model digital data files for Contractor's use during construction.

B. Web-Based Project Management Software Package: Use Architect's web-based Project management software package for purposes of hosting and managing Project communication and documentation until Final Completion.
   1. Architect's Project Management Software: "Part3" as provided by Part3 Technologies Corporation (www.part3.io).
   2. Web-based Project management software includes, at a minimum, the following features:
      a. Compilation of Project data, including Contractor, Subcontractors, Architect, Architect's consultants, Owner, and other entities involved in Project. Include names of individuals and contact information.
      b. Access control for each entity for each workflow process, to determine entity's digital rights to create, modify, view, and print documents. This includes the ability to export all accessible documentation, reports, logs, and data combined at anytime.
      c. Document workflow planning, allowing customization of workflow between project entities.
      d. Creation, logging, tracking, and notification for Project communications required in other Specification Sections, including, but not limited to, RFIs, submittals, meeting minutes,

Minor Changes in the Work, Construction Change Directives, and Change Orders. If solely using the Architect's Project management software, the Contractor shall organize and maintain the creation, logging, and notification of all project communications to the Architect and/or Owner.

e. Track status of each Project communication in real time, and log time and date when responses are provided.
f. Procedures for handling PDFs or similar file formats, allowing markups by each entity. Provide security features to lock markups against changes once submitted.
g. Logging the overall construction budget and tracking modifications that relate to Change Orders or Contract modifications.
h. Processing and tracking of payment applications.
i. Processing and tracking of contract modifications.
j. Creating and distributing meeting minutes.
k. Document management for Drawings, Specifications, and coordination drawings, including revision control.
l. Management of construction progress photographs.
m. Mobile device compatibility, including smartphones and tablets.
n. Creating and distributing field reports and punch lists .

3. If the Contractor will be utilizing a separate Project management software, it shall be compatible and have the ability to sync with the Architect's Project management software.
4. At completion of Project, provide digital archive in format that is readable by common desktop software applications in format acceptable to Architect. Provide data in locked format to prevent further changes.

C. PDF Document Preparation: Where PDFs are required to be submitted to Architect, prepare as follows:
1. Assemble complete submittal package into a single indexed file, incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
2. Name file with submittal number or other unique identifier, including revision identifier.
3. Certifications: Where digitally submitted certificates and certifications are required, provide a digital signature with digital certificate on where indicated.

1.8 PROJECT MEETINGS

A. General: Schedule and conduct meetings and conferences at Project site unless otherwise indicated.
1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times a minimum of seven days prior to meeting.
2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees no later than one business day prior to the meeting.
3. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Architect, within three days of the meeting.

B. Preconstruction Conference: Schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than 15 working days after execution of the Agreement.
1. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
2. Agenda: Discuss items of significance that could affect progress, including the following:
a. Responsibilities and personnel assignments.
b. Tentative construction schedule.
c. Phasing.
d. Critical work sequencing and long lead items.
e. Designation of key personnel and their duties.
f. Lines of communications.

g. Use of web-based Project software.
h. Procedures for processing field decisions and Change Orders.
i. Procedures for RFIs.
j. Procedures for testing and inspecting.
k. Procedures for processing Applications for Payment.
l. Distribution of the Contract Documents.
m. Submittal procedures.
n. Preparation of Record Documents.
o. Use of the premises and existing building.
p. Work restrictions.
q. Working hours.
r. Owner's occupancy requirements.
s. Responsibility for temporary facilities and controls.
t. Procedures for moisture and mold control.
u. Procedures for disruptions and shutdowns.
v. Construction waste management and recycling.
w. Parking availability.
x. Office, work, and storage areas.
y. Equipment deliveries and priorities.
z. First aid.
aa. Security.
bb. Progress cleaning.

3. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.

C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity when required by other Sections and when required for coordination with other construction.
1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect of scheduled meeting dates.
2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
a. Contract Documents.
b. Options.
c. Related RFIs.
d. Related Change Orders.
e. Purchases.
f. Deliveries.
g. Submittals.
h. Review of mockups.
i. Possible conflicts.
j. Compatibility requirements.
k. Time schedules.
l. Weather limitations.
m. Manufacturer's written instructions.
n. Warranty requirements.
o. Compatibility of materials.
p. Acceptability of substrates.
q. Temporary facilities and controls.
r. Space and access limitations.
s. Regulations of authorities having jurisdiction.
t. Testing and inspecting requirements.
u. Installation procedures.
v. Coordination with other work.
w. Required performance results.
x. Protection of adjacent work.
y. Protection of construction and personnel.

3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.
5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.

D. Progress Meetings: Conduct progress meetings at biweekly intervals.
1. Coordinate dates of meetings with preparation of payment requests.
2. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
3. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
    a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
        1) Review schedule for next period.
    b. Review present and future needs of each entity present, including the following:
        1) Interface requirements.
        2) Sequence of operations.
        3) Status of submittals.
        4) Deliveries.
        5) Off-site fabrication.
        6) Access.
        7) Site use.
        8) Temporary facilities and controls.
        9) Progress cleaning.
        10) Quality and work standards.
        11) Status of correction of deficient items.
        12) Field observations.
        13) Status of RFIs.
        14) Status of Proposal Requests.
        15) Pending changes.
        16) Status of Change Orders.
        17) Pending claims and disputes.
        18) Documentation of information for payment requests.
4. Minutes: Entity responsible for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information.
    a. Schedule Updating: Revise Contractor's construction schedule after each progress meeting, where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 31 00

SECTION 01 32 00 - CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:
   1. Startup construction schedule.
   2. Contractor's Construction Schedule.

B. Related Requirements:
   1. Section 01 29 00 "Payment Procedures" for schedule of values and requirements for use of cost-loaded schedule for Applications for Payment.
   2. Section 01 40 00 "Quality Requirements" for schedule of tests and inspections.

1.2 DEFINITIONS

A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction Project. Activities included in a construction schedule consume time and resources.
   1. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.
   2. Predecessor Activity: An activity that precedes another activity in the network.
   3. Successor Activity: An activity that follows another activity in the network.

B. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.

C. Event: The starting or ending point of an activity.

D. Float: The measure of leeway in starting and completing an activity.
   1. Float time is not for the exclusive use or benefit of either Owner or Contractor, but is a jointly owned, expiring Project resource available to both parties as needed to meet schedule milestones and Contract completion date.
   2. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the successor activity.
   3. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.

E. Resource Loading: The allocation of labor and equipment necessary for completing an activity as scheduled.

1.3 INFORMATIONAL SUBMITTALS

A. Format for Submittals: Submit required submittals in the following format:
   1. Working electronic copy of schedule file.
   2. PDF file.

B. Startup construction schedule.

C. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.

1.4 COORDINATION

A. Coordinate Contractor's Construction Schedule with the schedule of values, list of subcontracts, submittal schedule, progress reports, payment requests, and other required schedules and reports.
   1. Secure time commitments for performing critical elements of the Work from entities involved.
   2. Coordinate each construction activity in the network with other activities, and schedule them in proper sequence.

1.5 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Computer Scheduling Software: Prepare schedules using current version of a program that has been developed specifically to manage construction schedules.

B. Time Frame: Extend schedule from date established for the Notice to Proceed to date of Final Completion.
   1. Contract completion date to not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.

C. Activities: Treat each floor or separate area as a separate numbered activity for each main element of the Work. Comply with the following:
   1. Activity Duration: Define activities so no activity is longer than 20 days, unless specifically allowed by Architect.
   2. Temporary Facilities: Indicate start and completion dates for the following as applicable:
      a. Securing of approvals and permits required for performance of the Work.
      b. Temporary facilities.
      c. Construction of mock-ups, prototypes and samples.
      d. Owner interfaces and furnishing of items.
      e. Interfaces with Separate Contracts.
      f. Regulatory agency approvals.
      g. Punch list.
   3. Procurement Activities: Include procurement process activities for long lead-time items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
   4. Submittal Review Time: Include review and resubmittal times indicated in Section 01 33 00 "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's Construction Schedule with submittal schedule.
   5. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Architect's administrative procedures necessary for certification of Substantial Completion.
   6. Punch List and Final Completion: Include not more than 30 days for completion of punch list items and Final Completion.

D. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.
   1. Phasing: Arrange list of activities on schedule by phase.
   2. Work Restrictions: Show the effect of the following items on the schedule:
      a. Coordination with existing construction.
      b. Limitations of continued occupancies.
      c. Uninterruptible services.
      d. Use-of-premises restrictions.
      e. Seasonal variations.
   3. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:
      a. Subcontract awards.
      b. Submittals.
      c. Purchases.
      d. Fabrication.

e. Deliveries.
f. Installation.

E. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and Final Completion , and the following interim milestones:
1. Temporary enclosure and space conditioning.
2. The start and completion dates of the athletic field and each ancillary building.

F. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:
1. Unresolved issues.
2. Unanswered Requests for Information.
3. Rejected or unreturned submittals.
4. Notations on returned submittals.
5. Pending modifications affecting the Work and the Contract Time.

G. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule one week before each regularly scheduled progress meeting.
1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
3. As the Work progresses, indicate Final Completion percentage for each activity.

H. Recovery Schedule: When periodic update indicates the Work is 14 or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule. Indicate changes to working hours, working days, crew sizes, equipment required to achieve compliance, and date by which recovery will be accomplished.

I. Distribution: Distribute copies of approved schedule to Architect Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.
1. Post copies in Project meeting rooms and temporary field offices.
2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

1.6 STARTUP CONSTRUCTION SCHEDULE

A. Gantt-Chart Schedule: Submit startup, horizontal, Gantt-chart-type construction schedule within seven days of date established for the Notice to Proceed .

B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line. Outline significant construction activities for first 90 days of construction. Include skeleton diagram for the remainder of the Work and a cash requirement prediction based on indicated activities.

1.7 GANTT-CHART SCHEDULE REQUIREMENTS

A. Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal, Gantt-chart-type, Contractor's Construction Schedule within 30 days of date established for commencement of the Work .
1. Base schedule on the startup construction schedule and additional information received since the start of Project.

B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.
   1. For construction activities that require three months or longer to complete, indicate an estimated completion percentage in 10 percent increments within time bar.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 32 00

SECTION 01 33 00 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
1. Submittal schedule requirements.
2. Administrative and procedural requirements for submittals.

B. Related Requirements:
1. Section 01 29 00 "Payment Procedures" for submitting Applications for Payment and the schedule of values.
2. Section 01 31 00 "Project Management and Coordination" for submitting coordination drawings and subcontract list and for requirements for web-based Project software.
3. Section 01 32 00 "Construction Progress Documentation" for submitting schedules and reports, including Contractor's construction schedule.
4. Section 01 40 00 "Quality Requirements" for submitting test and inspection reports, and schedule of tests and inspections.
5. Section 01 77 00 "Closeout Procedures" for submitting closeout submittals and maintenance material submittals.
6. Section 01 78 39 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.

1.3 DEFINITIONS

A. Action Submittals: Written and graphic information and physical samples that require Architect's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."

B. Informational Submittals: Written and graphic information and physical samples that do not require Architect's responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as "informational submittals."

1.4 SUBMITTAL SCHEDULE

A. Submittal Schedule: Submit, as an action submittal, a list of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Architect and additional time for handling and reviewing submittals required by those corrections.
1. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.
2. Initial Submittal Schedule: Submit concurrently with startup construction schedule. Include submittals required during the first 60 days of construction. List those submittals required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
3. Final Submittal Schedule: Submit concurrently with the first complete submittal of Contractor's construction schedule.

a. Submit revised submittal schedule as required to reflect changes in current status and timing for submittals.

4. Format: Arrange the following information in a tabular format:
   a. Scheduled date for first submittal.
   b. Specification Section number and title.
   c. Submittal Category: Action; informational.
   d. Name of subcontractor.
   e. Description of the Work covered.
   f. Scheduled date for Architect's final release or approval.
   g. Scheduled dates for purchasing.
   h. Scheduled date of fabrication.
   i. Scheduled dates for installation.
   j. Activity or event number.

1.5 SUBMITTAL FORMATS

A. Submittal Information: Include the following information in each submittal:
   1. Project name.
   2. Date.
   3. Name of Architect.
   4. Name of Contractor.
   5. Name of firm or entity that prepared submittal.
   6. Names of subcontractor, manufacturer, and supplier.
   7. Unique submittal number, including revision identifier. Include Specification Section number (with spaces) followed by a dash (-) with sequential two-digit numeric identifier. For resubmittals add a decimal (.) followed by a sequential single-digit numeric suffix.
      a. The submittal number and file name of the first submittal of a particular Specification Section shall use the six-digit Specification Section number (with spaces) followed by a dash (-) with a sequential two-digit numeric identifier (01 33 00-01).
      b. The file name of the second submittal of a particular Specification Section shall use the six-digit (with spaces) Specification Section number followed by a dash (-) with the next sequential two-digit numeric identifier (01 33 00-02).
      c. The submittal number and file name of a particular submittal requiring a resubmittal shall follow the naming convention outlined above followed by a decimal (.) with a sequential single-digit numeric identifier (01 33 00-01.1).
   8. Category and type of submittal.
      a. Submittals shall be broken up into individual electronic files and separate submittal numbers based on their submittal type or category. Examples of submittal types are listed below:
         1) Product Data / Manufacturer's Instructions
         2) Shop Drawings / Coordination Drawings
         3) Samples / Color Selections
         4) Mock-ups
         5) Warranties
         6) Schedule
         7) Reports / Test Data
         8) Certification / Affidavit / Qualification Data
         9) Delegated Design / Calculations / Stamped Drawings
   9. Submittal purpose and description.
   10. Number and title of Specification Section, with paragraph number and generic name for each of multiple items.
   11. Drawing number and detail references, as appropriate.
   12. Indication of full or partial submittal.
   13. Location(s) where product is to be installed, as appropriate.
   14. Other necessary identification.
   15. Remarks.
   16. Signature of transmitter.

B. Options: Contractor shall identify selections based on information provided in the Contract Documents and clearly note such on the submittal. If there are options that are not included in the Contract Documents, clearly identify those options requiring selection by Architect.
   1. Submittals received without options selected based on information provided in the Contract Documents shall be returned to the Contractor without action.

C. Transmittal: Assemble each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form / cover page. Architect shall return submittals, without review, received from sources other than the Contractor.

D. Grouping of Submittals: Unless otherwise specified, group submittals containing all associated items to assure that information is available for reviewing each item when it is received.
   1. Partial submittals may be rejected as not complying with the provisions of the Contract.
   2. The Contractor shall be responsible for any delays resulting from resubmittal of partial submittals.

E. Deviations and Additional Information: On each submittal, clearly indicate deviations from requirements in the Contract Documents, including minor variations and limitations; include relevant additional information and revisions, other than those requested by Architect on previous submittals. Indicate by highlighting on each submittal or noting on attached separate sheet.

F. Electronic Submittals: Prepare submittals as PDF package, incorporating complete information into each PDF file. Name PDF file with submittal number.

1.6 SUBMITTAL PROCEDURES

A. Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.
   1. Email: Prepare submittals as PDF package and transmit to Architect by sending via email. Include PDF transmittal form. Include information in email subject line as requested by Architect.
      a. Architect will return annotated file. Annotate and retain one copy of file as a digital Project Record Document file.

B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
   1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
   2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
   3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
   4. Coordinate transmittal of submittals for related parts of the Work specified in different Sections, so processing will not be delayed because of need to review submittals concurrently for coordination.
      a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
   1. Initial Review: Allow 15 working days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
   2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
   3. Resubmittal Review: Allow 15 working days for review of each resubmittal.
   4. Sequential Review: Where sequential review of submittals by Architect's consultants, Owner, or other parties is indicated, allow 21 working days for initial review of each submittal.

D. Resubmittals: Make resubmittals in same form as initial submittal.
   1. Note date and content of previous submittal.
   2. Note date and content of revision in label or title block, and clearly indicate extent of revision.
   3. Resubmit submittals until they are marked with approval notation from Architect's action stamp.

E. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.

F. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Architect's action stamp.

1.7 SUBMITTAL REQUIREMENTS

A. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
   1. If information must be specially prepared for submittal because standard published data are unsuitable for use, submit as Shop Drawings, not as Product Data.
   2. Mark each copy of each submittal to show which products and options are applicable.
   3. Include the following information, as applicable:
      a. Manufacturer's catalog cuts.
      b. Manufacturer's product specifications.
      c. Standard color charts.
      d. Statement of compliance with specified referenced standards.
      e. Testing by recognized testing agency.
      f. Application of testing agency labels and seals.
      g. Notation of coordination requirements.
      h. Availability and delivery time information.
   4. Submit Product Data before Shop Drawings, and before or concurrently with Samples.

B. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.
   1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
      a. Identification of products.
      b. Schedules.
      c. Compliance with specified standards.
      d. Notation of coordination requirements.
      e. Notation of dimensions established by field measurement.
      f. Relationship and attachment to adjoining construction clearly indicated.
      g. Seal and signature of professional engineer if specified.
   2. PDF Sheet Size: Except for templates, patterns, and similar full-size Drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches , but no larger than 30 by 42 inches .

C. Samples: Submit Samples for review of type, color, pattern, and texture for a check of these characteristics with other materials and for comparison of these characteristics between submittal and actual components as delivered and installed onsite.
   1. Transmit Samples that contain multiple, related components, such as accessories together in one submittal package.
   2. Identification: Permanently attach label on unexposed side of Samples that includes the following:
      a. Project name and submittal number.
      b. Generic description of Sample.
      c. Product name and name of manufacturer.
      d. Sample source.
      e. Number and title of applicable Specification Section.
      f. Specification paragraph number and generic name of each item.
   3. Email Transmittal: Provide PDF transmittal. Include digital image file illustrating Sample characteristics and identification information for record.

4. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
   a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
   b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.
5. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units, showing the full range of colors, textures, and patterns available.
   a. Number of Samples: Submit three full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return submittal with options selected.

D. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:
1. Type of product. Include unique identifier for each product indicated in the Contract Documents or assigned by Contractor if none is indicated.
2. Manufacturer and product name, and model number if applicable.
3. Number and name of room or space.
4. Location within room or space.

E. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.

F. Design Data: Prepare and submit written and graphic information indicating compliance with indicated performance and design criteria in individual Specification Sections. Include list of assumptions and summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Number each page of submittal.

G. Certificates:
1. Certificates and Certifications Submittals: Submit a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity. Provide a notarized signature where indicated.
2. Installer Certificates: Submit written statements on manufacturer's letterhead, certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
3. Manufacturer Certificates: Submit written statements on manufacturer's letterhead, certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
4. Material Certificates: Submit written statements on manufacturer's letterhead, certifying that material complies with requirements in the Contract Documents.
5. Product Certificates: Submit written statements on manufacturer's letterhead, certifying that product complies with requirements in the Contract Documents.
6. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of AWS B2.1/B2.1M on AWS forms. Include names of firms and personnel certified.

1.8 DELEGATED-DESIGN SERVICES

A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
1. If criteria indicated are insufficient to perform services or certification required, submit a written request for additional information to Architect.

B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF file paper copies of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.
   1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

1.9 CONTRACTOR'S REVIEW

A. Action Submittals and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.

B. Contractor's Approval: Indicate Contractor's approval for each submittal with an approval stamp. Include name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.
   1. Architect will not review submittals received from Contractor that do not have Contractor's review and approval stamp and marked as reviewed and approved for compliance with the Contract Documents.
      a. Prior to submitting each submittal, the Contractor shall carefully review and coordinate all aspects, including field dimensions, of each item being submitted.
      b. The Contractor shall verify that each item and the submittal for it conform in all respects with the specified requirements.
      c. By affixing the Contractor's approval stamp and authorized signature to each submittal, the Contractor certifies that this coordination has been performed.
      d. Delays occasioned by failure of the Contractor to properly review, coordinate and submit in accordance with the requirements set forth for submittals shall be the responsibility of the Contractor and not qualify for a Time extension.
      e. By approving and submitting submittals to the Architect, the Contractor represents that the Contractor has determined and verified materials, field measurements and field construction criteria related thereto, or will do so, and has checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.
   2. The Contractor shall not perform any portion of the Work for which the Contract Documents require submittal and review of Shop Drawings, Product Data, Samples or similar submittals until they are marked with approval notation from Architect's action stamp.

1.10 ARCHITECT'S REVIEW

A. General: Architect shall stamp each submittal with a dual action stamp indicating the Architect's action and the Contractor's response action. The Architect shall mark the stamp appropriately to indicate action, as follows:
   1. Architect's Action Column:
      a. Approved: Submittal is approved as submitted with no review comments or revisions required.
      b. Approved as Noted: Review comments and/or revisions have been added to the submittal.
      c. Not Approved - Refer to Notes: Review comments and/or revisions are extensive and significant to the point that approval is questionable.
      d. Rejected: Work covered in the submittal is not complete or does not conform to the Contract Documents.
      e. Reviewed Only: An informational submittal used for record keeping and tracking of information that does not require approval.
      f. Returned without Review: Used to inform the Contractor that the submittal is not required by the Contract Documents and has not been reviewed by the Architect.
   2. Contractor's Action Column:
      a. No Action Required: Nothing else is needed from the Contractor on the submittal.

1) Work included in the submittal can proceed unless approval from a third party (i.e. Authority Having Jurisdiction, etc.) is required provided that all comments noted, if any, are properly incorporated into the Work.

b. Revise and Resubmit: Revisions to the submittal need to be made according to the notations and resubmitted to the Architect.
   1) Work cannot proceed until the submittal is revised, resubmitted, and approved.

c. Resubmit New Submittal: The submittal is unacceptable to the point that a new submittal needs to be made according to the notations and resubmitted to the Architect.
   1) Work cannot proceed until the submittal is revised, resubmitted, and approved.

d. Submit Final Record Copy: Revisions are needing to be made to the submittal and a clean final copy of the submittal resubmitted to the Architect for their files.
   1) Work included in the submittal can proceed unless approval from a third party (i.e. Authority Having Jurisdiction, etc.) is required and provided that all comments noted, if any, are properly incorporated into the Work.

B. Action Submittals: Architect will review each submittal, indicate corrections or revisions required , and return.
   1. PDF Submittals: Architect will indicate, via markup on each submittal, the appropriate action .

C. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.

D. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect.

E. Incomplete submittals, submittals that have not been reviewed and approved by the Contractor, and submittals that do not have the Contractor's approval stamp are unacceptable, shall be considered nonresponsive, and shall be returned for resubmittal without review.

F. Architect shall return without review submittals received from sources other than Contractor.

G. Submittals not required by the Contract Documents shall be returned by Architect without review.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 33 00

SECTION 01 40 00 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for quality assurance and quality control.

B. Testing and inspection services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
   1. Specific quality-assurance and quality-control requirements for individual work results are specified in their respective Specification Sections. Requirements in individual Sections may also cover production of standard products.
   2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and quality-control procedures that facilitate compliance with the Contract Document requirements.
   3. Requirements for Contractor to provide quality-assurance and quality-control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.

1.2 DEFINITIONS

A. Experienced: When used with an entity or individual, "experienced," unless otherwise further described, means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

B. Field Quality-Control Tests and Inspections: Tests and inspections that are performed on-site for installation of the Work and for completed Work.

C. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, subcontractor, or sub-subcontractor, to perform a particular construction operation, including installation, erection, application, assembly, and similar operations.
   1. Use of trade-specific terminology in referring to a Work result does not require that certain construction activities specified apply exclusively to specific trade(s).

D. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria. Unless otherwise indicated, copies of reports of tests or inspections performed for other than the Project do not meet this definition.

E. Product Tests: Tests and inspections that are performed by a nationally recognized testing laboratory (NRTL) in accordance with 29 CFR 1910.7, by a testing agency accredited in accordance with NIST's National Voluntary Laboratory Accreditation Program (NVLAP), or by a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.

F. Source Quality-Control Tests and Inspections: Tests and inspections that are performed at the source (e.g., plant, mill, factory, or shop).

G. Testing Agency: An entity engaged to perform specific tests, inspections, or both. The term "testing laboratory" has the same meaning as the term "testing agency."

H. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work, to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.

I. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work, to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Contractor's quality-control services do not include contract administration activities performed by Architect.

1.3 DELEGATED DESIGN SERVICES

A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
   1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.

1.4 CONFLICTING REQUIREMENTS

A. Conflicting Standards and Other Requirements: If compliance with two or more standards or requirements is specified and the standards or requirements establish different or conflicting requirements for minimum quantities or quality levels, inform the Architect regarding the conflict and obtain clarification prior to proceeding with the Work. Refer conflicting requirements that are different, but apparently equal, to Architect for clarification before proceeding.

B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified is the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

1.5 INFORMATIONAL SUBMITTALS

A. Permits, Licenses, and Certificates: For Owner's record, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents established for compliance with standards and regulations bearing on performance of the Work.

1.6 REPORTS AND DOCUMENTS

A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:
   1. Date of issue.
   2. Project title and number.
   3. Name, address, telephone number, and email address of testing agency.
   4. Dates and locations of samples and tests or inspections.
   5. Names of individuals making tests and inspections.
   6. Description of the Work and test and inspection method.
   7. Identification of product and Specification Section.
   8. Complete test or inspection data.
   9. Test and inspection results and an interpretation of test results.
   10. Record of temperature and weather conditions at time of sample-taking and testing and inspection.
   11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
   12. Name and signature of laboratory inspector.
   13. Recommendations on retesting and reinspecting.

B. Manufacturer's Technical Representative's Field Reports: Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:

1. Name, address, telephone number, and email address of technical representative making report.
2. Statement on condition of substrates and their acceptability for installation of product.
3. Statement that products at Project site comply with requirements.
4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
5. Statement of whether conditions, products, and installation will affect warranty.
6. Other required items indicated in individual Specification Sections.

C. Factory-Authorized Service Representative's Reports: Prepare written information documenting manufacturer's factory-authorized service representative's tests and inspections specified in other Sections. Include the following:
1. Name, address, telephone number, and email address of factory-authorized service representative making report.
2. Statement of whether conditions, products, and installation will affect warranty.
3. Other required items indicated in individual Specification Sections.

1.7 QUALITY ASSURANCE

A. Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.

B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units. As applicable, procure products from manufacturers able to meet qualification requirements, warranty requirements, and technical or factory-authorized service representative requirements.

C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

D. Installer Qualifications: A firm or individual experienced in installing, erecting, applying, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.

E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that is similar in material, design, and extent to those indicated for this Project.

F. Specialists: Certain Specification Sections require that specific construction activities be performed by entities who are recognized experts in those operations. Specialists will satisfy qualification requirements indicated and engage in the activities indicated.
1. Requirements of authorities having jurisdiction supersede requirements for specialists.

G. Testing and Inspecting Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspection indicated, as documented in accordance with ASTM E329, and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.

H. Manufacturer's Technical Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

I. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect, demonstrate, repair, and perform service on

installations of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

J. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:
   1. Contractor's Responsibilities:
      a. Provide test specimens representative of proposed products and construction.
      b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
      c. Provide sizes and configurations of test assemblies, mockups, and laboratory mockups to adequately demonstrate capability of products to comply with performance requirements.
   2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect , with copy to Contractor. Interpret tests and inspections, and state in each report whether tested and inspected Work complies with or deviates from the Contract Documents.

1.8 QUALITY CONTROL

A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.
   1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspection they are engaged to perform.
   2. Costs for retesting and reinspecting construction that replaces or is necessitated by Work that failed to comply with the Contract Documents will be charged to Contractor , and the Contract Sum will be adjusted by Change Order.

B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities, whether specified or not, to verify and document that the Work complies with requirements.
   1. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
   2. Engage a qualified testing agency to perform quality-control services.
      a. Contractor will not employ same entity engaged by Owner, unless agreed to in writing by Owner.
   3. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspection will be performed.
   4. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
   5. Testing and inspection requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
   6. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

C. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.

D. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Section 01 33 00 "Submittal Procedures."

E. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.

F. Contractor's Associated Requirements and Services: Cooperate with agencies and representatives performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
   1. Access to the Work.
   2. Incidental labor and facilities necessary to facilitate tests and inspections.
   3. Adequate quantities of representative samples of materials that require testing and inspection. Assist agency in obtaining samples.

G. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and quality-control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspection.
   1. Schedule times for tests, inspections, obtaining samples, and similar activities.

1.9 SPECIAL TESTS AND INSPECTIONS

A. Special Tests and Inspections: Owner will engage a qualified testing agency to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner, and as follows:
   1. Notifying Architect and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
   2. Submitting a certified written report of each test, inspection, and similar quality-control service to Architect with copy to Contractor and to authorities having jurisdiction.
   3. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
   4. Interpreting tests and inspections, and stating in each report whether tested and inspected Work complies with or deviates from the Contract Documents.
   5. Retesting and reinspecting corrected Work.
   6. .

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

A. Test and Inspection Log: Prepare a record of tests and inspections. Include the following:
   1. Date test or inspection was conducted.
   2. Description of the Work tested or inspected.
   3. Date test or inspection results were transmitted to Architect.
   4. Identification of testing agency or special inspector conducting test or inspection.

B. Maintain log at Project site. Post changes and revisions as they occur. Provide access to test and inspection log for Architect's and authorities' having jurisdiction reference during normal working hours.
   1. Submit log at Project closeout as part of Project Record Documents.

3.2 REPAIR AND PROTECTION

A. General: On completion of testing, inspection, sample-taking, and similar services, repair damaged construction and restore substrates and finishes.
   1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Section 01 73 00 "Execution."

B. Protect construction exposed by or for quality-control service activities.

C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 01 40 00

SECTION 01 41 00 – REGULATORY REQUIREMENTS

PART 1 - GENERAL

1.1 CODES – OAK RIDGE, TN

A. Work shall conform to the requirements of the adopted codes and legislation listed below.
1. 2018 International Building Code (IBC)
2. 2018 International Fire Code (IFC)
3. 2018 International Existing Building Code (IEBC)
4. 2018 International Energy Conservation Code (IECC)
5. 2018 International Plumbing Code (IPC)
6. 2018 International Fuel Gas Code (IFGC)
7. 2018 International Mechanical Code (IMC)
8. 2017 National Electrical Code (NEC)
9. 2010 Americans with Disabilities Act Accessibility Guidelines (ADAAG)
10. TDEC Division of Water Pollution Control, Water Quality Control Act of 1977
11. Zoning Ordinance of Oak Ridge, Tennessee with Amendments through 01/18/24

1.2 MATERIAL AND TESTING STANDARDS

A. Components of the Work shall conform to requirements of American Society for Testing and Materials (ASTM) standards, American National Standards Institute (ANSI) standards, and trade association standards, as listed in the various other sections of the specifications.

1.3 ADDITIONAL OWNER REQUIREMENTS

A. Refer to Owner’s Request for Proposal document for additional regulatory requirements, affidavits, certifications, and forms that need to be submitted with your Bid.

END OF SECTION

SECTION 01 42 00 - REFERENCES

PART 1 - GENERAL

1.1 DEFINITIONS

A. General: Basic Contract definitions are included in the Conditions of the Contract.

B. "Approved": When used to convey Architect's action on Contractor's submittals, applications, and requests, "approved" is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.

C. "Directed": A command or instruction by Architect. Other terms, including "requested," "authorized," "selected," "required," and "permitted," have the same meaning as "directed."

D. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms, including "shown," "noted," "scheduled," and "specified," have the same meaning as "indicated."

E. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.

F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.

G. "Install": Unload, temporarily store, unpack, assemble, erect, place, anchor, apply, work to dimension, finish, cure, protect, clean, and similar operations at Project site.

H. "Provide": Furnish and install, complete and ready for the intended use.

I. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

1.2 INDUSTRY STANDARDS

A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.

B. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.
   1. For standards referenced by applicable building codes, comply with dates of standards as listed in building codes.

1.3 ABBREVIATIONS AND ACRONYMS

A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they are to mean the recognized name of the entities indicated in Gale's "Encyclopedia of Associations: National Organizations of the U.S." or in Columbia Books' "National Trade & Professional Associations of the United States."

B. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they are to mean the recognized name of the entities in the following list. This information is believed to be accurate as of the date of the Contract Documents.
   1. ICC - International Code Council; www.iccsafe.org.

C. Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they are to mean the recognized name of the standards and regulations in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.
   1. NFHS - National Federation or State High School Associations; www.nfhs.org.

D. State Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they are to mean the recognized name of the entities in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.
   1. TDEC - Tennessee Department of Environment & Conservation.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 42 00

SECTION 01 45 29 - TESTING LABORATORY SERVICES

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work included:
1. Cooperate with the testing laboratory(ies) selected by the Owner and all others responsible for testing and inspecting the Work.
2. Provide such other testing and inspecting as are specified to be furnished by the Contractor in this Section and elsewhere in the Contract Documents.

B. Related work:
1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions and Sections in Division 01 of these Specifications.
2. Requirements for testing may be described in various Sections of these Specifications.
3. Where no testing requirements are described, the Owner may request testing to be performed.
4. Divisions 02 through 49 Sections for specific requirements for testing of the Work in those Sections.

C. Work not included:
1. Selection of testing laboratory(ies): The Owner will select qualified independent testing laboratory(ies).

1.2 QUALITY ASSURANCE

A. The testing laboratory(ies) will be qualified to the Owner's approval in accordance with latest and current edition of ASTM E329.

B. Testing will be in accordance with all pertinent codes and regulations, and with selected standards of the American Society for Testing and Materials (ASTM).

1.3 PRODUCT HANDLING

A. Promptly process and distribute copies of test reports.

B. Provide an electronic PDF copy of test results to the Architect, Owner, and other designated recipients for tests that are required by the specifications included in this Project Manual and on the Drawings.

PART 2 - PRODUCTS

2.1 PAYMENT FOR TESTING

A. Contract required testing: Tests required by the technical sections of these specifications shall be paid for by the Owner.

B. Owner requested testing: Where the Owner requests tests to be conducted on any part of the Work to prove compliance with the requirements of the Contract Documents, such tests shall be paid for as follows:
1. Work proven by the tests to be in compliance with requirements of the Contract Documents shall be paid for by the Owner.
2. Work proven by the tests not to be in compliance with the Contract Documents shall be paid for by the Contractor at no additional expense to the Owner.

C. Retesting: When tests indicate noncompliance with the Contract Documents, subsequent retesting occasioned by the noncompliance shall be performed by the same testing agency(ies), and costs thereof will be paid for by the Contractor at no additional cost to the Owner.

2.2 CODE COMPLIANCE TESTING

A. Inspections and tests required by codes or ordinances, or by a plan approval authority, and which are made by a legally constituted authority, shall be the responsibility of and shall be paid for by the Contractor, unless such is otherwise provided in the Contract Documents.

2.3 CONTRACTOR'S CONVENIENCE TESTING

A. Inspecting and testing performed exclusively for the Contractor's convenience shall be the sole responsibility of the Contractor and shall not be paid for by the Owner.

PART 3 - EXECUTION

3.1 COOPERATION WITH TESTING LABORATORY(IES)

A. Representatives of the testing laboratory(ies) shall have access to the Work at all times and at all locations where the Work is in progress. Provide facilities for such access to enable the laboratory to perform its functions properly.

3.2 TAKING SPECIMENS

A. All specimens and samples for testing, unless otherwise provided in the Contract Documents, shall be taken by the testing laboratory personnel only. All sampling equipment and personnel will be provided by the testing laboratory(ies). All deliveries of specimens and samples to the testing laboratory(ies) will be performed by the testing laboratory(ies).

B. All specimens taken which require curing prior to transportation to the laboratory(ies) shall be stored in a location at the site where the specimens will be protected from disturbance, shock, freezing or other detrimental occurrences until the specimens are transported to the laboratory(ies) by testing personnel.

3.3 SCHEDULE FOR TESTING

A. Establishing schedule:
1. By advance discussion with the testing laboratory(ies) selected by the Owner, the Contractor shall determine the time required for the laboratory(ies) to perform its tests and to issue each of its findings.
2. Provide all required time for testing within the construction schedule.

B. Revising schedule: When changes of construction schedule are necessary during construction, coordinate all such changes with the testing laboratory(ies) as required.

C. Adherence to schedule: When the testing laboratory is ready to test according to the established schedule, but is prevented from testing or taking specimens due to incompleteness of the Work, or due to delay in delivery of materials, all personnel or equipment costs attributable to the delay so occasioned shall be borne by the Contractor and shall not be borne by the Owner. Such delay shall be documented by the testing laboratory in reports submitted to the Owner. Costs for such delays will be included in a Change Order crediting the Owner for such costs.

3.4 AUTHORITY OF THE TESTING LABORATORY PERSONNEL

A. The Testing Laboratory Personnel shall be the person observing or performing tests of portions of the Work.

B. When the Testing Laboratory determines that any portion of the Work, for which they have been retained to test as specified herein, does not conform to the project specifications, they shall reject the Work or materials as not complying with the requirements of the Contract Documents, and such work or material shall be removed or corrected to comply with the Contract Requirements. Such removal or correction shall be done at no additional cost to the Owner and without extension of time.

C. In the event that materials delivered to the site fail to comply with the Contract Requirements, based on tests performed by the Testing Laboratory, such materials shall be immediately removed from the site and shall not be incorporated into the Work.

D. Any materials that do not comply with Contract Requirements shall be reported by Testing Laboratory verbally and in a handwritten report to the Superintendent at the site immediately and in writing to the Architect subsequently.

E. In the event that materials rejected by the Testing Laboratory as non-compliant are not removed immediately from the site, the Architect shall be notified immediately by telephone, e-mail, or other method.

F. Any material that has been rejected by Testing Laboratory as non-compliant that has been incorporated into the work by the Contractor after notification of the rejection shall be carefully described as to its location in the Work including measurements and other locational data such as drawings. Such information of location of non-compliant materials shall be communicated immediately to the Architect as provided in item 3.4.E above.

G. The Architect shall make a determination as to whether additional testing of rejected materials shall be made and how the costs for such testing shall be paid for. If subsequent testing indicates that the rejected materials are or are not acceptable, the Architect shall notify the Contractor and will provide directions for its disposal as part of the Work.

END OF SECTION 01 45 29

SECTION 01 45 33 - CODE-REQUIRED SPECIAL INSPECTIONS AND PROCEDURES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Code-required special inspections.

B. Testing services incidental to special inspections.

C. Submittals.

D. Manufacturers' field services.

E. Fabricators' field services.

1.2 RELATED REQUIREMENTS

A. Document 00 31 19 - Existing Condition Information.

B. Section 01 33 00 - Submittal Procedures

C. Section 01 40 00 - Quality Requirements.

D. Section 01 41 00 - Regulatory Requirements.

E. Section 01 42 00 - References.

F. Section 01 45 29 - Testing Laboratory Services.

G. Section 01 60 00 - Product Requirements: Requirements for material and product quality.

1.3 ABBREVIATIONS AND ACRONYMS

A. AHJ: Authority having jurisdiction.

B. IAS: International Accreditation Service, Inc.

C. NIST: National Institute of Standards and Technology.

1.4 DEFINITIONS

A. Code or Building Code: ICC (IBC), International Building Code, Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements and specifically, Chapter 17 - Special Inspections and Tests.

B. Authority Having Jurisdiction (AHJ): Agency or individual officially empowered to enforce the building, fire and life safety code requirements of the permitting jurisdiction in which the Project is located.

C. Special Inspection:
   1. Special inspections are inspections and testing of materials, installation, fabrication, erection or placement of components and connections mandated by the AHJ that also require special expertise to ensure compliance with the approved Contract Documents and the referenced standards.
   2. Special inspections are separate from and independent of tests and inspections conducted by Owner or Contractor for the purposes of quality assurance and contract administration.

1.5 REFERENCE STANDARDS

A. ACI 318 - Building Code Requirements for Structural Concrete and Commentary; 2014 (Errata 2018).

B. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures; Most Recent Edition Cited by Referring Code or Reference Standard.

C. ASTM C31/C31M - Standard Practice for Making and Curing Concrete Test Specimens in the Field; 2021.

D. ASTM C172/C172M - Standard Practice for Sampling Freshly Mixed Concrete; 2017.

E. ASTM E329 - Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection; 2018.

F. ASTM E543 - Standard Specification for Agencies Performing Nondestructive Testing; 2015.

G. ASTM E2174 - Standard Practice for On-Site Inspection of Installed Firestops; 2014b.

H. ASTM E2393 - Standard Practice for On-Site Inspection of Installed Fire Resistive Joint Systems and Perimeter Fire Barriers; 2010a (Reapproved 2015).

I. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2020.

J. AWS D1.4/D1.4M - Structural Welding Code - Reinforcing Steel; 2018.

K. IAS AC89 - Accreditation Criteria for Testing Laboratories; 2017.

L. IAS AC291 - Accreditation Criteria for Special Inspection Agencies; 2017.

M. ICC (IBC) - International Building Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

N. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures; 2016.

1.6 SUBMITTALS

A. See Section 01 33 00 - Submittal Procedures, for submittal procedures.

B. Special Inspection Agency Qualifications: Prior to the start of work, the Special Inspection Agency is required to:
   1. Submit agency name, address, and telephone number, names of full time registered Engineer and responsible officer.
   2. Submit copy of report of laboratory facilities inspection made by NIST Construction Materials Reference Laboratory during most recent inspection, with memorandum of remedies of any deficiencies reported by the inspection.
   3. Submit certification that Special Inspection Agency is acceptable to AHJ.

C. Testing Agency Qualifications: Prior to the start of work, the Testing Agency is required to:
   1. Submit agency name, address, and telephone number, and names of full time registered Engineer and responsible officer.
   2. Submit certification that Testing Agency is acceptable to AHJ.

D. Fabricator's Qualification Statement: Fabricator is required to submit documentation of fabrication facilities and methods as well as quality control procedures.

E. Special Inspection Reports: After each special inspection, Special Inspector is required to promptly submit at least two copies of report; one to Architect and one to the AHJ.
   1. Include:
      a. Date issued.
      b. Project title and number.
      c. Name of Special Inspector.
      d. Date and time of special inspection.
      e. Identification of product and specifications section.
      f. Location in the Project.
      g. Type of special inspection.
      h. Date of special inspection.
      i. Results of special inspection.
      j. Compliance with Contract Documents.

F. Fabricator Special Inspection Reports: After each special inspection of fabricated items at the Fabricator's facility, Special Inspector is required to promptly submit at least two copies of report; one to Architect and one to AHJ.
   1. Include:
      a. Date issued.
      b. Project title and number.
      c. Name of Special Inspector.
      d. Date and time of special inspection.
      e. Identification of fabricated item and specification section.
      f. Location in the Project.
      g. Results of special inspection.
      h. Verification of fabrication and quality control procedures.
      i. Compliance with Contract Documents.
      j. Compliance with referenced standard(s).

G. Test Reports: After each test or inspection, promptly submit at least two copies of report; one to Architect and one to AHJ.
   1. Include:
      a. Date issued.
      b. Project title and number.
      c. Name of inspector.
      d. Date and time of sampling or inspection.
      e. Identification of product and specifications section.
      f. Location in the Project.
      g. Type of test or inspection.
      h. Date of test or inspection.
      i. Results of test or inspection.
      j. Compliance with Contract Documents.

H. Certificates: When specified in individual special inspection requirements, Special Inspector shall submit certification by the manufacturer, fabricator, and installation subcontractor to Architect and AHJ, in quantities specified for Product Data.
   1. Indicate material or product complies with or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
   2. Certificates may be recent or previous test results on material or product, but must be acceptable to Architect and AHJ.

1.7 SPECIAL INSPECTION AGENCY

A. Owner will employ services of a Special Inspection Agency to perform inspections and associated testing and sampling in accordance with ASTM E329 and required by the building code.

B. The Special Inspection Agency may employ and pay for services of an independent testing agency to perform testing and sampling associated with special inspections and required by the building code.

C. Employment of agency in no way relieves Contractor of obligation to perform work in accordance with requirements of Contract Documents.

1.8 TESTING AND INSPECTION AGENCIES

A. Owner may employ services of an independent testing agency to perform additional testing and sampling associated with special inspections but not required by the building code.

B. Employment of agency in no way relieves Contractor of obligation to perform work in accordance with requirements of Contract Documents.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF SPECIAL INSPECTIONS, GENERAL

A. Frequency of Special Inspections: Special Inspections are indicated as continuous or periodic.
1. Continuous Special Inspection: Special Inspection Agency is required to be present in the area where the work is being performed and observe the work at all times the work is in progress.
2. Periodic Special Inspection: Special Inspection Agency is required to be present in the area where work is being performed and observe the work part-time or intermittently and at the completion of the work.

3.2 SPECIAL INSPECTIONS FOR STEEL CONSTRUCTION

A. Structural Steel: Comply with quality assurance inspection requirements of ICC (IBC).

B. High-Strength Bolt, Nut and Washer Material:
1. Verify identification markings comply with ASTM standards specified in the approved contract and to AISC 360, Section A3.3; periodic.
2. Submit manufacturer's certificates of compliance; periodic.

C. High-Strength Bolting Installation: Verify items listed below comply with AISC 360, Section M2.5.
1. Snug tight joints; periodic.
2. Pretensioned and slip-critical joints with matchmarking, twist-off bolt or direct tension indicator method of installation; periodic.
3. Pretensioned and slip-critical joints without matchmarking or calibrated wrench method of installation; continuous.

D. Structural Steel and Cold Formed Steel Deck Material:
1. Structural Steel: Verify identification markings comply with AISC 360, Section M3.5; periodic.
2. Other Steel: Verify identification markings comply with ASTM standards specified in the approved Contract Documents; periodic.
3. Submit manufacturer's certificates of compliance and test reports; periodic.

E. Welding:
1. Structural Steel and Cold Formed Steel Deck:
a. Complete and Partial Joint Penetration Groove Welds: Verify compliance with AWS D1.1/D1.1M; continuous.
b. Multipass Fillet Welds: Verify compliance with AWS D1.1/D1.1M; continuous.
c. Single Pass Fillet Welds Less than 5/16 inch (7.94 mm) Wide: Verify compliance with AWS D1.1/D1.1M; periodic.
d. Plug and Slot Welds: Verify compliance with AWS D1.1/D1.1M; continuous.

e. Single Pass Fillet Welds 5/16 inch (7.94 mm) or Greater: Verify compliance with AWS D1.1/D1.1M; continuous.

2. Reinforcing Steel: Verify items listed below comply with AWS D1.4/D1.4M and ACI 318, Section 3.5.2.
   a. Verification of weldability; periodic.
   b. Reinforcing steel resisting flexural and axial forces in intermediate and special moment frames as well as boundary elements of special structural walls of concrete and shear reinforcement; continuous.
   c. Shear reinforcement; continuous.
   d. Other reinforcing steel; periodic.

F. Steel Frame Joint Details: Verify compliance with approved Contract Documents.
1. Details, bracing and stiffening; periodic.
2. Member locations; periodic.
3. Application of joint details at each connection; periodic.

3.3 SPECIAL INSPECTIONS FOR CONCRETE CONSTRUCTION

A. Reinforcing Steel, Including Prestressing of Tendons and Placement: Verify compliance with approved Contract Documents and ACI 318, Sections 3.5 and 7.1 through 7.7; periodic.

B. Reinforcing Steel Welding: Verify compliance with AWS D1.4/D1.4M and ACI 318, Section 3.5.2; periodic.

C. Anchors Cast in Concrete: Verify compliance with ACI 318, 17.8.2; periodic.

D. Bolts Installed in Concrete: Where allowable loads have been increased or where strength design is used, verify compliance with approved Contract Documents and ACI 318, Sections 8.1.3 and 21.2.8 prior to and during placement of concrete; continuous.

E. Design Mix: Verify plastic concrete complies with the design mix in approved Contract Documents and with ACI 318, Chapter 4 and 5.2; periodic.

F. Concrete Sampling Concurrent with Strength Test Sampling: Each time fresh concrete is sampled for strength tests, verify compliance with ASTM C172/C172M, ASTM C31/C31M and ACI 318, Chapter 26.5, 26.12, and record the following, continuous:
1. Slump.
2. Air content.
3. Temperature of concrete.

G. Specified Curing Temperature and Techniques: Verify compliance with approved Contract Documents and ACI 318, Sections 5.11 through 5.13; periodic.

H. Concrete Strength in Situ: Verify concrete strength complies with approved Contract Documents and ACI 318, Section 6.2, for the following.

I. Formwork Shape, Location and Dimensions: Verify compliance with approved Contract Documents and ACI 318, Section 6.1.1; periodic.

3.4 SPECIAL INSPECTIONS FOR MASONRY CONSTRUCTION

A. Masonry Structures Subject to Special Inspection:
1. Masonry construction when required by the quality assurance program of TMS 402/602.
2. Empirically designed masonry, glass unit masonry and masonry veneer in structures designated as "essential facilities".

B. Verify each item below complies with approved Contract Documents and the applicable articles of TMS 402/602.
   1. Inspections and Approvals:
      a. Verify compliance with the required inspection provisions of the approved Contract Documents; periodic.
      b. Verify approval of submittals required by Contract Documents; periodic.
   2. Compressive Strength of Masonry: Verify compressive strength of masonry units prior to start of construction unless specifically exempted by code; periodic.
   3. Slump Flow and Visual Stability Index (VSI): Verify compliance as self consolidating grout arrives on site; continuous.
   4. Joints and Accessories: When masonry construction begins, verify:
      a. Proportions of site prepared mortar; periodic.
      b. Construction of mortar joints; periodic.
      c. Location of reinforcement, connectors, prestressing tendons, anchorages, etc; periodic.
   5. Structural Elements, Joints, Anchors, Protection: During masonry construction, verify:
      a. Size and location of structural elements; periodic.
      b. Type, size and location of anchors, including anchorage of masonry to structural members, frames or other construction; periodic.
      c. Size, grade and type of reinforcement, anchor bolts and prestressing tendons and anchorages; periodic.
      d. Welding of reinforcing bars; continuous.
   6. Grouting Preparation: Prior to grouting, verify:
      a. Grout space is clean; periodic.
      b. Correct placement of reinforcing, connectors, prestressing tendons and anchorages; periodic.
      c. Correctly proportioned site prepared grouts and prestressing grout for bonded tendons; periodic.
      d. Correctly constructed mortar joints; periodic.
   7. Preparation of Grout Specimens, Mortar Specimens and Prisms: Observe preparation of specimens; periodic.

3.5 SPECIAL INSPECTIONS FOR FIRE RESISTANT PENETRATIONS AND JOINTS

A. Verify penetration firestops in accordance with ASTM E2174.

B. Verify fire resistant joints in accordance with ASTM E2393.

3.6 SPECIAL INSPECTIONS FOR SEISMIC RESISTANCE

A. Architectural Components: Erection and fastening of components below; periodic.
   1. Interior and exterior veneer.
   2. Interior and exterior non-loadbearing walls and partitions.

B. Designated Seismic System Verification: Verify label, anchorage or mounting complies with certificate of compliance provided by manufacturer or fabricator.

C. Structural Observations for Seismic Resistance: Visually observe structural system for general compliance with the approved Contract Documents; periodic.

3.7 SPECIAL INSPECTION AGENCY DUTIES AND RESPONSIBILITIES

A. Special Inspection Agency shall:
   1. Provide qualified personnel at site. Cooperate with Architect and Contractor in performance of services.
   2. Perform specified sampling and testing of products in accordance with specified reference standards.
   3. Ascertain compliance of materials and products with requirements of Contract Documents.

4. Promptly notify Architect and Contractor of observed irregularities or non-compliance of work or products.
5. Perform additional tests and inspections required by Architect.
6. Submit reports of all tests or inspections specified.

B. Limits on Special Inspection Agency Authority:
1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
2. Agency may not approve or accept any portion of the work.
3. Agency may not assume any duties of Contractor.
4. Agency has no authority to stop the work.

C. Re-testing required because of non-compliance with specified requirements shall be performed by the same agency on instructions by Architect.

D. Re-testing required because of non-compliance with specified requirements shall be paid for by Contractor.

3.8 CONTRACTOR DUTIES AND RESPONSIBILITIES

A. Contractor Responsibilities, General:
1. Deliver to agency at designated location, adequate samples of materials for special inspections that require material verification.
2. Cooperate with agency and laboratory personnel; provide access to approved documents at project site, to the work, to manufacturers' facilities, and to fabricators' facilities.
3. Provide incidental labor and facilities:
a. To provide access to work to be tested or inspected.
b. To obtain and handle samples at the site or at source of Products to be tested or inspected.
c. To facilitate tests or inspections.
d. To provide storage and curing of test samples.

B. Notify Architect and laboratory 24 hours prior to expected time for operations requiring testing or inspection services.

C. Arrange with Owner's agency and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.

3.9 MANUFACTURERS' AND FABRICATORS' FIELD SERVICES

A. When specified in individual specification sections, require material suppliers, assembly fabricators, or product manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, to test, adjust, and balance equipment, and to initiate instructions when necessary.

B. Submit qualifications of observer to Architect 30 days in advance of required observations.
1. Observer subject to approval of Owner.

C. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

END OF SECTION 01 45 33

SECTION 01 50 00 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.

B. Related Requirements:
1. Section 01 10 00 "Summary" for work restrictions and limitations on utility interruptions.

1.2 USE CHARGES

A. Installation, removal, and use charges for temporary facilities to be included in the Contract Sum unless otherwise indicated. Allow other entities engaged in the Project to use temporary services and facilities without cost, including, but not limited to, Owner's construction forces, Architect, testing agencies, and authorities having jurisdiction.

B. Water and Sewer Service from Existing System: Water from Owner's existing water system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.

C. Electric Power Service from Existing System: Electric power from Owner's existing system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.

1.3 QUALITY ASSURANCE

A. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

1.4 PROJECT CONDITIONS

A. Temporary Use of Permanent Facilities: Engage Installer of each permanent service to assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Portable Chain-Link Fencing: Minimum 2-inch, 0.148-inch- thick, galvanized-steel, chain-link fabric fencing; minimum 6 feet high with galvanized-steel pipe posts; minimum 2-3/8-inch- OD line posts and 2-7/8-inch- OD corner and pull posts, with 1-5/8-inch- OD top and bottom rails. Provide galvanized-steel bases for supporting posts.

B. Dust-Control Adhesive-Surface Walk-Off Mats: Provide mats, minimum 36 by 60 inches.

2.2 EQUIPMENT

A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.

PART 3 - EXECUTION

3.1 TEMPORARY FACILITIES, GENERAL

A. Conservation: Coordinate construction and use of temporary facilities with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.
1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. See other Sections for disposition of salvaged materials that are designated as Owner's property.

3.2 INSTALLATION, GENERAL

A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.
1. Locate facilities to limit site disturbance as specified in Section 01 10 00 "Summary."

B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

C. Isolation of Work Areas in Occupied Facilities: Prevent dust, fumes, and odors from entering occupied areas.
1. Prior to commencing work, isolate the HVAC system in area where work is to be performed.
a. Maintain negative air pressure within work area, using HEPA-equipped air-filtration units, starting with commencement of temporary partition construction, and continuing until removal of temporary partitions is complete.
2. Perform daily construction cleanup and final cleanup using approved, HEPA-filter-equipped vacuum equipment.

3.3 TEMPORARY UTILITY INSTALLATION

A. General: Install temporary service or connect to existing service.
1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.

B. Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.
1. Connect temporary sewers to municipal system as directed by authorities having jurisdiction.

C. Water Service:
1. Connect to Owner's existing water service facilities. Clean and maintain water service facilities in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.

D. Sanitary Facilities: Provide temporary toilets, wash facilities, safety shower and eyewash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.
1. Use of Permanent Toilets: Use of Owner's existing or new toilet facilities is not permitted .

E. Electric Power Service:
1. Connect to Owner's existing electric power service. Maintain equipment in a condition acceptable to Owner.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.

B. Temporary Erosion and Sedimentation Control:
   1. Comply with requirements of EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent and requirements specified in Section 31 10 00 "Site Clearing."
   2. Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to undisturbed areas and to adjacent properties and walkways, in accordance with erosion- and sedimentation-control Drawings .
      a. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross tree- or plant-protection zones.
      b. Inspect, repair, and maintain erosion- and sedimentation-control measures during construction until permanent vegetation has been established.
      c. Clean, repair, and restore adjoining properties and roads affected by erosion and sedimentation from Project site during the course of Project.
      d. Remove erosion and sedimentation controls, and restore and stabilize areas disturbed during removal.

C. Stormwater Control: Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.

D. Site Enclosure Fence: Before construction operations begin , furnish and install site enclosure fence in a manner that will prevent people from easily entering site except by entrance gates.
   1. Extent of Fence: As required to enclose entire Project site or portion determined sufficient to accommodate construction operations .
   2. Maintain security by limiting number of keys and restricting distribution to authorized personnel. Furnish one set of keys to Owner.

E. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.

3.5 MOISTURE AND MOLD CONTROL

A. Moisture and Mold Protection: Protect stored materials and installed Work in accordance with Moisture and Mold Protection Plan.

B. Exposed Construction Period: Before installation of weather barriers, when materials are subject to wetting and exposure and to airborne mold spores, protect as follows:
   1. Protect porous materials from water damage.
   2. Protect stored and installed material from flowing or standing water.
   3. Keep porous and organic materials from coming into prolonged contact with concrete.
   4. Remove standing water from decks.
   5. Keep deck openings covered or dammed.

C. Partially Enclosed Construction Period: After installation of weather barriers but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:
   1. Do not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.
   2. Keep interior spaces reasonably clean and protected from water damage.
   3. Periodically collect and remove waste containing cellulose or other organic matter.
   4. Discard or replace water-damaged material.
   5. Do not install material that is wet.
   6. Discard and replace stored or installed material that begins to grow mold.
   7. Perform work in a sequence that allows wet materials adequate time to dry before enclosing the material in gypsum board or other interior finishes.

D. Controlled Construction Period: After completing and sealing of the building enclosure but prior to the full operation of permanent HVAC systems, maintain as follows:
   1. Control moisture and humidity inside building by maintaining effective dry-in conditions.

2. Use temporary or permanent HVAC system to control humidity within ranges specified for installed and stored materials.
3. Comply with manufacturer's written instructions for temperature, relative humidity, and exposure to water limits.
    a. Hygroscopic materials that may support mold growth, including wood and gypsum-based products, that become wet during the course of construction and remain wet for 48 hours are considered defective and require replacing.
    b. Measure moisture content of materials that have been exposed to moisture during construction operations or after installation. Record readings beginning at time of exposure and continuing daily for 48 hours. Identify materials containing moisture levels higher than allowed. Report findings in writing to Architect.
    c. Remove and replace materials that cannot be completely restored to their manufactured moisture level within 48 hours.

3.6 OPERATION, TERMINATION, AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.

B. Maintenance: Maintain facilities in good operating condition until removal.
    1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.

C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.

D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
    1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
    2. Remove temporary roads and paved areas not intended for or acceptable for integration into permanent construction. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.
    3. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 01 77 00 "Closeout Procedures."

END OF SECTION 01 50 00

SECTION 01 57 23 - TEMPORARY STORMWATER POLLUTION CONTROL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
1. Temporary stormwater pollution controls.

1.3 STORMWATER POLLUTION PREVENTION PLAN

A. The Stormwater Pollution Prevention Plan (SWPPP) is part of the Contract Documents.

1.4 INFORMATIONAL SUBMITTALS

A. Inspection reports.

1.5 QUALITY ASSURANCE

A. Installers: Trained as indicated in the SWPPP.

PART 2 - PRODUCTS

2.1 TEMPORARY STORMWATER POLLUTION CONTROLS

A. Provide temporary stormwater pollution controls as required by the SWPPP.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with all best management practices, general requirements, performance requirements, reporting requirements, and all other requirements included in the SWPPP.

B. Locate stormwater pollution controls in accordance with the SWPPP.

C. Conduct construction as required to comply with the SWPPP and that minimize possible contamination or pollution or other undesirable effects.
1. Inspect, repair, and maintain SWPPP controls during construction.
a. Inspect all SWPPP controls not less than every seven days, and after each occurrence of a storm event, as outlined in the SWPPP.

D. Remove SWPPP controls at completion of construction and restore and stabilize areas disturbed during construction.

END OF SECTION 01 57 23

SECTION 01 60 00 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.

B. Related Requirements:
1. Section 01 10 00 "Summary" for Contractor requirements related to Owner-furnished products.
2. Section 01 21 00 "Allowances" for products selected under an allowance.
3. Section 01 23 00 "Alternates" for products selected under an alternate.
4. Section 01 25 00 "Substitution Procedures" for requests for substitutions.
5. Section 01 42 00 "References" for applicable industry standards for products specified.
6. Section 01 77 00 "Closeout Procedures" for submitting warranties.

1.3 DEFINITIONS

A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature that is current as of date of the Contract Documents.
2. New Products: Items that have not previously been incorporated into another project or facility. Salvaged items or items reused from other projects are not considered new products. Items that are manufactured or fabricated to include recycled content materials are considered new products, unless indicated otherwise.
3. Comparable Product: Product by named manufacturer that is demonstrated and approved through the comparable product submittal process described in Part 2 "Comparable Products" Article, to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.

B. Basis-of-Design Product Specification: A specification in which a single manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation. Published attributes and characteristics of basis-of-design product establish salient characteristics of products.
1. Evaluation of Comparable Products: In addition to the basis-of-design product description, product attributes and characteristics may be listed to establish the significant qualities related to type, function, in-service performance and physical properties, weight, dimension, durability, visual characteristics, and other special features and requirements for purposes of evaluating comparable products of additional manufacturers named in the specification. Manufacturer's published attributes and characteristics of basis-of-design product also establish salient characteristics of products for purposes of evaluating comparable products.

C. Subject to Compliance with Requirements: Where the phrase "Subject to compliance with requirements" introduces a product selection procedure in an individual Specification Section, provide products qualified under the specified product procedure. In the event that a named product or product by a

named manufacturer does not meet the other requirements of the specifications, select another named product or product from another named manufacturer that does meet the requirements of the specifications; submit a comparable product request or substitution request, if applicable.

D. Comparable Product Request Submittal: An action submittal requesting consideration of a comparable product, including the following information:
   1. Identification of basis-of-design product or fabrication or installation method to be replaced, including Specification Section number and title and Drawing numbers and titles.
   2. Data indicating compliance with the requirements specified in Part 2 "Comparable Products" Article.

E. Basis-of-Design Product Specification Submittal: An action submittal complying with requirements in Section 01 33 00 "Submittal Procedures."

F. Substitution: Refer to Section 01 25 00 "Substitution Procedures" for definition and limitations on substitutions.

1.4 QUALITY ASSURANCE

A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.

B. Identification of Products: Except for required labels and operating data, do not attach or imprint manufacturer or product names or trademarks on exposed surfaces of products or equipment that will be exposed to view in occupied spaces or on the exterior.
   1. Labels: Locate required product labels and stamps on a concealed surface, or, where required for observation following installation, on a visually accessible surface that is not conspicuous.
   2. Equipment Nameplates: Provide a permanent nameplate on each item of service- or power-operated equipment. Locate on a visually accessible but inconspicuous surface. Include information essential for operation, including the following:
      a. Name of product and manufacturer.
      b. Model and serial number.
      c. Capacity.
      d. Speed.
      e. Ratings.
   3. See individual identification Sections in Divisions 21, 22, 23, and 26 for additional equipment identification requirements.

1.5 COORDINATION

A. Modify or adjust affected work as necessary to integrate work of approved comparable products and approved substitutions.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products, using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.

B. Delivery and Handling:
   1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
   2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
   3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.

4. Inspect products on delivery to determine compliance with the Contract Documents and that products are undamaged and properly protected.

C. Storage:
1. Provide a secure location and enclosure at Project site for storage of materials and equipment.
2. Store products to allow for inspection and measurement of quantity or counting of units.
3. Store materials in a manner that will not endanger Project structure.
4. Store products that are subject to damage by the elements under cover in a weathertight enclosure above and off the ground, with ventilation adequate to prevent condensation and with adequate protection from wind.
5. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
6. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
7. Protect stored products from damage and liquids from freezing.

1.7 PRODUCT WARRANTIES

A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.
1. Manufacturer's Warranty: Written standard warranty form furnished by individual manufacturer for a particular product and issued in the name of the Owner or endorsed by manufacturer to Owner.
2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner and issued in the name of the Owner or endorsed by manufacturer to Owner.

B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.
1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
2. Specified Form: When specified forms are included in the Project Manual, prepare a written document, using indicated form properly executed.
3. See other Sections for specific content requirements and particular requirements for submitting special warranties.

C. Submittal Time: Comply with requirements in Section 01 77 00 "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.
1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
3. Owner reserves the right to limit selection to products with warranties meeting requirements of the Contract Documents.
4. Where products are accompanied by the term "as selected," Architect will make selection.
5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.
6. Or Equal: For products specified by name and accompanied by the term "or equal," "or approved equal," or "or approved," comply with requirements in "Comparable Products" Article to obtain approval for use of an unnamed product.

a. Submit additional documentation required by Architect in order to establish equivalency of proposed products. Unless otherwise indicated, evaluation of "or equal" product status is by the Architect, whose determination is final.

B. Product Selection Procedures:
1. Limited List of Products: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will be considered unless otherwise indicated.
a. Limited list of products may be indicated by the phrase "Subject to compliance with requirements, provide one of the following."
2. Non-Limited List of Products: Where Specifications include a list of names of both available manufacturers and products, provide one of the products listed or an unnamed product that complies with requirements.
a. Non-limited list of products is indicated by the phrase "Subject to compliance with requirements, available products that may be incorporated in the Work include, but are not limited to, the following."
b. Provision of an unnamed product is not considered a substitution, if the product complies with requirements.
3. Limited List of Manufacturers: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will be considered unless otherwise indicated.
a. Limited list of manufacturers is indicated by the phrase "Subject to compliance with requirements, provide products by one of the following."
4. Non-Limited List of Manufacturers: Where Specifications include a list of available manufacturers, provide a product by one of the manufacturers listed or a product by an unnamed manufacturer that complies with requirements.
a. Non-limited list of manufacturers is indicated by the phrase "Subject to compliance with requirements, available manufacturers whose products may be incorporated in the Work include, but are not limited to, the following."
b. Provision of products of an unnamed manufacturer is not considered a substitution, if the product complies with requirements.
5. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications may additionally indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.
a. For approval of products by unnamed manufacturers, comply with requirements in Section 01 25 00 "Substitution Procedures" for substitutions for convenience.

C. Visual Selection Specification: Where Specifications include the phrase "as selected by Architect from manufacturer's full range" or a similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.2 COMPARABLE PRODUCTS

A. Conditions for Consideration of Comparable Products: Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect may return requests without action, except to record noncompliance with the following requirements:
1. Evidence that proposed product does not require revisions to the Contract Documents, is consistent with the Contract Documents, will produce the indicated results, and is compatible with other portions of the Work.
2. Detailed comparison of significant qualities of proposed product with those of the named basis-of-design product. Significant product qualities include attributes, such as type, function, in-service

performance and physical properties, weight, dimension, durability, visual characteristics, and other specific features and requirements.

3. Evidence that proposed product provides specified warranty.
4. List of similar installations for completed projects, with project names and addresses and names and addresses of architects and owners, if requested.
5. Samples, if requested.

B. Architect's Action on Comparable Products Submittal: If necessary, Architect will request additional information or documentation for evaluation, as specified in Section 01 33 00 "Submittal Procedures."

1. Form of Approval of Submittal: As specified in Section 01 33 00 "Submittal Procedures."
2. Use product specified if Architect does not issue a decision on use of a comparable product request within time allocated.

C. Submittal Requirements, Single-Step Process: When acceptable to Architect, incorporate specified submittal requirements of individual Specification Section in combined submittal for comparable products. Approval by the Architect of Contractor's request for use of comparable product and of individual submittal requirements will also satisfy other submittal requirements.

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 60 00

SECTION 01 61 16 - VOLATILE ORGANIC COMPOUND (VOC) CONTENT RESTRICTIONS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Requirements for Indoor-Emissions-Restricted products.

B. Requirements for VOC-Content-Restricted products.

1.2 RELATED REQUIREMENTS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Section 01 40 00 - Quality Requirements: Procedures for testing and certifications.

C. Section 01 60 00 - Product Requirements: Fundamental product requirements, substitutions and product options, delivery, storage, and handling.

D. Section 07 92 00 - Joint Sealants: Emissions-compliant sealants.

1.3 DEFINITIONS

A. Indoor-Emissions-Restricted Products: All products in the following product categories, whether specified or not:
1. Interior paints and coatings applied on site.
2. Interior adhesives and sealants applied on site, including flooring adhesives.
3. Flooring.
4. Products making up wall and ceiling assemblies.
5. Thermal and acoustical insulation.

B. VOC-Content-Restricted Products: All products in the following product categories, whether specified or not:
1. Interior paints and coatings applied on site.
2. Interior adhesives and sealants applied on site, including flooring adhesives.

C. Interior of Building: Anywhere inside the exterior weather barrier.

D. Adhesives: All gunnable, trowelable, liquid-applied, and aerosol adhesives, whether specified or not; including flooring adhesives, resilient base adhesives, and pipe jointing adhesives.

E. Sealants: All gunnable, trowelable, and liquid-applied joint sealants and sealant primers, whether specified or not; including firestopping sealants and duct joint sealers.

F. Inherently Non-Emitting Materials: Products composed wholly of minerals or metals, unless they include organic-based surface coatings, binders, or sealants; and specifically the following:
1. Concrete.
2. Clay brick.
3. Metals that are plated, anodized, or powder-coated.
4. Glass.
5. Ceramics.
6. Solid wood flooring that is unfinished and untreated.

1.4 REFERENCE STANDARDS

A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency; current edition.

B. ASTM D3960 - Standard Practice for Determining Volatile Organic Compound (VOC) Content of Paints and Related Coatings; 2005 (Reapproved 2013).

C. CAL (CDPH SM) - Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions From Indoor Sources Using Environmental Chambers; 2017, v1.2.

D. CARB (SCM) - Suggested Control Measure for Architectural Coatings; California Air Resources Board; 2007.

E. SCAQMD 1113 - South Coast Air Quality Management District Rule No.1113; current edition.

F. SCAQMD 1168 - South Coast Air Quality Management District Rule No.1168; current edition.

1.5 SUBMITTALS

A. Product Data: For each VOC-restricted product used in the project, submit evidence of compliance.

1.6 QUALITY ASSURANCE

A. VOC-Content Test Method: 40 CFR 59, Subpart D (EPA Method 24), or ASTM D3960, unless otherwise indicated.

PART 2 - PRODUCTS

2.1 MATERIALS

A. VOC-Content-Restricted Products: VOC content not greater than required by the following:
   1. Adhesives, Including Flooring Adhesives: SCAQMD 1168 Rule.
   2. Joint Sealants: SCAQMD 1168 Rule.
   3. Paints and Coatings: Each color; most stringent of the following:
      a. 40 CFR 59, Subpart D.
      b. SCAQMD 1113 Rule.
      c. CARB (SCM).

PART 3 - EXECUTION

3.1 FIELD QUALITY CONTROL

A. Owner reserves the right to reject non-compliant products, whether installed or not, and require their removal and replacement with compliant products at no extra cost to Owner.

B. Additional costs to restore indoor air quality due to installation of non-compliant products will be borne by Contractor.

END OF SECTION 01 61 16

SECTION 01 71 23 - FIELD ENGINEERING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Field engineering services by Contractor.

B. Land surveying services by Contractor.

1.2 DESCRIPTION OF SERVICES

A. Specific services listed in this section are in addition to, and do not supersede, general Execution and Closeout Requirements.

B. Sole responsibility for establishing all locations, dimensions and levels of items of work.

C. Sole responsibility for provision of all materials required to establish and maintain benchmarks and control points, including batter boards, grade stakes, structure elevation stakes, and other items.

D. Having a skilled instrument person(s) available on short notice when necessary for laying out the work.

E. Keeping a transit, theodolite, or TST (total station theodolite with electronic distance measurement device); leveling instrument; and related implements such as survey rods and other measurement devices, at the project site at all times.

F. Provision of facilities and assistance necessary for Architect to check lines and grade points placed by Contractor.
   1. Performance of excavation or embankment work until after all cross-sectioning necessary for determining payment quantities for Unit Price work have been completed and accepted by Architect.

G. Preparation and maintenance of daily reports of activity on the work. Submission of reports containing key progress indicators and job conditions to Architect.
   1. Number of employees at the Site.
   2. Number employees at the Site for each of Contractor's subcontractors.
   3. Breakdown of employees by trades.
   4. Major equipment and materials installed as part of the work.
   5. Location of areas in which construction was performed.
   6. Materials and equipment received.
   7. Work performed, including field quality control measures and testing.
   8. Weather conditions.
   9. Delays encountered, amount of delay incurred, and the reasons for the delay.
   10. Instructions received from Architect or Owner, if any.

H. Preparation and maintenance of professional-quality, accurate, well organized, legible notes of all measurements and calculations made while surveying and laying out the work.

I. Prior to backfilling operations, surveying - locating, and recording on a copy of Contract Documents - an accurate representation of buried work and Underground Facilities encountered.

1.3 REFERENCE STANDARDS

A. FGDC-STD-007.1 - Geospatial Positioning Accuracy Standards - Part 1: Reporting Methodology; 1998.

B. FGDC-STD-007.2 - Geospatial Positioning Accuracy Standards - Part 2: Standards for Geodetic Networks; 1998.

C. FGDC-STD-007.4 - Geospatial Positioning Accuracy Standards - Part 4: Architecture, Engineering, Construction, and Facilities Measurement; 2002.

D. State Plane Coordinate System for the State in which the Project is located.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Conduct a preinstallation meeting one week prior to the start of the work of this section; require attendance by all affected installers.

1.5 SUBMITTALS

A. See Section 01 33 00 – Submittal Procedures, for submittal procedures.

B. Submit in addition to items required in Section 01 73 00 - Execution.

C. Informational Submittals: Submit the following:
1. Field Engineering: Submit daily reports, with content as indicated in this section.

1.6 QUALITY ASSURANCE

A. Field Engineer's Qualifications: As established in Section 01 73 00 - Execution.

B. Land Surveyor's Qualifications: As established in Section 01 77 00 - Closeout Procedures.

C. Use adequate number of skilled and thoroughly trained workers to perform the work of this section in a timely and comprehensive manner.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. Notify Owner’s Representative and Architect of any discrepancies immediately in writing before proceeding to lay out the work. Locate and protect existing benchmarks and base line. Preserve permanent reference points during construction.

B. Existing Utilities and Equipment: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify existing conditions.

3.2 FIELD ENGINEERING

A. Maintain field office files, drawings, specifications, and record documents.

B. Coordinate field engineering services with Contractor's subcontractors, installers, and suppliers as appropriate.

C. Prepare layout and coordination drawings for construction operations.

D. Check and coordinate the work for conflicts and interferences, and immediately advise Architect and Owner of all discrepancies of which Contractor is aware.

E. Cooperate as required with Architect and Owner in observing the work and performing field inspections.

F. Review and coordinate work on a regular basis with shop drawings and Contractor's other submittals.

G. Check the location, line and grade of every major element as the work progresses. Notify the Architect when deviations from required lines or grades exceed allowable tolerances. Include in such notifications a thorough explanation of the problem, and a proposed plan and schedule for remedying the deviation. Do not proceed with remedial work without Owner’s concurrence of the remediation plan.

H. Check all formwork, reinforcing, inserts, structural steel, bolts, sleeves, piping, other materials and equipment for compliance with shop drawings and Contract Documents requirements.

I. Check all bracing and shoring for structural integrity and compliance with designs prepared by the Contractor.

3.3 LAND SURVEYING

A. General: Follow standards for geospatial positioning accuracy.
   1. FGDC-STD-007.1 as amended by Authority Having Jurisdiction.
   2. FGDC-STD-007.2 as amended by Authority Having Jurisdiction.
   3. FGDC-STD-007.4 as amended by Authority Having Jurisdiction.

B. Coordinate survey data with the State Plane Coordinate System of the State in which the Project is located.

C. Contractor is responsible for the restoration of all property corners and control monuments damaged or destroyed by construction-related activities. Any disturbed monuments must be replaced at Contractor’s expense by a surveyor licensed in the State in which the Project is located and approved by the Architect.
   1. Temporarily suspend work at such points and for such reasonable times as the Owner may require for resetting monuments. The Contractor will not be entitled to any additional compensation or extension of time.

3.4 CONSTRUCTION SURVEYING

A. General: Perform surveying as applicable to specific items necessary for proper execution of work.
   1. Alignment Staking: Provide alignment stakes at 50-foot (15.24 m) intervals on tangent, and at 25-foot (7.62 m) intervals on curves.
   2. Slope Staking: Provide slope staking at 50-foot (15.24 m) intervals on tangent, and at 25-foot (7.62 m) intervals on curves. Re-stake at every ten-foot difference in elevation.
   3. Structure: Stake out structures, including elevations, and check prior to and during construction.
   4. Site Utilities: Stake out utility lines including elevations, and check prior to and during construction.
   5. Road: Stake out roadway elevations at 50-foot (15.24 m)50-foot intervals on tangent, and at 25-foot (7.62 m) intervals on curves.
   6. Cross-sections: Provide original, intermediate, and final staking as required, for site work and other locations as necessary for quantity surveys.
   7. Easement Staking: Provide easement staking at 50-foot (15.24 m) intervals on tangent, and at 25-foot (7.62 m) intervals on curves. If required by project conditions, provide wooden laths with flagging at 100-foot (30.48 m) intervals.
   8. Record Staking: Provide permanent stake at each blind flange and each utility cap is provided for future connections. Use stakes for record staking of material(s) acceptable to Architect.

B. Surveying to Determine Quantities for Payment.

C. For each application for progress payment, perform such surveys and computations necessary to determine quantities of work performed or placed. Perform surveys necessary for Architect to determine final quantities of work in place.
   1. Record Log: Maintain a log of layout control work. Record any deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used.

D. Accuracy:
   1. Establish Contractor's temporary survey references points for Contractor’s use to at least second-order accuracy (e.g., 1:10000). Set construction staking used as a guide for the work to at least third-order accuracy (e.g., 1:5000). Provide the absolute margin for error specified below on the basis established by such orders.
      a. Accuracy of other staking shall be plus or minus 0.04 feet (12.2 mm) horizontally and plus or minus 0.02 feet (6.1 mm) vertically.
      b. Include an error analysis sufficient to demonstrate required accuracy in survey calculations.
   2. Owner reserves the right to check the Contractor's survey, measurements, and calculations. The requirement for accuracy will not be waived, whether this right is exercised or not.

3.5 REPORTS

A. Submit an electronic copy of Contractor’s daily reports for a given week by 9:00 AM Monday morning of the following week after the week covered in the associated report. Daily report shall be signed by responsible member of Contractor’s staff, such as project manager or superintendent, or foreman designated by Contractor as having authority to sign daily reports.

3.6 RECORDS

A. Maintain at the Site a complete and accurate log of control and survey work as it progresses.
   1. Organize and record survey data in accordance with recognized professional surveying standards, Laws and Regulations, and prevailing standards of practice in the State in which the Project is located. Record Contractor's surveyor's original field notes, computations, and other surveying data in Contractor-furnished hard-bound field books. Contractor is solely responsible for completeness and accuracy of survey work, and completeness and accuracy of survey records, including field books. Survey records, (including field books) may be rejected by Owner due to failure to organize and maintain survey records in a manner that allows reasonable and independent verification of calculations, and/or allows identification of elevations, dimensions, and grades of the work.
   2. Illegible notes or data, and erasures on any page of field books, are unacceptable. Do not submit copied notes or data. Corrections by ruling or lining out errors will be unacceptable unless initialed by the surveyor. Violation of these requirements may require re-surveying the data questioned by Architect.

END OF SECTION 01 71 23

SECTION 01 73 00 - EXECUTION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes general administrative and procedural requirements governing execution of the Work, including, but not limited to, the following:
   1. Construction layout.
   2. Field engineering.
   3. Installation.
   4. Cutting and patching.
   5. Coordination of Owner's portion of the Work.
   6. Progress cleaning.
   7. Starting and adjusting.
   8. Protection of installed construction.
   9. Correction of the Work.

B. Related Requirements:
   1. Section 01 10 00 "Summary" for coordination of Owner-furnished products , Owner-performed work , Owner's separate contracts, and limits on use of Project site.
   2. Section 01 33 00 "Submittal Procedures" for submitting surveys.
   3. Section 01 77 00 "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, replacing defective work, and final cleaning.

1.2 DEFINITIONS

A. Cutting: Removal of in-place construction necessary to permit installation or performance of subsequent work.

B. Patching: Fitting and repair work required to restore construction to original conditions after installation of subsequent work.

1.3 QUALITY ASSURANCE

A. Land Surveyor Qualifications: A professional land surveyor who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing land-surveying services of the kind indicated.

B. Professional Engineer Qualifications: Refer to Section 01 40 00 "Quality Requirements."

C. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of specified products and equipment.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Comply with requirements specified in other Sections.
   1. For projects requiring compliance with sustainable design and construction practices and procedures, use products for patching that comply with sustainable design requirements.

B. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.

1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Architect for the visual and functional performance of in-place materials. Use materials that are not considered hazardous.

C. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities, mechanical and electrical systems, and other construction affecting the Work.
1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, gas service piping, and water-service piping; underground electrical services; and other utilities.
2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.

B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.
1. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.

C. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Existing Utility Information: Furnish information to local utilityandOwner that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.

B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.

D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents, submit a request for information to Architect in accordance with requirements in Section 01 31 00 "Project Management and Coordination."

3.3 CONSTRUCTION LAYOUT

A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks and existing conditions. If discrepancies are discovered, notify Architect promptly.

B. Engage a land surveyor experienced in laying out the Work, using the following accepted surveying practices:
   1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
   2. Establish limits on use of Project site.
   3. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
   4. Inform installers of lines and levels to which they must comply.
   5. Check the location, level and plumb, of every major element as the Work progresses.
   6. Notify Architect when deviations from required lines and levels exceed allowable tolerances.
   7. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.

C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.

D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.

E. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect.

3.4 FIELD ENGINEERING

A. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.
   1. Do not change or relocate existing benchmarks or control points without prior written approval of Architect. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to Architect before proceeding.
   2. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.

B. Benchmarks: Establish and maintain a minimum of two permanent benchmarks on Project site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark.
   1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.
   2. Where the actual location or elevation of layout points cannot be marked, provide temporary reference points sufficient to locate the Work.
   3. Remove temporary reference points when no longer needed. Restore marked construction to its original condition.

3.5 INSTALLATION

A. Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
   1. Make vertical work plumb, and make horizontal work level.

2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.
4. Maintain minimum headroom clearance of 96 inches in occupied spaces and 90 inches in unoccupied spaces, unless otherwise indicated on Drawings.

B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.

C. Install products at the time and under conditions that will ensure satisfactory results as judged by Architect. Maintain conditions required for product performance until Substantial Completion.

D. Conduct construction operations, so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy of type expected for Project.

E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on-site and placement in permanent locations.

F. Tools and Equipment: Select tools or equipment that minimize production of excessive noise levels.

G. Templates: Obtain and distribute to the parties involved templates for Work specified to be factory prepared and field installed. Check Shop Drawings of other portions of the Work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.

H. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions with manufacturer.
1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
2. Allow for building movement, including thermal expansion and contraction.
3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

I. Joints: Make joints of uniform width. Where joint locations in exposed Work are not indicated, arrange joints for the best visual effect, as judged by Architect. Fit exposed connections together to form hairline joints.

3.6 CUTTING AND PATCHING

A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

B. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.

C. Temporary Support: Provide temporary support of Work to be cut.

D. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

E. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching in accordance with requirements in Section 01 10 00 "Summary."

F. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to minimize interruption to occupied areas.

G. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
   1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
   2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
   3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
   4. Excavating and Backfilling: Comply with requirements in applicable Sections where required by cutting and patching operations.
   5. Proceed with patching after construction operations requiring cutting are complete.

H. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as practicable, as judged by Architect. Provide materials and comply with installation requirements specified in other Sections, where applicable.
   1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
   2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
      a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
      b. Restore damaged pipe covering to its original condition.
   3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
      a. Where patching occurs in a painted surface, prepare substrate and apply primer and intermediate paint coats appropriate for substrate over the patch, and apply final paint coat over entire unbroken surface containing the patch, corner to corner of wall and edge to edge of ceiling. Provide additional coats until patch blends with adjacent surfaces.
   4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
   5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition and ensures thermal and moisture integrity of building enclosure.

I. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.7 COORDINATION OF OWNER'S PORTION OF THE WORK

A. Site Access: Provide access to Project site for Owner's construction personnel and Owner's separate contractors.
   1. Provide temporary facilities required for Owner-furnished, Contractor-installed and Owner-furnished, Owner-installed products.
   2. Refer to Section 01 10 00 "Summary" for other requirements for Owner-furnished, Contractor-installed and Owner-furnished, Owner-installed products.

B. Coordination: Coordinate construction and operations of the Work with work performed by Owner's construction personnel and Owner's separate contractors.
   1. Construction Schedule: Inform Owner of Contractor's preferred construction schedule for Owner's portion of the Work. Adjust construction schedule based on a mutually agreeable timetable. Notify Owner if changes to schedule are required due to differences in actual construction progress.
   2. Preinstallation Conferences: Include Owner's construction personnel and Owner's separate contractors at preinstallation conferences covering portions of the Work that are to receive Owner's work. Attend preinstallation conferences conducted by Owner's construction personnel if portions of the Work depend on Owner's construction.

3.8 PROGRESS CLEANING

A. Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.
   1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
   2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F.
   3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, in accordance with regulations.
      a. Use containers intended for holding waste materials of type to be stored.
   4. Coordinate progress cleaning for joint-use areas where Contractor and other contractors are working concurrently.

B. Site: Maintain Project site free of waste materials and debris.

C. Work Areas: Clean areas where Work is in progress to the level of cleanliness necessary for proper execution of the Work.
   1. Remove liquid spills promptly.
   2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.

D. Installed Work: Keep installed work clean. Clean installed surfaces in accordance with written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.

E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.

F. Exposed Surfaces: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in Section 01 74 19 "Construction Waste Management and Disposal."

H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

J. Limiting Exposures: Supervise construction operations to ensure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.9 STARTING AND ADJUSTING

A. Coordinate startup and adjusting of equipment and operating components with requirements in Section 01 91 13 "General Commissioning Requirements."

B. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.

C. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.

D. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

E. Manufacturer's Field Service: Comply with qualification requirements in Section 01 40 00 "Quality Requirements."

3.10 PROTECTION OF INSTALLED CONSTRUCTION

A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.

B. Protection of Existing Items: Provide protection and ensure that existing items to remain undisturbed by construction are maintained in condition that existed at commencement of the Work.

C. Comply with manufacturer's written instructions for temperature and relative humidity.

3.11 CORRECTION OF THE WORK

A. Repair or remove and replace damaged, defective, or nonconforming Work. Restore damaged substrates and finishes.
   1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.

B. Repair Work previously completed and subsequently damaged during construction period. Repair to like-new condition.

C. Restore permanent facilities used during construction to their specified condition.

D. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.

E. Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.

F. Remove and replace chipped, scratched, and broken glass or reflective surfaces.

END OF SECTION 01 73 00

SECTION 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for the following:
   1. Recycling nonhazardous demolition and construction waste.
   2. Disposing of nonhazardous demolition and construction waste.

B. Related Requirements:
   1. Section 31 10 00 "Site Clearing" for disposition of waste resulting from site clearing and removal of above- and below-grade improvements.

1.3 DEFINITIONS

A. Construction Waste: Building, structure, and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.

B. Demolition Waste: Building, structure, and site improvement materials resulting from demolition operations.

C. Disposal: Removal of demolition or construction waste and subsequent salvage, sale, recycling, or deposit in landfill, incinerator acceptable to authorities having jurisdiction, or designated spoil areas on Owner’s property.

D. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.

1.4 MATERIALS OWNERSHIP

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

B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.
   1. Carefully salvage in a manner to prevent damage and promptly return to Owner.

1.5 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with transportation and disposal regulations of authorities having jurisdiction.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. General: Achieve end-of-Project rates for salvage/recycling of 50 percent by weight of total nonhazardous solid waste generated by the Work. Practice efficient waste management in the use of materials in the course of the Work. Use all reasonable means to divert construction and demolition waste from landfills and incinerators. Facilitate recycling and salvage of materials .

1. Demolition Waste:
   a. Asphalt paving.
   b. Concrete.
   c. Concrete reinforcing steel.
   d. Electrical conduit.
   e. Copper wiring.
2. Construction Waste:
   a. Masonry and CMU.
   b. Lumber.
   c. Wood sheet materials.
   d. Wood trim.
   e. Metals.
   f. Roofing.
   g. Insulation.
   h. Piping.
   i. Electrical conduit.
   j. Packaging: Regardless of salvage/recycle goal indicated in "General" Paragraph above, salvage or recycle 100 percent of the following uncontaminated packaging materials:
      1) Paper.
      2) Cardboard.
      3) Boxes.
      4) Plastic sheet and film.
      5) Polystyrene packaging.
      6) Wood crates.
      7) Wood pallets.
      8) Plastic pails.
   k. Construction Office Waste: Regardless of salvage/recycle goal indicated in "General" Paragraph above, salvage or recycle 100 percent of the following construction office waste materials:
      1) Paper.
      2) Aluminum cans.
      3) Glass containers.

PART 3 - EXECUTION

3.1 PLAN IMPLEMENTATION

A. General: Implement waste management plan. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.
   1. Comply with operation, termination, and removal requirements in Section 01 50 00 "Temporary Facilities and Controls."

B. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work.

C. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
   1. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged and recycled.
   2. Comply with Section 01 50 00 "Temporary Facilities and Controls" for controlling dust and dirt, environmental protection, and noise control.

3.2 RECYCLING DEMOLITION AND CONSTRUCTION WASTE, GENERAL

A. General: Recycle paper and beverage containers used by on-site workers.

B. Preparation of Waste: Prepare and maintain recyclable waste materials according to recycling or reuse facility requirements. Maintain materials free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to the recycling process.

C. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical according to approved construction waste management plan.
   1. Provide appropriately marked containers or bins for controlling recyclable waste until removed from Project site. Include list of acceptable and unacceptable materials at each container and bin.
   2. Remove recyclable waste from Owner's property and transport to recycling receiver or processor as often as required to prevent overfilling bins.

3.3 RECYCLING DEMOLITION WASTE

A. Asphalt Paving: Break up and transport paving to asphalt-recycling facility.

B. Concrete: Remove reinforcement and other metals from concrete and sort with other metals.

C. Masonry: Remove metal reinforcement, anchors, and ties from masonry and sort with other metals.
   1. Clean and stack undamaged, whole masonry units on wood pallets.

D. Wood Materials: Sort and stack members according to size, type, and length. Separate lumber, engineered wood products, panel products, and treated wood materials.

E. Metals: Separate metals by type.
   1. Structural Steel: Stack members according to size, type of member, and length.
   2. Remove and dispose of bolts, nuts, washers, and other rough hardware.

F. Piping: Reduce piping to straight lengths and store by material and size. Separate supports, hangers, valves, sprinklers, and other components by material and size.

G. Conduit: Reduce conduit to straight lengths and store by material and size.

H. Lamps: Separate lamps by type and store according to requirements in 40 CFR 273.

3.4 RECYCLING CONSTRUCTION WASTE

A. Packaging:
   1. Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.
   2. Polystyrene Packaging: Separate and bag materials.
   3. Pallets: As much as possible, require deliveries using pallets to remove pallets from Project site. For pallets that remain on-site, break down pallets into component wood pieces and comply with requirements for recycling wood.
   4. Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.

B. Wood Materials:
   1. Clean Cut-Offs of Lumber: Grind or chip into small pieces.

C. Paint: Seal containers and store by type.

3.5 DISPOSAL OF WASTE

A. General: Except for items or materials to be salvaged or recycled, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.
   1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.

2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. Burning: Do not burn waste materials.

3.6 ATTACHMENTS

END OF SECTION 01 74 19

SECTION 01 77 00 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for Contract closeout, including, but not limited to, the following:
   1. Substantial Completion procedures.
   2. Final Completion procedures.
   3. List of incomplete items.
   4. Submittal of Project warranties.
   5. Final cleaning.

B. Related Requirements:
   1. Section 01 29 00 "Payment Procedures" for requirements for Applications for Payment for Substantial Completion and Final Completion.
   2. Section 01 78 23 "Operation and Maintenance Data" for additional operation and maintenance manual requirements.
   3. Section 01 78 39 "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.
   4. Section 01 79 00 "Demonstration and Training" for requirements to train Owner's maintenance personnel to adjust, operate, and maintain products, equipment, and systems.

1.2 DEFINITIONS

A. List of Incomplete Items: Contractor-prepared list of items to be completed or corrected, prepared for the Architect's use prior to Architect's inspection, to determine if the Work is substantially complete.

1.3 ACTION SUBMITTALS

A. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.

B. Certified List of Incomplete Items: Final submittal at Final Completion.

1.4 CLOSEOUT SUBMITTALS

A. Certificates of Release: From authorities having jurisdiction.

B. Certificate of Insurance: For continuing coverage.

C. Field Report: For pest-control inspection.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Schedule of Maintenance Material Items: For maintenance material submittal items required by other Sections.

1.6 SUBSTANTIAL COMPLETION PROCEDURES

A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's "punch list"), indicating the value of each item on the list and reasons why the Work is incomplete.

B. Submittals Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
   1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction, permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
   2. Submit closeout submittals specified in other Division 01 Sections, including Project Record Documents, operation and maintenance manuals, damage or settlement surveys, property surveys, and similar final record information.
   3. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
   4. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by . Label with manufacturer's name and model number.
      a. Schedule of Maintenance Material Items: Prepare and submit schedule of maintenance material submittal items, including name and quantity of each item and name and number of related Specification Section. Obtain Owner's signature for receipt of submittals.
   5. Submit testing, adjusting, and balancing records.
   6. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.

C. Procedures Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
   1. Advise Owner of pending insurance changeover requirements.
   2. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
   3. Complete startup and testing of systems and equipment.
   4. Perform preventive maintenance on equipment used prior to Substantial Completion.
   5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings specified in Section 01 79 00 "Demonstration and Training."
   6. Advise Owner of changeover in utility services.
   7. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
   8. Complete final cleaning requirements.
   9. Touch up paint and otherwise repair and restore marred exposed finishes to eliminate visual defects.

D. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of 10 days prior to date the Work will be completed and ready for final inspection. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.
   1. Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
   2. Results of completed inspection will form the basis of requirements for Final Completion.

1.7 FINAL COMPLETION PROCEDURES

A. Submittals Prior to Final Completion: Before requesting final inspection for determining Final Completion, complete the following:
   1. Submit a final Application for Payment in accordance with Section 01 29 00 "Payment Procedures."
   2. Certified List of Incomplete Items: Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect.

Certified copy of the list will state that each item has been completed or otherwise resolved for acceptance.

3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.
4. Submit pest-control final inspection report.

B. Inspection: Submit a written request for final inspection to determine acceptance a minimum of 10 days prior to date the Work will be completed and ready for final inspection. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.
   1. Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.8 LIST OF INCOMPLETE ITEMS

A. Organization of List: Include name and identification of each building and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.
   1. Organize list of spaces in sequential order, starting with exterior areas first and proceeding from lowest floor to highest floor, listed by room or space number.
   2. Organize items applying to each space by major element, including categories for ceilings, individual walls, floors, equipment, and building systems.
   3. Include the following information at the top of each page:
      a. Project name.
      b. Date.
      c. Name of Architect.
      d. Name of Contractor.
      e. Page number.
   4. Submit list of incomplete items in the following format:
      a. PDF Electronic File: Architect will return annotated file.

1.9 SUBMITTAL OF PROJECT WARRANTIES

A. Time of Submittal: Submit written warranties on request of Architect for designated portions of the Work where warranties are indicated to commence on dates other than date of Substantial Completion, or when delay in submittal of warranties might limit Owner's rights under warranty.

B. Partial Occupancy: Submit properly executed warranties within 15 days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with Contractor.

C. Organize warranty documents into an orderly sequence based on the table of contents of Project Manual.

D. Warranty Electronic File: Provide warranties and bonds in PDF format. Assemble complete warranty and bond submittal package into a single electronic PDF file with bookmarks enabling navigation to each item. Provide bookmarked table of contents at beginning of document.
   1. Submit on digital media acceptable to Architect .

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

PART 3 - EXECUTION

3.1 FINAL CLEANING

A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
   1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:
      a. Clean Project site of rubbish, waste material, litter, and other foreign substances.
      b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
      c. Remove tools, construction equipment, machinery, and surplus material from Project site.
      d. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
      e. Remove debris and surface dust from within and around work areas.
      f. Clean flooring, removing debris, dirt, and staining; clean in accordance with manufacturer's instructions.
      g. Vacuum and mop concrete.
      h. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Polish mirrors and glass, taking care not to scratch surfaces.
      i. Remove labels that are not permanent.
      j. Wipe surfaces of mechanical and electrical equipment and similar equipment within and adjacent to work areas. Remove dust, debris, and foreign substances.
      k. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
      l. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
      m. Clean ducts, blowers, and coils if units were operated without filters during construction or that display contamination with particulate matter on inspection.
         1) Clean HVAC system in compliance with NADCA ACR. Provide written report on completion of cleaning.
      n. Clean luminaires, lamps, globes, and reflectors to function with full efficiency.
      o. Clean strainers.
      p. Leave Project clean and ready for occupancy.

C. Construction Waste Disposal: Comply with waste-disposal requirements in Section 01 74 19 "Construction Waste Management and Disposal."

3.2 CORRECTION OF THE WORK

A. Complete repair and restoration operations required by "Correction of the Work" Article in Section 01 73 00 "Execution" before requesting inspection for determination of Substantial Completion.

END OF SECTION 01 77 00

SECTION 01 78 23 - OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
   1. Operation and maintenance documentation directory manuals.
   2. Emergency manuals.
   3. Systems and equipment operation manuals.
   4. Systems and equipment maintenance manuals.
   5. Product maintenance manuals.

B. Related Requirements:
   1. Section 01 33 00 "Submittal Procedures" for submitting copies of submittals for operation and maintenance manuals.

1.3 DEFINITIONS

A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.

B. Subsystem: A portion of a system with characteristics similar to a system.

1.4 CLOSEOUT SUBMITTALS

A. Submit operation and maintenance manuals indicated. Provide content for each manual as specified in individual Specification Sections, and as reviewed and approved at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.
   1. Architect will comment on whether content of operation and maintenance submittals is acceptable.
   2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.

B. Format: Submit operation and maintenance manuals in the following format:
   1. Submit on digital media acceptable to Architect . Enable reviewer comments on draft submittals.

C. Initial Manual Submittal: Submit draft copy of each manual at least 30 days before commencing demonstration and training. Architect will comment on whether general scope and content of manual are acceptable.

D. Final Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least 15 days before commencing demonstration and training. Architect will return copy with comments.
   1. Correct or revise each manual to comply with Architect's comments. Submit copies of each corrected manual within 15 days of receipt of Architect's comments and prior to commencing demonstration and training.

E. Comply with Section 01 77 00 "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

1.5 FORMAT OF OPERATION AND MAINTENANCE MANUALS

A. Manuals, Electronic Files: Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required.
   1. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.
   2. File Names and Bookmarks: Bookmark individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel on opening file.

1.6 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS

A. Organization of Manuals: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:
   1. Title page.
   2. Table of contents.
   3. Manual contents.

B. Title Page: Include the following information:
   1. Subject matter included in manual.
   2. Name and address of Project.
   3. Name and address of Owner.
   4. Date of submittal.
   5. Name and contact information for Contractor.
   6. Name and contact information for Architect.
   7. Names and contact information for major consultants to the Architect that designed the systems contained in the manuals.
   8. Cross-reference to related systems in other operation and maintenance manuals.

C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.
   1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.

D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.

E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

1.7 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY MANUAL

A. Operation and Maintenance Documentation Directory: Prepare a separate manual that provides an organized reference to emergency, operation, and maintenance manuals. List items and their location to facilitate ready access to desired information. Include the following:
   1. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.
   2. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.

3. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.

1.8 EMERGENCY MANUALS

A. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.

B. Content: Organize manual into a separate section for each of the following:
1. Type of emergency.
2. Emergency instructions.
3. Emergency procedures.

C. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:
1. Fire.
2. Water leak.
3. Power failure.
4. Water outage.
5. System, subsystem, or equipment failure.

D. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.

E. Emergency Procedures: Include the following, as applicable:
1. Instructions on stopping.
2. Shutdown instructions for each type of emergency.
3. Operating instructions for conditions outside normal operating limits.
4. Required sequences for electric or electronic systems.
5. Special operating instructions and procedures.

1.9 SYSTEMS AND EQUIPMENT OPERATION MANUALS

A. Systems and Equipment Operation Manual: Assemble a complete set of data indicating operation of each system, subsystem, and piece of equipment not part of a system. Include information required for daily operation and management, operating standards, and routine and special operating procedures.
1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.

B. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:
1. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
2. Performance and design criteria if Contractor has delegated design responsibility.
3. Operating standards.
4. Operating procedures.
5. Operating logs.
6. Wiring diagrams.
7. Control diagrams.
8. Piped system diagrams.
9. Precautions against improper use.
10. License requirements including inspection and renewal dates.

C. Descriptions: Include the following:

1. Product name and model number. Use designations for products indicated on Contract Documents.
2. Manufacturer's name.
3. Equipment identification with serial number of each component.
4. Equipment function.
5. Operating characteristics.
6. Limiting conditions.
7. Performance curves.
8. Engineering data and tests.
9. Complete nomenclature and number of replacement parts.

D. Operating Procedures: Include the following, as applicable:
1. Startup procedures.
2. Equipment or system break-in procedures.
3. Routine and normal operating instructions.
4. Regulation and control procedures.
5. Instructions on stopping.
6. Normal shutdown instructions.
7. Seasonal and weekend operating instructions.
8. Required sequences for electric or electronic systems.
9. Special operating instructions and procedures.

E. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.

F. Piped Systems: Diagram piping as installed, and identify color coding where required for identification.

1.10 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

A. Systems and Equipment Maintenance Manuals: Assemble a complete set of data indicating maintenance of each system, subsystem, and piece of equipment not part of a system. Include manufacturers' maintenance documentation, preventive maintenance procedures and frequency, repair procedures, wiring and systems diagrams, lists of spare parts, and warranty information.
1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.

B. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranties and bonds as described below.

C. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.

D. Manufacturers' Maintenance Documentation: Include the following information for each component part or piece of equipment:
1. Standard maintenance instructions and bulletins; include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.

a. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.

2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
3. Identification and nomenclature of parts and components.
4. List of items recommended to be stocked as spare parts.

E. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:
1. Test and inspection instructions.
2. Troubleshooting guide.
3. Precautions against improper maintenance.
4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
5. Aligning, adjusting, and checking instructions.
6. Demonstration and training video recording, if available.

F. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.
1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.

G. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.

H. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.

I. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
1. Include procedures to follow and required notifications for warranty claims.

J. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.
1. Do not use original project record documents as part of maintenance manuals.

1.11 PRODUCT MAINTENANCE MANUALS

A. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.

B. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.

C. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.

D. Product Information: Include the following, as applicable:
1. Product name and model number.

2. Manufacturer's name.
3. Color, pattern, and texture.
4. Material and chemical composition.
5. Reordering information for specially manufactured products.

E. Maintenance Procedures: Include manufacturer's written recommendations and the following:
1. Inspection procedures.
2. Types of cleaning agents to be used and methods of cleaning.
3. List of cleaning agents and methods of cleaning detrimental to product.
4. Schedule for routine cleaning and maintenance.
5. Repair instructions.

F. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.

G. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
1. Include procedures to follow and required notifications for warranty claims.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 78 23

SECTION 01 78 39 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for Project Record Documents, including the following:
   1. Record Drawings.
   2. Record specifications.
   3. Record Product Data.
   4. Miscellaneous record submittals.

B. Related Requirements:
   1. Section 01 73 00 "Execution" for final property survey.
   2. Section 01 77 00 "Closeout Procedures" for general closeout procedures.
   3. Section 01 78 23 "Operation and Maintenance Data" for operation and maintenance manual requirements.

1.3 CLOSEOUT SUBMITTALS

A. Record Drawings: Comply with the following:
   1. Number of Copies: Submit copies of Record Drawings as follows:
      a. Initial Submittal:
         1) Submit PDF electronic files of scanned record prints and one set(s) of file prints.
         2) Architect will indicate whether general scope of changes, additional information recorded, and quality of drafting are acceptable.
      b. Final Submittal:
         1) Submit PDF electronic files of scanned Record Prints and two set(s) of file prints.
         2) Print each drawing, whether or not changes and additional information were recorded.

B. Record Specifications: Submit annotated PDF electronic files of Project's Specifications, including addenda and Contract modifications.

C. Record Product Data: Submit annotated PDF electronic files and directories of each submittal.
   1. Where record Product Data are required as part of operation and maintenance manuals, submit duplicate marked-up Product Data as a component of manual.

D. Miscellaneous Record Submittals: See other Specification Sections for miscellaneous record-keeping requirements and submittals in connection with various construction activities. Submit annotated PDF electronic files and directories of each submittal.

1.4 RECORD DRAWINGS

A. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and revised drawings as modifications are issued.
   1. Preparation: Mark record prints to show the actual installation, where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.

a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
b. Accurately record information in an acceptable drawing technique.
c. Record data as soon as possible after obtaining it.
d. Record and check the markup before enclosing concealed installations.
e. Cross-reference record prints to corresponding photographic documentation.

2. Content: Types of items requiring marking include, but are not limited to, the following:
   a. Dimensional changes to Drawings.
   b. Revisions to details shown on Drawings.
   c. Depths of foundations.
   d. Locations and depths of underground utilities.
   e. Revisions to routing of piping and conduits.
   f. Revisions to electrical circuitry.
   g. Actual equipment locations.
   h. Duct size and routing.
   i. Locations of concealed internal utilities.
   j. Changes made by Change Order or Construction Change Directive.
   k. Changes made following Architect's written orders.
   l. Details not on the original Contract Drawings.
   m. Field records for variable and concealed conditions.
   n. Record information on the Work that is shown only schematically.
3. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.
4. Mark record prints with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
5. Mark important additional information that was either shown schematically or omitted from original Drawings.
6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.

B. Record Digital Data Files: Immediately before inspection for Certificate of Substantial Completion, review marked-up record prints with Architect. When authorized, prepare a full set of corrected digital data files of the Contract Drawings, as follows:
   1. Format: Annotated PDF electronic file with comment function enabled.
   2. Incorporate changes and additional information previously marked on record prints. Delete, redraw, and add details and notations where applicable.
   3. Refer instances of uncertainty to Architect for resolution.
   4. Architect will furnish Contractor with one set of digital data files of the Contract Drawings for use in recording information.
      a. See Section 01 31 00 "Project Management and Coordination" for requirements related to use of Architect's digital data files.
      b. Architect will provide data file layer information. Record markups in separate layers.

C. Format: Identify and date each Record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.
   1. Record Prints: Organize record prints into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
   2. Format: Annotated PDF electronic file with comment function enabled.
   3. Record Digital Data Files: Organize digital data information into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sheet identification. Include identification in each digital data file.
   4. Identification: As follows:
      a. Project name.
      b. Date.
      c. Designation "PROJECT RECORD DRAWINGS."
      d. Name of Architect.
      e. Name of Contractor.

1.5 RECORD SPECIFICATIONS

A. Preparation: Mark Specifications to indicate the actual product installation, where installation varies from that indicated in Specifications, addenda, and Contract modifications.
   1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
   2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
   3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
   4. For each principal product, indicate whether Record Product Data has been submitted in operation and maintenance manuals instead of submitted as Record Product Data.
   5. Note related Change Orders , Record Product Data, and Record Drawings where applicable.

B. Format: Submit record specifications as annotated PDF electronic file .

1.6 RECORD PRODUCT DATA

A. Recording: Maintain one copy of each submittal during the construction period for Project Record Document purposes. Post changes and revisions to Project Record Documents as they occur; do not wait until end of Project.

B. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.
   1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
   2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
   3. Note related Change Orders , Record Specifications, and Record Drawings where applicable.

C. Format: Submit Record Product Data as annotated PDF electronic file .
   1. Include Record Product Data directory organized by Specification Section number and title, electronically linked to each item of Record Product Data.

1.7 MISCELLANEOUS RECORD SUBMITTALS

A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.

B. Format: Submit miscellaneous record submittals as PDF electronic file .
   1. Include miscellaneous record submittals directory organized by Specification Section number and title, electronically linked to each item of miscellaneous record submittals.

1.8 MAINTENANCE OF RECORD DOCUMENTS

A. Maintenance of Record Documents: Store Record Documents in the field office apart from the Contract Documents used for construction. Do not use Project Record Documents for construction purposes. Maintain Record Documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to Project Record Documents for Architect's reference during normal working hours.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 78 39

SECTION 01 79 00 - DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:
   1. Instruction in operation and maintenance of systems, subsystems, and equipment.

1.2 CLOSEOUT SUBMITTALS

A. Demonstration and Training Video Recordings: Submit two copies within seven days of end of each training module.
   1. Identification: On each copy, provide an applied label with the following information:
      a. Name of Project.
      b. Name of Architect.
      c. Name of Contractor.
   2. At completion of training, submit complete training manual(s) for Owner's use prepared in same PDF file format required for operation and maintenance manuals specified in Section 01 78 23 "Operation and Maintenance Data."

1.3 QUALITY ASSURANCE

1.4 COORDINATION

A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations and to ensure availability of Owner's personnel.

B. Coordinate instructors, including providing notification of dates, times, length of instruction time, and course content.

C. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data have been reviewed and approved by Architect.

1.5 INSTRUCTION PROGRAM

A. Program Structure: Develop an instruction program that includes individual training modules for each system and for equipment not part of a system, as required by individual Specification Sections.

B. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following as applicable to the system, equipment, or component:
   1. Basis of System Design, Operational Requirements, and Criteria: Include the following:
      a. System, subsystem, and equipment descriptions.
      b. Performance and design criteria if Contractor is delegated design responsibility.
      c. Operating standards.
      d. Regulatory requirements.
      e. Equipment function.
      f. Operating characteristics.
      g. Limiting conditions.
      h. Performance curves.
   2. Documentation: Review the following items in detail:
      a. Emergency manuals.
      b. Systems and equipment operation manuals.

c. Systems and equipment maintenance manuals.
d. Product maintenance manuals.
e. Project Record Documents.
f. Identification systems.
g. Warranties and bonds.
h. Maintenance service agreements and similar continuing commitments.

3. Emergencies: Include the following, as applicable:
   a. Instructions on meaning of warnings, trouble indications, and error messages.
   b. Instructions on stopping.
   c. Shutdown instructions for each type of emergency.
   d. Operating instructions for conditions outside of normal operating limits.
   e. Sequences for electric or electronic systems.
   f. Special operating instructions and procedures.
4. Operations: Include the following, as applicable:
   a. Startup procedures.
   b. Equipment or system break-in procedures.
   c. Routine and normal operating instructions.
   d. Regulation and control procedures.
   e. Control sequences.
   f. Safety procedures.
   g. Instructions on stopping.
   h. Normal shutdown instructions.
   i. Operating procedures for emergencies.
   j. Operating procedures for system, subsystem, or equipment failure.
   k. Seasonal and weekend operating instructions.
   l. Required sequences for electric or electronic systems.
   m. Special operating instructions and procedures.
5. Adjustments: Include the following:
   a. Alignments.
   b. Checking adjustments.
   c. Noise and vibration adjustments.
   d. Economy and efficiency adjustments.
6. Troubleshooting: Include the following:
   a. Diagnostic instructions.
   b. Test and inspection procedures.
7. Maintenance: Include the following:
   a. Inspection procedures.
   b. Types of cleaning agents to be used and methods of cleaning.
   c. List of cleaning agents and methods of cleaning detrimental to product.
   d. Procedures for routine cleaning.
   e. Procedures for preventive maintenance.
   f. Procedures for routine maintenance.
   g. Instruction on use of special tools.
8. Repairs: Include the following:
   a. Diagnosis instructions.
   b. Repair instructions.
   c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
   d. Instructions for identifying parts and components.
   e. Review of spare parts needed for operation and maintenance.

1.6 PREPARATION

A. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a training manual organized in coordination with requirements in Section 01 78 23 "Operation and Maintenance Data."

B. Set up instructional equipment at instruction location.

1.7 INSTRUCTION

A. Facilitator: Engage a qualified facilitator to prepare instruction program and training modules, to coordinate instructors, and to coordinate between Contractor and Owner for number of participants, instruction times, and location.

B. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.
   1. Architect will furnish an instructor to describe basis of system design, operational requirements, criteria, and regulatory requirements.
   2. Owner will furnish Contractor with names and positions of participants.

C. Scheduling: Provide instruction at mutually agreed-on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.
   1. Schedule training with Owner with at least seven days' advance notice.

D. Training Location and Reference Material: Conduct training on-site in the completed and fully operational facility using the actual equipment in-place. Conduct training using final operation and maintenance data submittals.

E. Cleanup: Collect used and leftover educational materials and give to Owner. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 79 00

SECTION 04 26 13 - MASONRY VENEER

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Clay face brick.
2. Mortar materials.
3. Ties and anchors.
4. Miscellaneous masonry veneer accessories.
5. Mortar mixes.

B. Related Requirements:
1. Section 07 62 00 "Sheet Metal Flashing and Trim" for sheet metal cap flashing.
2. Section 07 92 00 "Joint Sealant" for control and expansion joints.

1.2 DEFINITIONS

A. CMU(s): Concrete masonry unit(s).

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site .

1.4 ACTION SUBMITTALS

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

B. Shop Drawings: For the following:
1. Masonry Units: Indicate sizes, profiles, coursing, and locations of special shapes.
2. Fabricated Flashing: Detail corner units, end-dam units, and other special applications.

C. Samples for Initial Selection:
1. Clay face brick , in the form of straps of five or more bricks.
2. Colored mortar.

D. Samples for Verification: For each type and color of the following:
1. Clay face brick , in the form of straps of five or more bricks.
2. Special brick shapes.
3. Pigmented and colored-aggregate mortar. Make Samples using same sand and mortar ingredients to be used on Project.
4. Accessories embedded in masonry.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For testing agency.

B. Material Certificates: For each type and size of the following:
1. Masonry units.
a. Include data on material properties and material test reports substantiating compliance with requirements.
b. For brick, include size-variation data verifying that actual range of sizes falls within specified tolerances.
c. For exposed brick, include test report for efflorescence in accordance with ASTM C67/C67M.

2. Cementitious materials. Include name of manufacturer, brand name, and type.
3. Mortar admixtures.
4. Preblended, dry mortar mixes. Include description of type and proportions of ingredients.
5. Anchors, ties, and metal accessories.

C. Qualification Statements: For testing agency.

D. Mix Designs: For each type of mortar. Include description of type and proportions of ingredients.
1. Include test reports for mortar mixes required to comply with property specification. Test in accordance with ASTM C109/C109M for compressive strength, ASTM C1506 for water retention, and ASTM C91/C91M for air content.

E. Cold-Weather and Hot-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with requirements.

1.6 MOCKUPS

A. Wall Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, to set quality standards for materials and execution, and to set quality standards for installation .
1. Build mockup as directed by Architect.
2. Build mockups typical exterior wall in sizes approximately 60 inches long by specified height by full thickness, including face and backup wythes and accessories.
a. Include a sealant-filled joint at least 16 inches long in mockup.
3. Clean one-half of exposed faces of mockups with masonry cleaner as indicated.
4. Protect accepted mockups from the elements with weather-resistant membrane.
5. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
6. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.

B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

D. Deliver preblended, dry mortar mix in moisture-resistant containers. Store preblended, dry mortar mix in delivery containers on elevated platforms in a dry location or in covered weatherproof dispensing silos.

E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.8 FIELD CONDITIONS

A. Protection of Masonry: During construction, cover tops of veneer, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.
1. Extend cover a minimum of 24 inches down face of veneer, and hold cover securely in place.

B. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry. Immediately remove grout, mortar, and soil that come in contact with masonry.

1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
2. Protect sills, ledges, and projections from mortar droppings.
3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.

C. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in TMS 602.
1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and higher and will remain so until masonry has dried, but not less than seven days after completing cleaning.

D. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in TMS 602.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Obtain exposed masonry units, cementitious mortar components, and mortar aggregate of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from single source manufacturer for each product required.

2.2 UNIT MASONRY, GENERAL

A. Masonry Standard: Comply with TMS 602/ACI 530.1/ASCE 6, except as modified by requirements in the Contract Documents.

B. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated in the Standard. Do not use units where such defects will be exposed in the completed Work.

2.3 BRICK

A. General: Provide shapes indicated and as follows, with exposed surfaces matching finish and color of exposed faces of adjacent units.
1. For ends of sills and caps and for similar applications that would otherwise expose unfinished brick surfaces, provide units without cores or frogs and with exposed surfaces finished.
2. Provide special shapes for applications where stretcher units cannot accommodate special conditions, including corners, movement joints, bond beams, sashes, and lintels, requiring brick of size, form, color, and texture on exposed surfaces that cannot be produced by sawing, and where shapes produced by sawing would result in sawed surfaces being exposed to view.

B. Clay Face Brick: Facing brick complying with ASTM C216 .
1. Products: Subject to compliance with requirements, provide the following. No substitutions:
   a. Face Brick #1: TBD.
2. Initial Rate of Absorption: Less than 30 g/30 sq. in. per minute when tested in accordance with ASTM C67/C67M.
3. Efflorescence: Provide brick that has been tested in accordance with ASTM C67/C67M and is rated "not effloresced."
4. Size (Actual Dimensions): Standard size.
5. Application: Use where brick is exposed unless otherwise indicated.
6. Color and Texture: TBD.

2.4 MORTAR MATERIALS

A. Portland Cement: ASTM C150/C150M, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.
   1. Alkali content will not be more than 0.1 percent when tested in accordance with ASTM C114.

B. Hydrated Lime: ASTM C207, Type S.

C. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.

D. Mortar Cement: ASTM C1329/C1329M.
   1. Manufacturers: Subject to compliance with requirements, provide products by Lafarge North America Inc.
      a. Other manufacturers who offer products that comply with the requirements of this Section will be considered as substitute manufacturers, subject to the conditions specified in Section 01 25 00 “Substitution Procedures.”

E. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes and complying with ASTM C979/C979M. Use only pigments with a record of satisfactory performance in masonry mortar.
   1. Manufacturers: Subject to compliance with requirements, provide products by the following:
      a. Davis Colors; True Tone Mortar Colors..
      b. Lanxess Corporation; Bayferrox Iron Oxide Pigments.
      c. Solomon Colors Inc.; SGS Mortar Colors.

F. Colored Cement Products: Packaged blend made from portland cement and hydrated lime and mortar pigments, all complying with specified requirements, and containing no other ingredients.
   1. Colored Portland Cement-Lime Mix:
      a. Products: Subject to compliance with requirements, provide one of the following:
         1) Capital Materials Corporation; Riverton Portland Cement Lime Custom Color.
         2) Holcim (US) Inc.; Rainbow Mortamix Custom Color Cement/Lime.
         3) Lafarge North America Inc.; Eaglebond Portland & Lime.
         4) Lehigh Cement Company; Lehigh Custom Color Portland/Lime Cement.
   2. Colored Masonry Cement:
      a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
         1) Cemex S.A.B. de C.V.
         2) Holcim (US) Inc.
         3) Lafarge North America Inc.
   3. Formulate blend as required to produce color indicated or, if not indicated, as selected from manufacturer's full color range.
   4. Pigments do not exceed 10 percent of portland cement by weight.
   5. Pigments do not exceed 5 percent of mortar cement by weight.

G. Preblended Dry Mortar Mix: Packaged blend made from portland cement and hydrated lime, or mortar cement, sand, mortar pigments, and admixtures and complying with ASTM C1714/C1714M.

H. Aggregate for Mortar: ASTM C144.
   1. For mortar that is exposed to view, use washed aggregate consisting of natural sand or crushed stone.
   2. For joints less than 1/4 inch thick, use aggregate graded with 100 percent passing the No. 16 sieve.
   3. White-Mortar Aggregates: Natural white sand or crushed white stone.
   4. Colored-Mortar Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.

I. Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C494/C494M, Type C , and recommended by manufacturer for use in masonry mortar of composition indicated.
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Euclid Chemical Company (The); a subsidiary of RPM International, Inc.
      b. GCP Applied Technologies Inc.

J. Water: Potable.

2.5 MASONRY JOINT REINFORCEMENT

A. Refer to Structural.

2.6 MISCELLANEOUS MASONRY ACCESSORIES

A. Compressible Filler: Premolded filler strips complying with ASTM D1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene or urethane .

B. Preformed Control-Joint Gaskets: Made from styrene-butadiene-rubber compound, complying with ASTM D 2000, Designation M2AA-805 and designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.

C. Bond-Breaker Strips: Asphalt-saturated, organic roofing felt complying with ASTM D 226, Type I (No. 15 asphalt felt).

2.7 MORTAR MIXES

A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.
   1. Do not use calcium chloride in mortar or grout.
   2. Use portland cement-lime or mortar cement mortar unless otherwise indicated.
   3. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.

B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.

C. Mortar for Unit Masonry: Comply with ASTM C270, Proportion Specification. Use Type N unless another type is indicated.
   1. For masonry below grade or in contact with earth, use Type S.
   2. For mortar parge coats, use Type S or Type N.

D. Pigmented Mortar: Use colored cement product or select and proportion pigments with other ingredients to produce color required. Do not add pigments to colored cement products.
   1. Pigments do not exceed 10 percent of portland cement by weight.
   2. Pigments do not exceed 5 percent of mortar cement by weight.
   3. Mix to match Architect's sample.
   4. Application: Use pigmented mortar for exposed mortar joints with the following units:
      a. Clay face brick.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
   1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

B. Before installation, examine rough-in and built-in construction for piping systems to verify actual locations of piping connections.

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

3.2 INSTALLATION, GENERAL

A. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match the construction immediately adjacent to opening.

B. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

C. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures. Mix units from several pallets or cubes as they are placed.

D. Wetting of Brick: Wet brick before laying if initial rate of absorption exceeds 30 g/30 sq. in. per minute when tested in accordance with ASTM C67/C67M. Allow units to absorb water so they are damp but not wet at time of laying.

3.3 TOLERANCES

A. Dimensions and Locations of Elements:
   1. For dimensions in cross section or elevation, do not vary by more than plus 1/2 inch or minus 1/4 inch.
   2. For location of elements in plan, do not vary from that indicated by more than plus or minus 1/2 inch.
   3. For location of elements in elevation, do not vary from that indicated by more than plus or minus 1/4 inch in a story height or 1/2 inch total.

B. Lines and Levels:
   1. For bed joints and top surfaces of bearing walls, do not vary from level by more than 1/4 inch in 10 ft., or 1/2-inch maximum.
   2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 ft., 1/4 inch in 20 ft., or 1/2-inch maximum.
   3. For vertical lines and surfaces, do not vary from plumb by more than 1/4 inch in 10 ft., 3/8 inch in 20 ft., or 1/2-inch maximum.
   4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 ft., 1/4 inch in 20 ft., or 1/2-inch maximum.
   5. For lines and surfaces, do not vary from straight by more than 1/4 inch in 10 ft., 3/8 inch in 20 ft., or 1/2-inch maximum.
   6. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 ft., or 1/2-inch maximum.
   7. For faces of adjacent exposed masonry units, do not vary from flush alignment by more than 1/16 inch except due to warpage of masonry units within tolerances specified for warpage of units.

C. Joints:
1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to 1/2 inch.
2. For exposed bed joints, do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch.
3. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch or minus 1/4 inch.
4. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch. Do not vary from adjacent bed-joint and head-joint thicknesses by more than 1/8 inch .
5. For exposed bed joints and head joints of stacked bond, do not vary from a straight line by more than 1/16 inch from one masonry unit to the next.

3.4 LAYING MASONRY WALLS

A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.

B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in running bond. Do not use units with less-than-nominal 4-inch horizontal face dimensions at corners.

C. Stopping and Resuming Work: Stop work by stepping back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar, and wet brick if required before laying fresh masonry.

D. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.

3.5 MORTAR BEDDING AND JOINTING

A. Lay solid masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.

B. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.

3.6 EXPANSION JOINTS

A. General: Install expansion-joint materials in unit masonry as masonry progresses. Do not allow materials to span expansion joints without provision to allow for in-plane wall or partition movement.

B. Form expansion joints as follows:
1. Build in compressible joint fillers where indicated.
2. Form open joint full depth of brick wythe and of width indicated, but not less than 3/8 inch for installation of sealant and backer rod specified in Section 07 92 00 "Joint Sealants."

C. Provide horizontal, pressure-relieving joints by either leaving an airspace or inserting a compressible filler of width required for installing sealant and backer rod specified in Section 07 92 00 "Joint Sealants," but not less than 3/8 inch immediately below steel.
1. Locate horizontal, pressure-relieving joints beneath shelf angles supporting masonry. In this application, provide 3/4-inch joint.

3.7 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage special inspectors to perform tests and inspections and prepare reports. Allow inspectors access to scaffolding and work areas as needed to perform tests and

inspections. Retesting of materials that fail to comply with specified requirements will be at Contractor's expense.

B. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, in accordance with ASTM C780.

C. Mortar Test (Property Specification): For each mix provided, in accordance with ASTM C780. Test mortar for mortar air content and compressive strength.

3.8 REPAIRING, POINTING, AND CLEANING

A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.

B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.

C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
3. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
4. Clean brick by bucket-and-brush hand-cleaning method described in BIA Technical Notes 20.
5. Clean stone trim to comply with stone supplier's written instructions.

3.9 MASONRY WASTE DISPOSAL

A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.

B. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above or recycled, and other masonry waste, and legally dispose of off Owner's property.

END OF SECTION 04 26 13

SECTION 07 11 13 - BITUMINOUS DAMPPROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Cold-applied, emulsified-asphalt dampproofing.

B. Related Requirements:
1. Section 04 20 00 "Unit Masonry" .

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.3 FIELD CONDITIONS

A. Weather Limitations: Proceed with application only when existing and forecasted weather conditions permit dampproofing to be performed according to manufacturers' written instructions.

B. Ventilation: Provide adequate ventilation during application of dampproofing in enclosed spaces. Maintain ventilation until dampproofing has cured.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Source Limitations: Obtain primary dampproofing materials and primers from single source from single manufacturer. Provide auxiliary materials recommended in writing by manufacturer of primary materials.

2.2 PERFORMANCE REQUIREMENTS

A. VOC Content: Products are to comply with VOC content limits of authorities having jurisdiction unless otherwise indicated.

2.3 COLD-APPLIED, EMULSIFIED-ASPHALT DAMPPROOFING

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. APOC, Inc; a division of Gardner Industries.
2. ChemMasters, Inc.
3. Euclid Chemical Company (The); a subsidiary of RPM International, Inc.
4. Henry Company; a Carlisle company.
5. Mar-flex Waterproofing & Building Products.
6. Master Builders Solutions, brand of MBCC Group, a Sika company.
7. W. R. Meadows, Inc.

B. Trowel Coats: ASTM D1227, Type II, Class 1.

C. Fibered Brush and Spray Coats: ASTM D1227, Type II, Class 1.

D. Brush and Spray Coats: ASTM D1227, Type III, Class 1.

2.4 AUXILIARY MATERIALS

A. Furnish auxiliary materials recommended in writing by dampproofing manufacturer for intended use and compatible with bituminous dampproofing.

B. Emulsified-Asphalt Primer: ASTM D1227, Type III, Class 1, except diluted with water as recommended in writing by manufacturer.

C. Asphalt-Coated Glass Fabric: ASTM D1668/D1668M, Type I.

D. Patching Compound: Epoxy or latex-modified repair mortar or Asbestos-free fibered mastic of type recommended in writing by dampproofing manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements for surface smoothness, maximum surface moisture content, and other conditions affecting performance of the Work.

B. Proceed with application only after substrate construction and penetrating work have been completed and unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean, prepare, and treat substrates according to manufacturer's written instructions. Provide clean, dust-free, and dry substrates for dampproofing application.

B. Mask or otherwise protect adjoining exposed surfaces from being stained, spotted, or coated with dampproofing. Prevent dampproofing materials from entering and clogging weep holes and drains.

C. Clean substrates of projections and substances detrimental to dampproofing work; fill voids, seal joints, and remove bond breakers if any.

D. Apply patching compound to patch and fill tie holes, honeycombs, reveals, and other imperfections.

3.3 INSTALLATION, GENERAL

A. Comply with manufacturer's written instructions for dampproofing application, cure time between coats, and drying time before backfilling unless otherwise indicated.
   1. Apply dampproofing to provide continuous plane of protection.
   2. Apply additional coats if recommended in writing by manufacturer or to achieve a smooth surface and uninterrupted coverage.

B. Where dampproofing footings and foundation walls, apply from finished-grade line to top of footing; extend over top of footing and down a minimum of 6 inches over outside face of footing.

3.4 INSTALLATION OF COLD-APPLIED, EMULSIFIED-ASPHALT DAMPPROOFING

A. Masonry Backup for Masonry Veneer Assemblies: Apply primer and one brush or spray coat at not less than 1 gal./100 sq. ft..

3.5 PROTECTION

A. Correct dampproofing that does not comply with requirements; repair substrates, and reapply dampproofing.

END OF SECTION 07 11 13

SECTION 07 21 00 - THERMAL INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Extruded polystyrene (XPS) foam-plastic board insulation.
2. Glass-fiber blanket insulation.
3. Foamed-In-Place Masonry Wall Insulation

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.
1. Extruded polystyrene foam-plastic board insulation.
2. Glass-fiber blanket insulation.

1.3 INFORMATIONAL SUBMITTALS

A. Product Test Reports: For each product, for tests performed by a qualified testing agency.

B. Research Reports: For foam-plastic insulation, from ICC-ES.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Protect insulation materials from physical damage and from deterioration due to moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.

B. Protect foam-plastic board insulation as follows:
1. Do not expose to sunlight except to necessary extent for period of installation and concealment.
2. Protect against ignition at all times. Do not deliver foam-plastic board materials to Project site until just before installation time.
3. Quickly complete installation and concealment of foam-plastic board insulation in each area of construction.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Surface-Burning Characteristics: Maximum flame-spread and smoke-developed indexes less than 25 and 450 when tested in accordance with ASTM E84.

B. Labeling: Provide identification of mark indicating R-value of each piece of insulation 12 inches and wider in width.

C. Thermal-Resistance Value (R-Value): R-value as indicated on Drawings In accordance with ASTM C518.

2.2 FOAM-PLASTIC BOARD INSULATION

A. Extruded Polystyrene Board Insulation (XPS): ASTM C578, of type and minimum compressive strength indicated below, with maximum flame-spread and smoke-developed indexes of 10 and 175, respectively, per ASTM E 84.
1. Manufacturers: Subject to compliance with requirements, provide products below by Owens Corning, or equivalent product manufactured with a blowing agent formulation that delivers a 90

percent reduction to Global Warming Potential (100 year) compared to standard formulations, including the complete elimination of HFC 134a.

a. For underslab and below grade applications, use Type VII, 60 psi (414 kPa), Foamular NGX 600.

B. Adhesive for Bonding Insulation: Product with demonstrated capability to bond insulation securely to substrates without damaging insulation and substrates.

2.3 GLASS-FIBER BLANKET INSULATION

A. Glass-Fiber Blanket Insulation, Unfaced : ASTM C665, Type I; passing ASTM E136 for combustion characteristics.

B. Glass-Fiber Blanket Insulation, Kraft Faced : ASTM C665, Type II (nonreflective faced), Class C (faced surface not rated for flame propagation); Category 1 (membrane is a vapor barrier).

2.4 FOAMED-IN-PLACE MASONRY WALL INSULATION

A. Manufacturers: Subject to compliance with requirements, provide products below by Tailored Chemical Products, or equivalent product.

B. General: Provide insulating materials which comply with requirements indicated for materials, compliance with referenced standards, and other characteristics.

C. Foamed-In-Place Masonry Insulation: Two component thermal insulation produced by combining a plastic resin and catalyst foaming agent surfactant which, when properly ratioed and mixed, together with compressed air produce a cold-setting foam insulation in the hollow cores of hollow unit masonry walls.

1. Surface Burning Characteristics: Maximum flame spread, smoke developed and fuel contributed of 0, 5 and 0 respectively.
2. Combustion Characteristics: Must be noncombustible, Class A building material.
3. Thermal Values: "R" Value of 4.91/inch at 32 degrees F mean; ASTM C-177.
4. Sound Abatement: Minimum Sound Transmission Class (STC) rating of 53 and a minimum Outdoor Indoor Transmission Class (OITC) rating of 44 for 8" masonry wall assembly (ASTM E90-90).

2.5 INSULATION FASTENERS

A. Adhesively Attached, Spindle-Type Anchors: Plate welded to projecting spindle; capable of holding insulation of specified thickness securely in position with self-locking washer in place.

1. Plate: Perforated, galvanized carbon-steel sheet, 0.030 inch thick by 2 inches square.
2. Spindle: Copper-coated, low-carbon steel; fully annealed; 0.105 inch in diameter; length to suit depth of insulation.

B. Adhesively Attached, Angle-Shaped, Spindle-Type Anchors: Angle welded to projecting spindle; capable of holding insulation of specified thickness securely in position with self-locking washer in place.

1. Angle: Formed from 0.030-inch- thick, perforated, galvanized carbon-steel sheet with each leg 2 inches square.
2. Spindle: Copper-coated, low-carbon steel; fully annealed; 0.105 inch in diameter; length to suit depth of insulation.

C. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch- thick galvanized-steel sheet, with beveled edge for increased stiffness, sized as required to hold insulation securely in place, but not less than 1-1/2 inches square or in diameter.

D. Anchor Adhesive: Product with demonstrated capability to bond insulation anchors securely to substrates without damaging insulation, fasteners, or substrates.

2.6 ACCESSORIES

A. Insulation for Miscellaneous Voids:
1. Glass-Fiber Blanket Insulation: ASTM C665, Type I, with maximum flame-spread and smoke-developed indexes of 25 and 450, respectively, per ASTM E 84.
a. Compact to approximately 40 percent of normal maximum volume equaling a density of approximately 2.5 lb/cu. ft. (40 kg/cu. m).
2. Spray Polyurethane Foam Insulation: ASTM C1029, Type II, closed cell, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E84.
a. Products: Subject to compliance with requirements, acceptable products include, but are not limited to the following:
1) Great Stuff by Dupont.
2) HandiFoam by ICP Building Solutions Group.
b. Apply according to manufacturer's written instructions.

B. Adhesive for Bonding Insulation: Product compatible with insulation, and air and water barrier materials, and with demonstrated capability to bond insulation securely to substrates without damaging insulation and substrates.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean substrates of substances that are harmful to insulation, including removing projections capable of puncturing insulation or vapor retarders, or that interfere with insulation attachment.

3.2 INSTALLATION, GENERAL

A. Comply with insulation manufacturer's written instructions applicable to products and applications.

B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.

C. Install insulation with manufacturer's R-value label exposed after insulation is installed.

D. Extend insulation to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.

E. Provide sizes to fit applications indicated and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units to produce thickness indicated unless multiple layers are otherwise shown or required to make up total thickness or to achieve R-value.

3.3 INSTALLATION OF SLAB INSULATION (XPS)

A. On vertical slab edge and foundation surfaces, set insulation units using manufacturer's recommended adhesive according to manufacturer's written instructions.
1. If not otherwise indicated, extend insulation a minimum of 48 inches below exterior grade line.

B. On horizontal surfaces, loosely lay insulation units according to manufacturer's written instructions. Stagger end joints and tightly abut insulation units.
1. Tape all joints to assist in securing insulation boards in place during pouring of concrete slab. No gaps in insulation are allowed.
2. If not otherwise indicated, extend insulation a minimum of 48-inches in from exterior walls.

3.4 INSTALLATION OF FOUNDATION WALL INSULATION (XPS)

A. Butt panels together for tight fit. No gaps in insulation are allowed.

B. Anchor Installation: Install board insulation on concrete substrates by adhesively attached, spindle-type insulation anchors as follows:
   1. Fasten insulation anchors to concrete substrates with insulation anchor adhesive according to anchor manufacturer's written instructions.
   2. Space anchors according to insulation manufacturer's written instructions for insulation type, thickness, and application.
   3. Apply insulation standoffs to each spindle to create cavity width indicated on Drawings between concrete substrate and insulation.
   4. After adhesive has dried, install board insulation by pressing insulation into position over spindles and securing it tightly in place with insulation-retaining washers, taking care not to compress insulation. Where drainage panels are installed over board insulation, remove portion of spindle protruding out from exterior face of board insulation and retaining washers to prevent puncturing drainage panel.
   5. Where insulation will not be covered by other building materials, apply capped washers to tips of spindles.

C. Adhesive Installation: Install with adhesive according to manufacturer's written instructions.

3.5 INSTALLATION OF INSULATION IN FRAMED CONSTRUCTION

A. Blanket Insulation: Install in cavities formed by framing members according to the following requirements:
   1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.
   2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
   3. Maintain 3-inch clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.
   4. For wood-framed construction, install blankets in accordance with ASTM C1320 and as follows:
      a. With faced blankets having stapling flanges, lap blanket flange over flange of adjacent blanket to maintain continuity of vapor retarder once finish material is installed over it.
   5. Vapor-Retarder-Faced Blankets: Tape joints and ruptures in vapor-retarder facings, and seal each continuous area of insulation to ensure airtight installation.

B. Miscellaneous Voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation using the following materials:
   1. Glass-Fiber Insulation: Compact to approximately 40 percent of normal maximum volume equaling a density of approximately 2.5 lb/cu. ft..
   2. Spray Polyurethane Insulation: Apply according to manufacturer's written instructions.

3.6 INSTALLATION OF REFLECTIVE INSULATION

A. Install interior radiation control coating system in accordance with ASTM C1321.

3.7 INSTALLATION OF FOAMED-IN-PLACE MASONRY WALL INSULATION

A. Inspection and Preparation
   1. Application Assemblies:
      a. Block Walls: 6", 8", 10", or 12" concrete masonry units
      b. Cavity Walls: 2" cavity or greater
   2. Installation of Foamed-In-Place Insulation:
      a. General: Install foamed-in-place insulation form interior, or as specified, prior to installation of interior finish work and after all masonry and structural concrete work is in place; comply with manufacturer's instructions.
      b. Installation: Fill all open cells and voids in hollow concrete masonry unit walls where shown on Drawings. The foam insulation shall be pressure injected through a series of 5/8" to 7/8" holes drilled into every vertical column of block cells (every 8" on center) centered on horizontal mortar joint beginning at an approximate height of four feet (4') from finished

floor level. Repeat this procedure at an approximate height of ten feet (10') above the first horizontal row of holes, or as needed to completely fill all voids the full height of wall and above and below intermediate bond beams in wall. Patch holes with mortar and score to resemble the finished face of existing surface.

3.8 PROTECTION

A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes.

B. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION 07 21 00

SECTION 07 25 00 - WEATHER BARRIERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Drainage wrap.
2. Flexible flashing.

1.2 ACTION SUBMITTALS

A. Product Data:
1. Drainage wrap.
2. Flexible flashing.

B. Product Data Submittals: For drainage wrap, include data on air and water-vapor permeance based on testing in accordance with referenced standards.

C. Shop Drawings: Show details of drainage wrap at terminations, openings, and penetrations. Show details of flexible flashing applications.

1.3 INFORMATIONAL SUBMITTALS

A. Evaluation Reports: For water-resistive barrier and flexible flashing, from ICC-ES.

PART 2 - PRODUCTS

2.1 WATER-RESISTIVE BARRIER

A. Drainage Wrap: ASTM E1677, Type I dimensional water-resistive barrier that also creates a drainage plane; with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, when tested in accordance with ASTM E84; and acceptable to authorities having jurisdiction.
1. Basis-of-Design Product: Subject to compliance with requirements, provide Tyvek® CommercialWrap® D as manufactured by DuPont de Nemours, Inc. or comparable product by one of the following:
a.
b. Benjamin Obdyke Incorporated.
2. Water-Vapor Permeance: Minimum 28 perms per ASTM E96-05/E96-05M, Desiccant Method (Procedure B).
3. Air Permeance: Maximum 0.004 cfm/sq. ft. at 0.3-inch wg when tested in accordance with ASTM E2178.
4. Allowable UV Exposure Time: Not more than 180 days.

B. Acrylic Seam Tape: Composite tape consisting of a pressure-sensitive acrylic adhesive, bonded to a polyethylene or polypropylene film for sealing joints and penetrations in building wrap. Provide tape from same manufacturer as approved wrap product.
1. Width: 3 inches.

2.2 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 .

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

3.1 INSTALLATION OF WATER-RESISTIVE BARRIER

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 1/2 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 or Drainage 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.

3.2 INSTALLATION OF FLEXIBLE FLASHING

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 07 25 00

SECTION 07 26 00 - VAPOR RETARDERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Polyethylene vapor retarders.

B. Related Requirements:
1. Section 03 30 00 "Cast-in-Place Concrete" for under-slab vapor retarders.
2. Section 07 21 00 "Thermal Insulation" for vapor retarders integral with insulation products.

1.2 ACTION SUBMITTALS

A. Product Data:
1. Polyethylene vapor retarders.

1.3 INFORMATIONAL SUBMITTALS

A. Product Test Reports: For each product, for tests performed by a qualified testing agency.

PART 2 - PRODUCTS

2.1 POLYETHYLENE VAPOR RETARDERS

A. Polyethylene Vapor Retarders: ASTM D4397, 15-mil thick sheet, with maximum permeance rating of 0.1 perm.
1. Manufacturers:
a. Basis-of-Design Product: Subject to compliance requirements, provide Stego Wrap 15-mil vapor retarder by Stego Industries, LLC or equal product by one of the following:
1) Fortifiber Building Systems Group - Moistop Ultra 15
2) Reef Industries - Griffolyn 15-Mil
3) W.R. Meadows, Inc. - Perminator 15-Mil

2.2 ACCESSORIES

A. Vapor-Retarder Tape: Pressure-sensitive tape of type recommended by vapor-retarder manufacturer for sealing overlap joints and penetrations in vapor retarder.
1. Basis-of-Design: Stego Tape

B. Vapor-Retarder Concrete Tape: Multi-layered tape of type recommended by vapor retarder vapor-retarder manufacturer for sealing vapor retarders to the underside of the concrete slab while the concrete is being placed.
1. Basis-of-Design: Stego Crete Claw Tape 6"

C. Adhesive for Vapor Retarders: Product recommended by vapor-retarder manufacturer and has demonstrated capability to bond vapor retarders securely to perimeter concrete walls and other substrates as indicated on Drawings.
1. Basis-of-Design: Stego Mastic

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean substrates of substances that are harmful to vapor retarders, including removing projections capable of puncturing vapor retarders.

3.2 INSTALLATION OF VAPOR RETARDERS UNDER CONCRETE SLABS

A. Place vapor retarders on top of 4" minimum stone base and perimeter underslab rigid insulation, and against underside of concrete slab as indicated on Drawings.
   1. Lap joints a minimum of 12-inches and seal with manufacturer's recommended tape.

B. Extend vapor retarders to extremities of areas and all perimeter walls to protect from vapor transmission. Secure vapor retarders in place with adhesives, vapor retarder tape, or other anchorage system as recommended by manufacturer.
   1. Turn vapor-retarder up face of perimeter walls and seal vapor-retarder to concrete wall with concrete tape below top side of concrete slab as recommended by manufacturer. Provide sufficient slack in vapor-retarder at all inside corner transitions and full depth of concrete around perimeter of slab to avoid concrete placement from pulling vapor-retarder away from face of wall.
   2. Vapor-retarder to serve as a bond breaker between perimeter edge of concrete slab and face of concrete wall.

C. Seal all penetrations and joints caused by columns, pipes, conduits, electrical boxes, reinforcing, and similar items penetrating vapor retarders with vapor-retarder tape as recommended by manufacturer to create a monolithic, airtight membrane and seal between penetrating objects and vapor retarders.

D. Repair tears or punctures in vapor retarders immediately before concealment by other work. Cover with vapor-retarder tape or another layer of vapor retarders sealed at all perimeter edges.

3.3 PROTECTION

A. Protect vapor retarders from damage until concealed by permanent construction.

END OF SECTION 07 26 00

SECTION 07 41 13.16 - STANDING-SEAM METAL ROOF PANELS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Preformed standing-seam metal roof panels.

B. Related Requirements:
1. Section 07 62 00 "Sheet Metal Flashing and Trum."
2. Section 07 92 00 "Joint Sealants" for sealing joints between metal roof panel system and adjacent construction.

1.2 ACTION SUBMITTALS

A. Product Data: For standing-seam metal roof panels. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of panel and accessory.

B. Shop Drawings:
1. Include fabrication and installation layouts of metal panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details.
2. Accessories: Include details of the flashing, trim, and anchorage systems, at a scale of not less than 1-1/2 inches per 12 inches.

C. Samples: For each type of metal panel indicated with factory-applied color finishes.
1. Include similar Samples of trim and accessories involving color selection.

1.3 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Test Reports: For standing-seam metal roof panels, for tests performed by a qualified testing agency.

C. Sample Warranties: For special warranties.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: For metal panels to include in maintenance manuals.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section and with at least three years of documented experience.

B. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer, with at least three years of documented experience.

1.6 MOCKUPS

A. Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
1. Build mockup of typical roof area and eave , including fascia, and soffit as shown on Drawings; approximately 6 feet square by full thickness, including attachments , underlayment, and accessories.

2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
3. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver components, metal 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.

C. Stack metal panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal panels to ensure dryness, with positive slope for drainage of water. Do not store metal panels in contact with other materials that might cause staining, denting, or other surface damage.

D. Retain strippable protective covering on metal panels during installation.

1.8 FIELD CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal panels to be performed according to manufacturers' written instructions and warranty requirements.

1.9 COORDINATION

A. Coordinate sizes and locations of roof curbs, equipment supports, and roof penetrations with actual equipment provided.

B. Coordinate metal panel installation with rain drainage work, flashing, trim, construction of soffits, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.10 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal panel systems that fail in materials or workmanship within specified warranty period.
1. Failures include, but are not limited to, the following:
    a. Structural failures including rupturing, cracking, or puncturing.
    b. Deterioration of metals and other materials beyond normal weathering.
2. Warranty Period: Two years from date of Substantial Completion.

B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal 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 Delta E 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: 20 years from date of Substantial Completion.

C. Special Weathertightness Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace standing-seam metal roof panel assemblies that fail to remain weathertight, including leaks, within specified warranty period.
1. Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Structural Performance: 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 on Drawings.
   2. Other Design Loads: As indicated on Drawings .
   3. Deflection Limits: For wind loads, no greater than 1/180 of the span.

B. Water Penetration under Static Pressure: 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..

C. Wind-Uplift Resistance: Provide metal roof panel assemblies that comply with UL 580 for wind-uplift-resistance class indicated.
   1. Uplift Rating: UL 60 .

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 (Range): 120 deg F , ambient; 180 deg F , material surfaces .

2.2 STANDING-SEAM METAL ROOF PANELS

A. Provide factory-formed metal roof panels designed to be installed by lapping and interconnecting raised side edges of adjacent panels with joint type indicated and mechanically attaching panels to supports using concealed clips in side laps. Include clips, cleats, pressure plates, and accessories required for weathertight installation.
   1. Aluminum Panel Systems: Unless more stringent requirements are indicated, comply with ASTM E1637.

B. Vertical-Rib, Snap-Joint, Standing-Seam Metal Roof Panels : Formed with vertical ribs at panel edges and a flat pan between ribs; designed for sequential installation by mechanically attaching panels to supports using concealed clips located under one side of panels, engaging opposite edge of adjacent panels, and snapping panels together.
   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. ATAS International, Inc.
      b. Berridge Manufacturing Company.
      c. Petersen Aluminum Corporation; PAC T-250 Panel: www.pac-clad.com/#sle.
   2. Aluminum Sheet: Coil-coated sheet, ASTM B209, alloy as standard with manufacturer, with temper as required to suit forming operations and structural performance required.
      a. Thickness: 0.040 inch.
      b. Surface: Smooth, flat finish.
      c. Exterior Finish: Two-coat fluoropolymer .
      d. Color: As selected by Architect from manufacturer's full range .
   3. Clips: Two-piece floating to accommodate thermal movement.
      a. 0.0250-inch- thick, stainless steel sheet.
   4. Panel Coverage: 16 inches .
   5. Panel Height: 1.5 inches minimum .

2.3 UNDERLAYMENT MATERIALS

A. Self-Adhering, High-Temperature Underlayment: Provide self-adhering, cold-applied, sheet underlayment, a minimum of 30 mils thick, consisting of slip-resistant, polyethylene-film top surface

laminated to a layer of butyl or SBS-modified asphalt adhesive, with release-paper backing. Provide primer when recommended by underlayment manufacturer.

1. Thermal Stability: Stable after testing at 240 deg F; ASTM D1970.
2. Low-Temperature Flexibility: Passes after testing at minus 20 deg F; ASTM D1970.
3. 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. VaproShield, LLC; SlopeShield Plus Self-Adhered: www.vaproshield.com/#sle.

B. Slip Sheet: Manufacturer's recommended slip sheet, of type required for application.

2.4 MISCELLANEOUS MATERIALS

A. Panel Accessories: Provide components required for a complete, weathertight panel system including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal panels unless otherwise indicated.

1. Closures: Provide closures at eaves and ridges, fabricated of same metal as metal panels.
2. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
3. 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 panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.

B. Flashing and Trim: Provide flashing and trim formed from same material as metal panels 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. Finish flashing and trim with same finish system as adjacent metal panels.

C. Panel Fasteners: Self-tapping screws designed to withstand design loads.

D. Panel Sealants: Provide sealant type recommended by manufacturer that are compatible with panel materials, are nonstaining, and do not damage panel finish.

1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.
2. Joint Sealant: ASTM C920; elastomeric polyurethane or silicone sealant; of type, grade, class, and use classifications required to seal joints in metal panels and remain weathertight; and as recommended in writing by metal panel manufacturer.
3. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C1311.

2.5 FABRICATION

A. Fabricate and finish metal panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.

B. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.

C. Fabricate metal panel joints with factory-installed captive gaskets or separator strips that provide a weathertight seal and prevent metal-to-metal contact, and that minimize noise from movements.

D. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.

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.

2. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
3. Sealed Joints: Form nonexpansion, but movable, joints in metal to accommodate sealant and to comply with SMACNA standards.
4. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
5. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended in writing by metal panel manufacturer.
    a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal panel manufacturer for application, but not less than thickness of metal being secured.

2.6 FINISHES

A. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in same piece are unacceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

C. Aluminum Panels and Accessories:
1. Two-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent polyvinylidene fluoride (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.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal panel supports, and other conditions affecting performance of the Work.
1. Examine primary and secondary roof framing to verify that rafters, purlins, angles, channels, and other structural panel support members and anchorages have been installed within alignment tolerances required by metal roof panel manufacturer.
2. Examine solid roof sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal roof panel manufacturer.
    a. Verify that air- or water-resistive barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.

B. Examine roughing-in for components and systems penetrating metal panels to verify actual locations of penetrations relative to seam locations of metal panels before installation.

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

3.2 PREPARATION

A. Miscellaneous Supports: Install subframing, furring, and other miscellaneous panel support members and anchorages according to ASTM C754 and metal panel manufacturer's written recommendations.

3.3 INSTALLATION OF UNDERLAYMENT

A. Self-Adhering Sheet Underlayment: Apply primer if required by manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation. Apply at locations indicated below , wrinkle free, in shingle fashion to shed water, and with end laps of not less than 6 inches staggered 24 inches between courses. Overlap side edges not less than 3-1/2 inches. Extend underlayment into gutter trough. Roll laps with roller. Cover underlayment within 14 days.

1. Apply over the entire roof surface.

B. Slip Sheet: Apply slip sheet over underlayment before installing metal roof panels.

C. Flashings: Install flashings to cover underlayment to comply with requirements specified in Section 07 62 00 "Sheet Metal Flashing and Trim."

3.4 INSTALLATION OF STANDING-SEAM METAL ROOF PANELS

A. Install metal panels according to manufacturer's written instructions in orientation, sizes, and locations indicated. Install panels perpendicular to supports unless otherwise indicated. Anchor metal panels and other components of the Work securely in place, with provisions for thermal and structural movement.
1. Shim or otherwise plumb substrates receiving metal panels.
2. Flash and seal metal panels at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until air- or water-resistive barriers and flashings that will be concealed by metal panels are installed.
3. Install screw fasteners in predrilled holes.
4. Locate and space fastenings in uniform vertical and horizontal alignment.
5. Install flashing and trim as metal panel work proceeds.
6. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
7. Align bottoms of metal panels and fasten with blind rivets, bolts, or self-tapping screws. Fasten flashings and trim around openings and similar elements with self-tapping screws.
8. Provide weathertight escutcheons for pipe- and conduit-penetrating panels.

B. Fasteners:
1. Aluminum Panels: Use aluminum or stainless steel fasteners for surfaces exposed to the exterior; use aluminum or galvanized-steel fasteners for surfaces exposed to the interior.

C. Anchor Clips: Anchor metal roof panels and other components of the Work securely in place, using manufacturer's approved fasteners according to manufacturers' written instructions.

D. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action as recommended in writing by metal panel manufacturer.

E. Standing-Seam Metal Roof Panel Installation: Fasten metal roof panels to supports with concealed clips at each standing-seam joint at location, spacing, and with fasteners recommended in writing by manufacturer.
1. Install clips to supports with self-tapping fasteners.
2. Install pressure plates at locations indicated in manufacturer's written installation instructions.
3. Seamed Joint: Crimp standing seams with manufacturer-approved, motorized seamer tool so clip, metal roof panel, and factory-applied sealant are completely engaged.
4. Watertight Installation:
   a. Apply a continuous ribbon of sealant or tape to seal joints of metal panels, using sealant or tape as recommend in writing by manufacturer as needed to make panels watertight.
   b. Provide sealant or tape between panels and protruding equipment, vents, and accessories.
   c. At panel splices, nest panels with minimum 6-inch end lap, sealed with sealant and fastened together by interlocking clamping plates.

F. Accessory Installation: 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 panel system including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items. Provide types indicated by metal roof panel manufacturers; or, if not indicated, types recommended by metal roof panel manufacturer.

G. 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 as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.
   1. Install exposed flashing and trim that is without 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 achieve 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 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).

3.5 ERECTION TOLERANCES

A. Installation Tolerances: Shim and align metal panel units within installed tolerance of 3/8 inch in 20 feet on slope and location lines as indicated and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

3.6 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect metal roof panel installation, including accessories. Report results in writing.

B. Remove and replace applications of metal roof panels where tests and inspections indicate that they do not comply with specified requirements.

C. Additional tests and inspections, at Contractor's expense, are performed to determine compliance of replaced or additional work with specified requirements.

D. Prepare test and inspection reports.

3.7 CLEANING AND PROTECTION

A. Remove temporary protective coverings and strippable films, if any, as metal panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.

B. Replace metal panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 07 41 13.16

SECTION 07 46 46 - FIBER-CEMENT SIDING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Fiber-cement horizontal siding.
2. Fiber-cement soffit.
3. Fiber-cement fascia boards.
4. Fiber-cement trim and accessories
5. Furring strips.

B. Related Requirements:
1. Section 07 25 00 "Weather Barriers" for weather-resistive barriers.
2. Section 07 92 00 "Joint Sealers" for sealants.
3. Section 09 91 13 "Exterior Painting" for field painting.

1.2 COORDINATION

A. Coordinate siding installation with flashings and other adjoining construction to ensure proper sequencing.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site .

1.4 ACTION SUBMITTALS

A. Product Data: For each of the following.
1. Fiber-cement horizontal siding.
2. Fiber-cement soffit.
3. Fiber-cement trim and accessories.
4. Furring strips.

B. Product Data Submittals: For each type of fiber-cement siding and soffit, Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

C. Samples for Initial Selection: For fiber-cement siding and soffit including related accessories.

D. Samples for Verification: For each type, color, texture, and pattern required.
1. 12-inch- long-by-actual-width Sample of siding.
2. 12-inch- long-by-actual-width Sample of soffit.
3. 12-inch- long-by-actual-width Samples of trim and accessories.

1.5 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of fiber-cement siding and soffit.

B. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for fiber-cement siding.

C. Research/Evaluation Reports: For each type of fiber-cement siding required, from ICC-ES.

D. Sample Warranty: For special warranty.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For each type of fiber-cement siding and soffit, including related accessories, to include in maintenance manuals.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store packaged materials in original containers with labels intact until time of use.

B. Store materials on elevated platforms, under cover, and in a dry location.

1.8 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace products that fail in materials or workmanship within specified warranty period.
   1. Failures include, but are not limited to, the following:
      a. Structural failures including cracking and deforming.
      b. Deterioration of materials beyond normal weathering.
   2. Warranty Period: 50 years from date of Substantial Completion.

B. Correct defective work within a five year period after Date of Substantial Completion.

C. Installation Warranty for Building Rainscreen Assembly: Installer of exterior rainscreen assembly (including framing, exterior panels, and attachments) to provide 10-year warranty that includes coverage for defective materials and/or workmanship. This warranty will also clearly include materials, labor, necessary activity to access these areas, and removal of any materials to effect repairs and restore to watertight conditions. www.edacontractors.com/#sle

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Obtain products, including related accessories, from single source from single manufacturer.

2.2 FIBER-CEMENT SIDING

A. Fiber-Cement Siding: ASTM C1186, Type A, Grade II, fiber-cement board, noncombustible when tested in accordance with ASTM E136; with a flame-spread index of 25 or less when tested in accordance with ASTM E84.
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. James Hardie Building Products, Inc.
      b. Nichiha USA, Inc.

B. Labeling: Provide fiber-cement siding that is tested and labeled in accordance with ASTM C1186 by a qualified testing agency acceptable to authorities having jurisdiction.

C. Nominal Thickness: Not less than 5/16 inch nominal.

D. Horizontal Pattern: Boards 8-1/4 to 8-1/2 inches wide in plain style, allowing a minimum of 1-1/4 inch overlap with 7 inch exposure.
   1. Style: Standard lap style with machined edges.
   2. Texture: Smooth .
   3. Length: 12 feet, nominal.

E. Factory Priming: Manufacturer's standard acrylic primer.

2.3 FIBER-CEMENT SOFFIT

A. Fiber-Cement Soffit: ASTM C1186, Type A, Grade II, fiber-cement board, noncombustible when tested in accordance with ASTM E136; with a flame-spread index of 25 or less when tested in accordance with ASTM E84.
   1. Manufacturers: Same as siding.

B. Nominal Thickness: Not less than 5/16 inch.

C. Length: 96 inches, and 144 inches nominal.

D. Pattern: , 24-inch- wide sheets, with smooth texture. Use only single width pieces. No splicing allowed.

E. Ventilation: Provide perforated and unperforated soffit panels where detailed on drawings.

F. Factory Priming: Manufacturer's standard acrylic primer.

2.4 ACCESSORIES

A. Siding Accessories, General: Provide starter strips, edge trim, outside and inside corner caps, and other items as recommended by siding manufacturer for building configeration.
   1. Provide accessories matching color and texture of adjacent siding unless otherwise indicated.
   2. Factory Priming: Manufacturer's standard acrylic primer.
   3. Fascia Panels:
      a. Material: Match siding in appearance.
      b. Thickness: 1-inch minimum, as detailed on Drawings.
      c. Width: As indicated on Drawings.
      d. Color: TBD.
   4. Trim:
      a. Thickness: 1-inch minimum, as detailed on Drawings.
      b. Width: As indicated on Drawings.
      c. Color: TBD.

B. Fiber-Cement Siding Metal Trim: Extruded aluminum alloy 6063-T5 temper.
   1. Dimension and Layout: As indicated on drawings.
   2. Finish: Clear anodized.

C. Decorative Accessories: Provide the following fiber-cement decorative accessories as indicated:
   1. Door and window casings.
   2. Moldings and trim.

D. Flashing: Provide aluminum flashing complying with Section 07 62 00 "Sheet Metal Flashing and Trim" at window and door heads and where indicated.

E. Furring Strips: Provide furring strips equal to Sturdi-Strips as manufactured by Cor-A-Vent; https://www.cor-a-vent.com/sturdi-strips.cfm

F. Fasteners:
   1. For fastening to wood, use ribbed bugle-head screws of sufficient length to penetrate a minimum of 1-1/4 inch into substrate.
   2. For fastening to metal, use ribbed bugle-head screws of sufficient length to penetrate a minimum of 1/4 inch, or three screw-threads, into substrate.
   3. For fastening fiber cement, use stainless steel fasteners.

G. Insect Screening for Soffit Vents: Aluminum, 18-by-16 mesh .
   1. One piece, perforated, ASTM B221 (ASTM B221M), 6063 alloy, T5 temper, aluminum, with flat panel edge and manufactured especially for soffit application.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates for compliance with requirements for installation tolerances and other conditions affecting performance of fiber-cement siding and soffit and related accessories.

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

3.2 PREPARATION

A. Clean substrates of projections and substances detrimental to application.

B. Protect surrounding areas and adjacent surfaces during execution of this work.

C. Install Sheet Metal Flashing:
1. Above door and window trim and casings.
2. Above horizontal trim in field of siding.

3.3 INSTALLATION

A. General: Comply with manufacturer's written installation instructions applicable to products and applications indicated unless more stringent requirements apply.
1. Read warranty and comply with terms necessary to maintain warranty coverage.
2. Install in accordance with conditions stated in model code evaluation report applicable to location of project.
3. Use trim details as indicated on drawings.
4. Touch up field cut edges before installing.
5. Do not install damaged components.
6. Install fasteners no more than 24 inches o.c.

B. Over Wood and Wood-Composite Sheathing: Fasten siding through sheathing into studs.

C. Allow space for thermal movement between both ends of siding panels that butt against trim; seal joint between panel and trim with specified sealant.

D. Joints in Horizontal Siding: Avoid joints in lap siding except at corners; where joints are inevitable stagger joints between successive courses.

E. Do not install siding less than 6 inches from ground surface, or closer than 1 inch to roofs, patios, porches, and other surfaces where water may collect.

F. Exterior Soffit Vents: Install in accordance with manufacturer's written instructions and at locations indicated on drawings; provide vent area as indicated on drawings.

G. After installation, seal joints except lap joints of lap siding; seal around penetrations, and paint exposed cut edges.

H. Install joint sealants as specified in Section 07 92 00 "Joint Sealants" and to produce a weathertight installation.

I. Finish Painting: Within one week after installation, paint siding and trim with one coat primer and two coats finish paint. Refer to Section 09 91 13 "Exterior Painting."

3.4 ADJUSTING AND CLEANING

A. Remove damaged, improperly installed, or otherwise defective materials and replace with new materials complying with specified requirements.

B. Clean finished surfaces according to manufacturer's written instructions and maintain in a clean condition during construction.

3.5 PROTECTION

A. Protect installed products until Date of Substantial Completion.

B. Touch-up, repair or replace damaged products before Date of Substantial Completion.

END OF SECTION 07 46 46

SECTION 07 62 00 - SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Formed roof-drainage sheet metal fabrications.
2. Formed wall sheet metal fabrications.
3. Wall cap flashing.
4. Splash Blocks
5. Miscellaneous sheet metal fabrications.

1.2 COORDINATION

A. Coordinate sheet metal flashing and trim layout and seams with sizes and locations of penetrations to be flashed, and joints and seams in adjacent materials.

B. Coordinate sheet metal flashing and trim installation with adjoining roofing and wall materials, joints, and seams to provide leakproof, secure, and noncorrosive installation.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site .
1. Review construction schedule. Verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
2. Review special roof details, roof drainage, roof-penetration flashing, equipment curbs, and condition of other construction that affect sheet metal flashing and trim.
3. Review requirements for insurance and certificates if applicable.
4. Review sheet metal flashing observation and repair procedures after flashing installation.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.
1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each manufactured product and accessory.

B. Shop Drawings: For sheet metal flashing and trim.
1. Include plans, elevations, sections, and attachment details.
a. Show roof drainage assemblies including the following:
1) Gutters showing direction of slopes, expansion joints, and details of attachment to building.
2) Include downspout locations; note deviations to locations and routing shown on Drawings.
3) Include dimensions of work and spacing of attachments.
2. Include identification of material, thickness, weight, and finish for each item and location in Project.
3. Include details for forming, including profiles, shapes, seams, and dimensions.
4. Include details for joining, supporting, and securing, including layout and spacing of fasteners, cleats, clips, and other attachments. Include pattern of seams.
5. Include details of termination points and assemblies.
6. Include details of edge conditions, including eaves, rakes, and other flashings as applicable.
7. Include details of special conditions.
8. Include details of connections to adjoining work.
9. Detail formed flashing and trim at scale of not less than 1-1/2 inches per 12 inches .

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For fabricator.

B. Product Certificates: For each type of wall cap and roof edge flashing that is ANSI/SPRI/FM 4435/ES-1 tested .

C. Product Test Reports: For each product, for tests performed by a qualified testing agency.

D. Sample Warranty: For special warranty.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For sheet metal flashing and trim, and its accessories, to include in maintenance manuals.

1.7 QUALITY ASSURANCE

A. Fabricator Qualifications: Employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.
   1. For wall caps and roof edge flashings that are ANSI/SPRI/FM 4435/ES-1 tested, shop is to be listed as able to fabricate required details as tested and approved.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage.
   1. Store sheet metal flashing and trim materials away from uncured concrete and masonry.
   2. Protect stored sheet metal flashing and trim from contact with water.

B. Protect strippable protective covering on sheet metal flashing and trim from exposure to sunlight and high humidity, except to extent necessary for period of sheet metal flashing and trim installation.

1.9 WARRANTY

A. Special Warranty on Finishes: Manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows 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 Delta E units when tested in accordance with ASTM D2244.
      b. Chalking in excess of a No. 8 rating when tested in accordance with ASTM D4214.
      c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
   2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. General: Sheet metal flashing and trim assemblies, including cleats, anchors, and fasteners, are to withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim are not to rattle, leak, or loosen, and are to remain watertight.

B. Sheet Metal Standard for Flashing and Trim: Comply with NRCA's "The NRCA Roofing Manual: Architectural Metal Flashing, Condensation and Air Leakage Control, and Reroofing" and SMACNA's "Architectural Sheet Metal Manual" requirements for dimensions and profiles shown unless more stringent requirements are indicated.

C. SPRI Wind Design Standard: Manufacture and install wall caps, copings and roof edge flashings tested in accordance with ANSI/SPRI/FM 4435/ES-1 and capable of resisting the following design pressure:
   1. Design Pressure: As indicated on Drawings .

D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent 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 .

2.2 SHEET METALS

A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying strippable, temporary protective film before shipping.

B. Aluminum Sheet: ASTM B209/209M, alloy as standard with manufacturer for finish required, with temper as required to suit forming operations and performance required; with smooth, flat surface.
   1. Exposed Coil-Coated Finish:
      a. Two-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent polyvinylidene fluoride (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. Color: Match Architect's sample .
   3. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with minimum total dry film thickness of 0.5 mil.

C. Stainless Steel Sheet: ASTM A240/A240M or ASTM A666, Type 304 , dead soft, fully annealed; with smooth, flat surface.
   1. Finish: ASTM A480/A480M, No. 2D (dull, cold rolled) .

2.3 UNDERLAYMENT MATERIALS

A. Refer to Section 07 41 13.16 "Standing-Seam Metal Roof Panels."

2.4 MISCELLANEOUS MATERIALS

A. General: Provide materials and types of fasteners , solder, protective coatings, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and as recommended by manufacturer of primary sheet metal or manufactured item unless otherwise indicated.

B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal or manufactured item.
   1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.
      a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating. Provide metal-backed EPDM or PVC sealing washers under heads of exposed fasteners bearing on weather side of metal.
      b. Blind Fasteners: High-strength aluminum or stainless steel rivets suitable for metal being fastened.
      c. Spikes and Ferrules: Same material as gutter; with spike with ferrule matching internal gutter width.
   2. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.
   3. Fasteners for Stainless Steel Sheet: Series 300 stainless steel.

C. Solder:

1. For Stainless Steel: ASTM B32, , with acid flux of type recommended by stainless steel sheet manufacturer.

D. Sealant Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.

E. Elastomeric Sealant: ASTM C920, elastomeric polyurethane polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

F. Butyl Sealant (For Expansion Joints With Limited Movement): ASTM C1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.

G. Bituminous Coating: Cold-applied asphalt emulsion in accordance with ASTM D1187/D1187M.

H. Asphalt Roofing Cement: ASTM D4586/D4586M, asbestos free, of consistency required for application.

2.5 FABRICATION, GENERAL

A. General: Custom fabricate sheet metal flashing and trim to comply with details indicated and recommendations in cited sheet metal standard that apply to design, dimensions, geometry, metal thickness, and other characteristics of item required.
1. Fabricate sheet metal flashing and trim in shop to greatest extent possible.
2. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
3. Obtain field measurements for accurate fit before shop fabrication.
4. Verify shapes and dimensions of surfaces to be covered and obtain field measurements for accurate fit before shop fabrication.
5. Form sheet metal flashing and trim to fit substrates without excessive oil-canning, buckling, and tool marks; true to line, levels, and slopes; and with exposed edges folded back to form hems.
6. Conceal fasteners and expansion provisions where possible. Do not use exposed fasteners on faces exposed to view.

B. Fabrication Tolerances:
1. Fabricate sheet metal flashing and trim that is capable of installation to a tolerance of 1/4 inch in 20 feet on slope and location lines indicated on Drawings and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

C. Expansion Provisions: Form metal for thermal expansion of exposed flashing and trim.
1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with butyl sealant concealed within joints.
2. Use lapped expansion joints only where indicated on Drawings.

D. Sealant Joints: Where movable, nonexpansion-type joints are required, form metal in accordance with cited sheet metal standard to provide for proper installation of elastomeric sealant.

E. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.

F. Fabricate cleats and attachment devices of sizes as recommended by cited sheet metal standard for application, but not less than thickness of metal being secured.

G. Seams:
1. Fabricate nonmoving seams with flat-lock seams. Tin edges to be seamed, form seams, and solder.

2. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints where necessary for strength.

H. Do not use graphite pencils to mark metal surfaces.

2.6 ROOF-DRAINAGE SHEET METAL FABRICATIONS

A. Hanging Gutters:
1. Fabricate to cross section required, complete with end pieces, outlet tubes, and other accessories as required.
2. Fabricate in continuous sections.
3. Furnish flat-stock gutter brackets and flat-stock gutter spacers and straps fabricated from same metal as gutters, of size recommended by cited sheet metal standard, but with thickness not less than twice the gutter thickness .
4. Fabricate expansion joints, expansion-joint covers, gutter bead reinforcing bars, and gutter accessories from same metal as gutters. Shop fabricate interior and exterior corners.
5. Gutter Profile: As indicated and in accordance with cited sheet metal standard.
6. Expansion Joints: Butt type with cover plate .
7. Gutters with Girth up to 15 Inches (380 mm): Fabricate from the following materials:
   a. Aluminum: 0.032 inch thick.
8. Gutters with Girth 16 to 20 Inches (410 to 510 mm): Fabricate from the following materials:
   a. Aluminum: 0.040 inch thick.

B. Downspouts: Fabricate rectangular downspouts to dimensions indicated on Drawings, complete with mitered elbows. Furnish with metal hangers from same material as downspouts and anchors Shop fabricate all components.
1. Hanger Style: Concealed, in accordance with SMACNA's "Architectural Sheet Metal Manual."
2. Fabricate from the following materials:
   a. Aluminum: 0.024 inch thick.

C. Splash Blocks:
1. Copper: [**16 oz./sq. ft.**] <**Insert value>**.
2. Aluminum: 0.040 inch thick.
3. Stainless Steel: [**0.0188 inch**] <**Insert dimension>** thick.
4. Zinc-Tin Alloy-Coated Copper: [**16 oz./sq. ft.**] <**Insert value>**.
5. Pre-cast concrete formed splash blocks.

2.7 WALL SHEET METAL FABRICATIONS

A. Through-Wall Flashing:
1. Stainless Steel: 0.0156 inch thick.

B. Opening Flashings in Frame Construction: Fabricate head, sill, jamb, and similar flashings to extend 4 inches minimum beyond wall openings. Form head and sill flashing with 2-inch- high, end dams. Fabricate from the following materials:
1. Stainless Steel: 0.0156 inch thick.

2.8 FINISH REQUIREMENTS

A. Exposed Finish: High-Performance Organic Finish, Two-Coat PVDF: Fluoropolymer finish complying with AAMA 2605 and containing not less than 70 percent PVDF resin by weight in color coat.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with installer present, for compliance with requirements for installation tolerances, substrate, and other conditions affecting performance of the Work.
   1. Verify compliance with requirements for installation tolerances of substrates.
   2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
   3. Verify that air- or water-resistant barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.

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

3.2 INSTALLATION OF UNDERLAYMENT

A. Self-Adhering, High-Temperature Sheet Underlayment:
   1. Install self-adhering, high-temperature sheet underlayment; wrinkle free.
   2. Prime substrate if recommended by underlayment manufacturer.
   3. Comply with temperature restrictions of underlayment manufacturer for installation; use primer for installing underlayment at low temperatures.
   4. Apply in shingle fashion to shed water, with end laps of not less than 6 inches staggered 24 inches between courses.
   5. Overlap side edges not less than 3-1/2 inches. Roll laps and edges with roller.
   6. Roll laps and edges with roller.

B. Cover underlayment within 14 days.

C. Install slip sheet, wrinkle free, over underlayment before installing sheet metal flashing and trim.
   1. Install in shingle fashion to shed water.
   2. Lap joints not less than 4 inches.

3.3 INSTALLATION, GENERAL

A. Install sheet metal flashing and trim to comply with details indicated and recommendations of cited sheet metal standard that apply to installation characteristics required unless otherwise indicated on Drawings.
   1. Install fasteners , solder, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
   2. Install sheet metal flashing and trim true to line, levels, and slopes. Provide uniform, neat seams with minimum exposure of solder and sealant.
   3. Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement.
   4. Install sheet metal flashing and trim to fit substrates and to result in watertight performance.
   5. Install continuous cleats with fasteners spaced not more than 12 inches o.c.
   6. Space individual cleats not more than 12 inches apart. Attach each cleat with at least two fasteners. Bend tabs over fasteners.
   7. Install exposed sheet metal flashing and trim with limited oil-canning, and free of buckling and tool marks.
   8. Do not field cut sheet metal flashing and trim by torch.
   9. Do not use graphite pencils to mark metal surfaces.

B. Metal Protection: Where dissimilar metals contact each other, or where metal contacts pressure-treated wood or other corrosive substrates, protect against galvanic action or corrosion by painting contact surfaces with bituminous coating or by other permanent separation as recommended by sheet metal manufacturer or cited sheet metal standard.

1. Coat concealed side of uncoated-aluminum and stainless steel sheet metal flashing and trim with bituminous coating where flashing and trim contact wood, ferrous metal, or cementitious construction.
2. Underlayment: Where installing sheet metal flashing and trim directly on cementitious or wood substrates, install underlayment and cover with slip sheet.

C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim.
1. Space movement joints at maximum of 10 feet with no joints within 24 inches of corner or intersection.
2. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with sealant concealed within joints.
3. Use lapped expansion joints only where indicated on Drawings.

D. Fasteners: Use fastener sizes that penetrate substrate not less than recommended by fastener manufacturer to achieve maximum pull-out resistance .

E. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.

F. Seal joints as required for watertight construction.
1. Use sealant-filled joints unless otherwise indicated.
    a. Embed hooked flanges of joint members not less than 1 inch into sealant.
    b. Form joints to completely conceal sealant.
    c. When ambient temperature at time of installation is between 40 and 70 deg F, set joint members for 50 percent movement each way.
    d. Adjust setting proportionately for installation at higher ambient temperatures.
        1) Do not install sealant-type joints at temperatures below 40 deg F.
2. Prepare joints and apply sealants to comply with requirements in Section 07 92 00 "Joint Sealants."

G. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter.
1. Pre-tin edges of sheets with solder to width of 1-1/2 inches; however, reduce pre-tinning where pre-tinned surface would show in completed Work.
2. Do not solder metallic-coated steel and aluminum sheet.
3. Do not use torches for soldering.
4. Heat surfaces to receive solder, and flow solder into joint.
    a. Fill joint completely.
    b. Completely remove flux and spatter from exposed surfaces.
5. Stainless Steel Soldering:
    a. Tin edges of uncoated sheets, using solder for stainless steel and acid flux.
    b. Promptly remove acid-flux residue from metal after tinning and soldering.
    c. Comply with solder manufacturer's recommended methods for cleaning and neutralization.

H. Rivets: Rivet joints in uncoated aluminum where necessary for strength.

3.4 INSTALLATION OF ROOF-DRAINAGE SYSTEM

A. General: Install sheet metal roof-drainage items to produce complete roof-drainage system in accordance with cited sheet metal standard unless otherwise indicated. Coordinate installation of roof perimeter flashing with installation of roof-drainage system.

B. Hanging Gutters:
1. Join sections with riveted and soldered joints or joints sealed with sealant.
2. Provide for thermal expansion.
3. Attach gutters at eave or fascia to firmly anchor them in position.
4. Provide end closures and seal watertight with sealant.
5. Slope to downspouts.

6. Anchor gutter with concealed gutter brackets spaced not more than 24 inches apart to roof deck unless otherwise indicated, and loosely lock to front gutter bead.
7. Install gutter with expansion joints at locations indicated on Drawings, but not exceeding 50 feet apart. Install expansion-joint caps.

C. Downspouts:
1. Join sections with 1-1/2-inch telescoping joints.
2. Provide hangers with fasteners designed to hold downspouts securely to walls.
3. Locate hangers at top and bottom and at approximately 60 inches o.c.
4. Provide elbows at base of downspout to direct water away from building.

3.5 INSTALLATION OF ROOF FLASHINGS

A. General: Install sheet metal flashing and trim to comply with performance requirements and cited sheet metal standard.
1. Provide concealed fasteners where possible, and set units true to line, levels, and slopes.
2. Install work with laps, joints, and seams that are permanently watertight and weather resistant.

B. Roof Edge Flashing:
1. Install roof edge flashings in accordance with ANSI/SPRI/FM 4435/ES-1.

3.6 INSTALLATION OF WALL FLASHINGS

A. General: Install sheet metal wall flashing to intercept and exclude penetrating moisture in accordance with cited sheet metal standard unless otherwise indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.

B. Opening Flashings in Frame Construction: Install continuous head, sill, jamb, and similar flashings to extend 4 inches beyond wall openings.

3.7 INSTALLATION TOLERANCES

A. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerance of 1/4 inch in 20 feet on slope and location lines indicated on Drawings and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

3.8 CLEANING

A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.

B. Clean and neutralize flux materials. Clean off excess solder.

C. Clean off excess sealants.

3.9 PROTECTION

A. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions.

B. On completion of sheet metal flashing and trim installation, remove unused materials and clean finished surfaces as recommended in writing by sheet metal flashing and trim manufacturer.

C. Maintain sheet metal flashing and trim in clean condition during construction.

D. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures, as determined by Architect.

END OF SECTION 07 62 00

SECTION 07 92 00 - JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Interior and exterior joint sealants.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site .

1.3 ACTION SUBMITTALS

A. Product Data: For each joint-sealant product.

B. Samples for Initial Selection: Manufacturer's standard color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.

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.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified testing agency.

B. Product Test Reports: For each kind of joint sealant, for tests performed by manufacturer and witnessed by a qualified testing agency.

C. Field quality-control reports.

D. Sample warranties.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.

1.6 FIELD CONDITIONS

A. Do not proceed with installation of joint sealants under the following conditions:
1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F.
2. When joint substrates are wet.
3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.7 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

2.1 JOINT SEALANTS, GENERAL

A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.

B. VOC Content: Sealants and sealant primers shall comply with the following:
   1. Architectural sealants shall have a VOC content of 250 g/L or less.
   2. Sealants and sealant primers for nonporous substrates shall have a VOC content of 250 g/L or less.
   3. Sealants and sealant primers for porous substrates shall have a VOC content of 775 g/L or less.

C. Colors of Exposed Joint Sealants: Match Architect's samples .

D. Suitability for Contact with Food: Where sealants are indicated for joints that will come in repeated contact with food, provide products that comply with 21 CFR 177.2600.

2.2 SILICONE JOINT SEALANTS

A. (SL-1) Single-Component Mildew Resistant Silicone Sealant: ASTM C 920, Type S; Grade NS; Class 25; Uses NT.
   1. Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to the following:
      a. 786; Dow Corning Corporation.
      b. Sanitary SCS1700; GE Advanced Materials - Silicones.
      c. 860; Pecora Corporation.
      d. Tremsil 200 Sanitary; Tremco Incorporated.

B. (SL-2) Single-Component Silicone Sealant: ASTM C 920, Type S, Grade NS, Class 100/50, Use NT.
   1. Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to the following:
      a. Dow Corning Corporation; 790.
      b. GE Advanced Materials - Silicones; SilPruf LM SCS2700.
      c. Pecora Corporation; 301 NS, 311 NS, 890, or 890FTS.
      d. Sika Corporation, Construction Products Division; SikaSil-C990.
      e. Tremco Incorporated; Spectrem 1 or Spectrem 800.

2.3 URETHANE JOINT SEALANTS

A. (SL-3) Multi-component Pourable Urethane Sealant: ASTM C 920,Type M; Grade P; Class 25; Uses T, M, A, and O.
   1. Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to the following:
      a. NR-200; Pecora Corporation.
      b. Sikaflex-2c SL; Sika Corporation, Inc.
      c. SL 2, MasterSeal.
      d. THC-900; Tremco Incorporated.

2.4 SOLVENT-RELEASE JOINT SEALANTS

A. (SL-4) Butyl-Rubber-Based Solvent-Release Joint Sealant: Comply with ASTM C 1311.
1. Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to the following:
a. Chem-Calk 300; Bostik Findley.
b. BC-158; Pecora Corporation.
c. Tremco Butyl Sealant; Tremco Incorporated.

2.5 MILDEW-RESISTANT JOINT SEALANTS

A. Mildew-Resistant Joint Sealants: Formulated for prolonged exposure to humidity with fungicide to prevent mold and mildew growth.

B. (SL-5) 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, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
a. Pecora Corporation.
b. PPG Paints; PPG Industries, Inc.
c. Sika Corporation - Building Components.

2.6 LATEX JOINT SEALANTS

A. (SL-6) Latex Joint Sealant: Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.
1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to the following:
a. BASF Building Systems; Sonolac.
b. Bostik, Inc.; Chem-Calk 600.
c. May National Associates, Inc.; Bondaflex 600 or Bondaflex Sil-A 700.
d. Pecora Corporation; AC-20+.
e. Schnee-Morehead, Inc.; SM 8200.
f. Tremco Incorporated; Tremflex 834.

2.7 ACOUSTICAL JOINT SEALANTS

A. (SL-7) Acoustical Sealant for Exposed and Concealed Joints: Manufacturer's standard nonsag, paintable, nonstaining latex acoustical sealant complying with ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.
1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
a. AC-20 FTR; Pecora Corporation.
b. Smoke N Sound Acoustical Sealant; Specified Technologies, Inc.
c. SHEETROCK Acoustical Sealant; USG Corporation.

2.8 JOINT-SEALANT BACKING

A. Sealant Backing Material, General: Nonstaining; compatible with joint substrates, sealants, primers, and other joint fillers; and approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

B. Cylindrical Sealant Backings: ASTM C1330, Type C (closed-cell material with a surface skin), Type O (open-cell material), Type B (bicellular material with a surface skin), or any of the preceding types, as approved in writing by joint-sealant manufacturer for joint application indicated, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.

2.9 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, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.

C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting performance of the Work.

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

3.2 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 all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
   2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:
      a. Concrete.
      b. Masonry.
      c. Unglazed surfaces of ceramic tile.
      d. Exterior insulation and finish systems.
   3. Remove laitance and form-release agents from concrete.
   4. 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 of joint sealants. Nonporous joint substrates include the following:
      a. Metal.
      b. Glass.
      c. Porcelain enamel.
      d. Glazed surfaces of ceramic tile.

B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-

sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

B. Sealant Installation Standard: Comply with recommendations in ASTM C1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Install sealant backings of type 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.
1. Do not leave gaps between ends of sealant backings.
2. Do not stretch, twist, puncture, or tear sealant backings.
3. Remove absorbent sealant backings that have become wet before sealant application, and replace them with dry materials.

D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

E. 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.

F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants in accordance with requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
1. Remove excess sealant from surfaces adjacent to joints.
2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
3. Provide concave joint profile per Figure 8A in ASTM C 1193 unless otherwise indicated.

3.4 INSTALLATION OF ACOUSTICAL JOINT SEALANTS

A. Comply with acoustical joint-sealant manufacturer's written installation instructions unless more stringent requirements apply.

B. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical joint sealant. Install acoustical joint sealants at both faces of partitions, at perimeters, and through penetrations. Comply with ASTM C 919, ASTM C 1193, and manufacturer's written recommendations for closing off sound-flanking paths around or through assemblies, including sealing partitions to underside of floor slabs above acoustical ceilings.

C. Acoustical Ceiling Areas: Apply acoustical joint sealant at perimeter edge moldings of acoustical ceiling panels. Color shall match edge molding.

3.5 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect joint sealants systems, including accessories.

B. Prepare test and inspection reports for Architect's review.

3.6 CLEANING

A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.7 PROTECTION

A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out, remove, and repair damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

3.8 JOINT-SEALANT SCHEDULE

A. (SL-1) Mildew-resistant interior joints in vertical surfaces and horizontal nontraffic surfaces.
1. Joints between plumbing fixtures and adjoining walls, floors, and counters.
2. Architectural woodwork, and on interior joints of all exterior doors and windows

B. (SL-2) Interior joints in vertical surfaces and horizontal nontraffic surfaces.
1. Control and expansion joints on exposed interior surfaces of exterior walls.
2. Perimeter joints of exterior openings where indicated.
3. Tile control and expansion joints.
4. Vertical joints on exposed surfaces of interior unit masonry walls and partitions.

C. (SL-2) Exterior joints in vertical surfaces and horizontal nontraffic surfaces.
1. Construction joints in cast-in-place concrete.
2. Control and expansion joints in unit masonry.
3. Joints in dimension stone cladding.
4. Joints between metal panels.
5. Joints between different materials listed above.

D. (SL-3) Interior and exterior joints in horizontal traffic surfaces.
1. Isolation and contraction joints in cast-in-place concrete slabs.

E. (SL-4) Bedding of exterior thresholds.

F. (SL-5) Interior joints in wet areas such as in bathrooms, restrooms, kitchen, and food prep areas.

G. (SL-6) Interior joints where sealant will be painted and if another sealant type is not otherwise indicated in other Part 3 Paragraphs.

H. (SL-7) Interior acoustical joints in vertical surfaces and horizontal nontraffic surfaces.

I. Provide sealants appropriate to substrate materials and conditions at all other exposed interior joints not indicated in this Article.

END OF SECTION 07 92 00

SECTION 08 11 13 - HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Exterior standard steel doors and frames.

B. Related Requirements:
   1. Section 08 71 00 "Door Hardware" for door hardware for hollow-metal doors.
   2. Section 09 91 13 "Exterior Painting" for field finishing HM door and frame.
   3. Section 09 91 23 "Interior Painting" for field finishing HM door and frame,

1.2 DEFINITIONS

A. Minimum Thickness: Minimum thickness of base metal without coatings in accordance with NAAMM-HMMA 803 or ANSI/SDI A250.8.

B. Clearance: The distance between bottom of door and top of finished flooring.

C. Undercut: The distance between bottom of door and bottom of frame.

1.3 COORDINATION

A. Coordinate anchorage installation for hollow-metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

B. Coordinate requirements for installation of door hardware, electrified door hardware, and access control and security systems.

1.4 ACTION SUBMITTALS

A. Product Data Submittals: For each type of product.
   1. Include construction details, material descriptions, core descriptions, finishes, and other data showing compliance with requirements.

B. Shop Drawings: Include the following:
   1. Elevations of each door type.
   2. Details of doors, including vertical- and horizontal-edge details and metal thicknesses.
   3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
   4. Locations of reinforcement and preparations for hardware.
   5. Details of each different wall opening condition.
   6. Details of electrical raceway and preparation for electrified hardware, access control systems, and security systems.
   7. Details of anchorages, joints, field splices, and connections.
   8. Details of accessories.
   9. Details of moldings, removable stops, and glazing.

C. Product Schedule: For hollow-metal doors and frames, prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with final door hardware schedule.

1.5 INFORMATIONAL SUBMITTALS

A. Product Test Reports: For each type of thermally rated door assemblies for tests performed by a qualified testing agency indicating compliance with performance requirements.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver hollow-metal doors and frames palletized, packaged, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.
   1. Provide additional protection to prevent damage to factory-finished units.

B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.

C. Store hollow-metal doors and frames vertically under cover at Project site with head up. Place on minimum 4-inch- high wood blocking. Provide minimum 1/4-inch space between each stacked door to permit air circulation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Ceco Door; ASSA ABLOY.
   2. Curries Company; ASSA ABLOY.
   3. Republic Doors and Frames.
   4. Steelcraft; an Allegion brand.

B. Source Limitations: Obtain hollow-metal work from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Thermally Rated Door Assemblies: Provide door assemblies with U-factor of not more than 0.40 deg Btu/F x h x sq. ft. when tested in accordance with ASTM C1363 or ASTM E1423.

2.3 EXTERIOR STANDARD STEEL DOORS AND FRAMES

A. Construct hollow-metal doors and frames to comply with standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.

B. Heavy-Duty Doors and Frames: ANSI/SDI A250.8, Level 2; ANSI/SDI A250.4, Level B.
   1. Doors:
      a. Type: As indicated in the Door and Frame Schedule on Drawings.
      b. Thickness: 1-3/4 inches.
      c. Face: Metallic-coated steel sheet, minimum thickness of 0.042 inch, with minimum A60 coating.
      d. Edge Construction: Model 1, Full Flush .
      e. Edge Bevel: Bevel lock edge 1/8 inch in 2 inches .
      f. Top Edge Closures: Close top edges of doors with flush closures of same material as face sheets. Seal joints against water penetration.
      g. Bottom Edges: Close bottom edges of doors where required for attachment of weather stripping with end closures or channels of same material as face sheets. Provide weep-hole openings in bottoms of exterior doors to permit moisture to escape.
      h. Core: Polyisocyanurate .
   2. Frames:
      a. Materials: Metallic-coated steel sheet, minimum thickness of 0.053 inch, with minimum A60 coating.

b. Construction: Full profile welded.

3. Exposed Finish: Prime .

2.4 FRAME ANCHORS

A. Jamb Anchors:
1. Type: Anchors of minimum size and type required by applicable door and frame standard, and suitable for performance level indicated.
2. Quantity: Minimum of three anchors per jamb, with one additional anchor for frames with no floor anchor. Provide one additional anchor for each 24 inches of frame height above 7 feet.
3. Postinstalled Expansion Anchor: Minimum 3/8-inch- diameter bolts with expansion shields or inserts, with manufacturer's standard pipe spacer.

B. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor.

C. Material: ASTM A879/A879M, Commercial Steel (CS), 04Z coating designation; mill phosphatized.
1. For anchors built into exterior walls, steel sheet complying with ASTM A1008/A1008M or ASTM A1011/A1011M; hot-dip galvanized in accordance with ASTM A153/A153M, Class B.

2.5 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A1008/A1008M, Commercial Steel (CS), Type B; suitable for exposed applications.

B. Hot-Rolled Steel Sheet: ASTM A1011/A1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.

C. Metallic-Coated Steel Sheet: ASTM A653/A653M, Commercial Steel (CS), Type B.

D. Inserts, Bolts, and Fasteners: Hot-dip galvanized in accordance with ASTM A153/A153M.

E. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hollow-metal frames of type indicated.

2.6 FABRICATION

A. Fabricate hollow-metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for metal thickness. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.

B. Hollow-Metal Doors:
1. Exterior Doors: Provide weep-hole openings in bottoms of exterior doors to permit moisture to escape. Seal joints in top edges of doors against water penetration.
2. Astragals: Provide overlapping astragal on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated. Extend minimum 3/4 inch (19 mm) beyond edge of door on which astragal is mounted or as required to comply with published listing of qualified testing agency. Coordinate with Section 08 71 00 “Door Hardware” for handing of door and determination of active leaf.

C. Hollow-Metal Frames: Fabricate in one piece except where handling and shipping limitations require multiple sections. Where frames are fabricated in sections, provide alignment plates or angles at each joint, fabricated of metal of same or greater thickness as frames.
1. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.

2. Door Silencers: Except on weather-stripped frames, drill stops to receive door silencers as follows. Keep holes clear during construction.
   a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
   b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.

D. Hardware Preparation: Factory prepare hollow-metal doors and frames to receive templated mortised hardware, and electrical wiring; include cutouts, reinforcement, mortising, drilling, and tapping in accordance with ANSI/SDI A250.6, the Door Hardware Schedule on Drawings, and templates.
1. Reinforce doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.
2. Comply with BHMA A156.115 for preparing hollow-metal doors and frames for hardware.

2.7 STEEL FINISHES

A. Prime Finish: Clean, pretreat, and apply manufacturer's standard primer.
1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with ANSI/SDI A250.10; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

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 embedded and built-in anchors to verify actual locations before frame installation.

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

3.2 PREPARATION

A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces. Touch up factory-applied finishes where spreaders are removed.

B. Drill and tap doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.

3.3 INSTALLATION

A. General: Install hollow-metal doors and frames plumb, rigid, properly aligned, and securely fastened in place. Comply with approved Shop Drawings and with manufacturer's written instructions.

B. Hollow-Metal Frames: Install hollow metal frames of size and profile indicated. Comply with ANSI/SDI A250.11 .
1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces without damage to completed Work.
   a. Install door silencers in frames before grouting.
2. Floor Anchors: Secure with postinstalled expansion anchors.
   a. Floor anchors may be set with power-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.
3. Installation Tolerances: Adjust hollow-metal frames to the following tolerances:
   a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.

b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
d. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.

C. Hollow-Metal Doors: Fit and adjust hollow-metal doors accurately in frames, within clearances specified below. Provide undercut of frames to allow door clearances above finished floor material.
1. Non-Fire-Rated Steel Doors: Comply with ANSI/SDI A250.8 .

3.4 REPAIR

A. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.

B. Metallic-Coated Surface Touchup: Clean abraded areas and repair with galvanizing repair paint in accordance with manufacturer's written instructions.

3.5 CLEANING AND TOUCHUP

A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow-metal work that is warped, bowed, or otherwise unacceptable.

B. Remove grout and other bonding material from hollow-metal work immediately after installation.

C. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.

D. Metallic-Coated Surface Touchup: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.

END OF SECTION 08 11 13

SECTION 08 33 13 - COILING COUNTER DOORS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Counter door assemblies.

B. Related Requirements:
1. Section 09 91 23 "Interior Painting" for finish painting of factory-primed doors.

1.2 ACTION SUBMITTALS

A. Product Data: For each type and size of coiling counter door and accessory.
1. Include construction details, material descriptions, dimensions of individual components, profiles for slats, and finishes.

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.
2. Include details of equipment assemblies, and 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.

1.3 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.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain coiling counter doors from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Sound-Control Doors: Assemblies tested in a laboratory for sound-transmission-loss performance according to ASTM E90, calculated according to ASTM E413, and rated for not less than the STC value indicated.

2.3 COUNTER DOOR ASSEMBLY

A. Counter Door: Coiling counter door formed with curtain of interlocking metal slats.
1. Basis-of-Design Product: Subject to compliance with requirements, provide Overhead Door Corporation; or comparable product by one of the following:
a. Cornell; a Cornell Cookson Company .

B. Operation Cycles: Door components and operators capable of operating for not less than 20,000 . 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. Curtain R-Value: 5.0 deg F x h x sq. ft./Btu .

D. Door Curtain Material: Aluminum.

E. Door Curtain Slats: Flat profile slats of 1-1/4-inch center-to-center height.
1. Insulated-Slat Interior Facing: Metal .
2. Gasket Seal. Manufacturer's standard continuous gaskets between slats.

F. Bottom Bar: Manufacturer's standard continuous channel or tubular shape, fabricated aluminum extrusion and finished to match door .

G. Curtain Jamb Guides: Aluminum with exposed finish matching curtain slats. Provide continuous integral wear strips to prevent metal-to-metal contact and to minimize operational noise.

H. Hood: Match curtain material and finish .
1. Shape: Square .
2. Mounting: Face of wall .

I. Sill Configuration: Stone sill provided by Contractor.

J. Locking Devices: Equip door with slide bolt for padlock .
1. Locking Device Assembly: Single-jamb side locking bars on both jamb sides, operable from inside .

K. Manual Door Operator: Push-up operation .

L. Curtain Accessories: Equip door with weatherseals and push/pull handles .

M. Door Finish:
1. Aluminum Finish: Clear anodized .
2. Interior Curtain-Slat Facing: Match finish of exterior curtain-slat face .

2.4 DOOR CURTAIN MATERIALS AND FABRICATION

A. Door Curtains: Fabricate coiling counter door curtain of interlocking metal slats in a continuous length for width of door without splices. Unless otherwise indicated, provide slats of thickness and mechanical properties recommended by door manufacturer for performance, size, and type of door indicated, and as follows:
1. Aluminum Door Curtain Slats: ASTM B209 sheet or ASTM B221 extrusions, alloy and temper standard with manufacturer for type of use and finish indicated; thickness of 0.050 inch; and as required.
2. Insulation: Fill slats for insulated doors with manufacturer's standard thermal insulation complying with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, according to ASTM E84 or UL 723. Enclose insulation completely within slat faces.
3. Metal Interior Curtain-Slat Facing: Match metal of exterior curtain-slat face.

B. Curtain Jamb Guides: Manufacturer's standard angles or channels and angles of same material and finish as curtain slats unless otherwise indicated, with sufficient depth and strength to retain curtain, to allow curtain to operate smoothly, and to withstand loading. Slot bolt holes for guide adjustment. Provide removable stops on guides to prevent overtravel of curtain.

2.5 HOODS

A. General: Form sheet metal hood to entirely enclose coiled curtain and operating mechanism at opening head. Contour to fit end brackets to which hood is attached. Roll and reinforce top and bottom edges for stiffness. Form closed ends for surface-mounted hoods and fascia for any portion of between-jamb mounting that projects beyond wall face. Equip hood with intermediate support brackets as required to prevent sagging.

1. Aluminum: 0.040-inch- thick aluminum sheet complying with ASTM B209, of alloy and temper recommended by manufacturer and finisher for type of use and finish indicated.

2.6 LOCKING DEVICES

A. Slide Bolt: Fabricate with side-locking bolts to engage through slots in tracks for locking by padlock, located on both left and right jamb sides, operable from coil side.

2.7 CURTAIN ACCESSORIES

A. Weatherseals: Equip door with weather-stripping gaskets fitted to entire perimeter of door for air-resistant installation unless otherwise indicated.
1. At door head, use 1/8-inch- thick, replaceable, continuous-sheet baffle secured to inside of hood or field-installed on the header.
2. At door jambs, use replaceable, adjustable, continuous, flexible, 1/8-inch- thick seals of flexible vinyl, rubber, or neoprene .

B. Astragal: Equip each door bottom bar with a replaceable, adjustable, continuous, compressible gasket of flexible vinyl, rubber, or neoprene as a cushion bumper.

C. Push/Pull Handles: Equip each push-up-operated or emergency-operated door with lifting handles on each side of door, finished to match door.

2.8 COUNTERBALANCE MECHANISM

A. General: Counterbalance doors by means of manufacturer's standard mechanism with an adjustable-tension, steel helical torsion spring mounted around a steel shaft and contained in a spring barrel connected to top of curtain with barrel rings. Use grease-sealed bearings or self-lubricating graphite bearings for rotating members.

B. Counterbalance Barrel: Fabricate spring barrel of manufacturer's standard hot-formed, structural-quality, seamless or welded carbon-steel pipe, of sufficient diameter and wall thickness to support rolled-up curtain without distortion of slats and to limit barrel deflection to not more than 0.03 in./ft. of span under full load.

C. Counterbalance Spring: One or more oil-tempered, heat-treated steel helical torsion springs. Size springs to counterbalance weight of curtain, with uniform adjustment accessible from outside barrel. Secure ends of springs to barrel and shaft with cast-steel barrel plugs.
1. Fire-Rated Doors: Equip with auxiliary counterbalance spring and prevent tension release from main counterbalance spring when automatic closing device operates.

D. Torsion Rod for Counterbalance Shaft: Fabricate of manufacturer's standard cold-rolled steel, sized to hold fixed spring ends and carry torsional load.

E. Brackets: Manufacturer's standard mounting brackets of either cast iron or cold-rolled steel plate.

2.9 MANUAL DOOR OPERATORS

A. General: Equip door with manual door operator by door manufacturer.

B. Push-up Door Operation: Design counterbalance mechanism so that required lift or pull for door operation does not exceed 25 lbf .

2.10 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM/NOMMA 500 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.

2.11 ALUMINUM FINISHES

A. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.

PART 3 - EXECUTION

3.1 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.

3.2 INSTALLATION, GENERAL

A. Install coiling counter doors and operating equipment complete with necessary hardware, anchors, inserts, hangers, and equipment supports; according to manufacturer's written instructions and as specified.

B. Install coiling counter doors, hoods, controls, and operators at the mounting locations indicated for each door.

3.3 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 seals to provide tight fit around entire perimeter.

3.4 DEMONSTRATION

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

END OF SECTION 08 33 13

SECTION 08 51 13 - ALUMINUM WINDOWS

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 premanufactured aluminum windows for exterior locations.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.
1. Include construction details, material descriptions, glazing and fabrication methods, dimensions of individual components and profiles, hardware, and finishes for aluminum windows.

B. Shop Drawings: For aluminum windows.
1. Include plans, elevations, sections, hardware, accessories, insect screens, operational clearances, and details of installation, including anchor, flashing, and sealant installation.

C. Samples for Initial Selection: For units with factory-applied finishes.
1. Include Samples of hardware and accessories involving color selection.

D. Samples for Verification: For aluminum windows and components required, showing full range of color variations for finishes, and prepared on Samples of size indicated below:
1. Exposed Finishes: 2 by 4 inches .
2. Exposed Hardware: Full-size units.

E. Product Schedule: For aluminum windows. Use same designations indicated on Drawings.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For manufacturer and Installer.

B. Product Test Reports: For each type of aluminum window, for tests performed by a qualified testing agency.

C. Field quality-control reports.

D. Sample Warranties: For manufacturer's warranties.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: A manufacturer capable of fabricating aluminum windows that meet or exceed performance requirements indicated and of documenting this performance by test reports and calculations.

B. Installer Qualifications: An installer acceptable to aluminum window manufacturer for installation of units required for this Project.

1.6 WARRANTY

A. Manufacturer's Assembly Warranty: Manufacturer agrees to repair or replace aluminum windows that do not comply with requirements or that fail in materials or workmanship within specified warranty period.
   1. Failures include, but are not limited to, the following:
      a. Failure to meet performance requirements.
      b. Structural failures including excessive deflection, water leakage, condensation, and air infiltration.
      c. Faulty operation of movable sash and hardware.
      d. Deterioration of materials and finishes beyond normal weathering.
      e. Failure of insulating glass.
   2. Warranty Period:
      a. Window: 10 years from date of Substantial Completion.
      b. Glazing Units: 10 years from date of Substantial Completion.
      c. Aluminum Finish: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain all components of aluminum windows from single source from single manufacturer.

2.2 WINDOW PERFORMANCE REQUIREMENTS

A. Product Standard: Comply with AAMA/WDMA/CSA 101/I.S.2/A440 for definitions and minimum standards of performance, materials, components, accessories, and fabrication unless more stringent requirements are indicated.
   1. Window Certification: AAMA certified with label attached to each window.

B. Performance Class and Grade: AAMA/WDMA/CSA 101/I.S.2/A440 as follows:
   1. Minimum Performance Class: CW .
   2. Minimum Performance Grade: 30 .

C. Thermal Transmittance: NFRC 100 maximum whole-window U-factor of 0.25 to 0.37 Btu/sq. ft. x h x deg F .

D. Condensation-Resistance Factor (CRF): Provide aluminum windows tested for thermal performance according to AAMA 1503, showing a CRF of 66 - 72.

E. Thermal Movements: Provide aluminum windows, including anchorage, that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base engineering calculation 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 .

2.3 ALUMINUM WINDOWS

A. Basis-of-Design Product: Subject to compliance with requirements, provide 'Garage Slider' type window as manufactured by PGT Custom Windows and Doors, and supplied by Diversified Enclosures and Screens; (865) 453-6780, or an equivalent product by one of the following:
   1. EFCO Corporation; a Pella company.
   2. Kawneer North America; an Alcoa company.
   3. TRACO.
   4. Wausau Window and Wall Systems.
   5. YKK AP America Inc.

6. All Weather Architectural Aluminum.
7. AluminTechno, LLC.
8. Boyd Aluminum Mfg. Co.
9. DeSCo Architectural, Inc.
10. OldCastle BuildingEnvelope (OBE).
11. Winco Window Company, Inc.

B. Operating Types: Provide the following types in locations indicated on Drawings:
   1. Horizontal sliding.

C. Frames and Sashes: Aluminum extrusions complying with AAMA/WDMA/CSA 101/I.S.2/A440.
   1. Thermally Improved Construction: Fabricate frames, sashes, and muntins with an integral, concealed, low-conductance thermal barrier located between exterior materials and window members exposed on interior side in a manner that eliminates direct metal-to-metal contact.

D. Insulating-Glass Units: ASTM E2190.
   1. Glass: ASTM C1036, Type 1, Class 1, q3.
      a. Tint: Clear .
         1) Apply tinted film in the field. Owner to select from manufactured standards color and shade selections.
      b. Kind: Fully tempered, .
   2. Filling: Fill space between glass lites with argon.
   3. Low-E Coating: Provide Vitro Solarban 60, Low-E Clear Insulating Glass. Refer to Insulated Glass Schedule at end of Section 08 80 00 "Glazing."

E. Glazing System: Manufacturer's standard factory-glazing system that produces weathertight seal .

F. Hardware, General: Provide manufacturer's standard hardware fabricated from aluminum, stainless steel, carbon steel complying with AAMA 907, or other corrosion-resistant material compatible with adjacent materials; designed to smoothly operate, tightly close, and securely lock windows, and sized to accommodate sash weight and dimensions.
   1. Exposed Hardware Color and Finish: Match Architect's sample .

G. Horizontal-Sliding Window Hardware:
   1. Sill Cap/Track: Extruded-aluminum track with natural anodized finish of dimensions and profile indicated; designed to comply with performance requirements indicated and to drain to the exterior.
   2. Locks and Latches: Allow unobstructed movement of the sash across adjacent sash in direction indicated and operated from the inside only.
   3. Roller Assemblies: Low-friction design.

H. Weather Stripping: Provide full-perimeter weather stripping for each operable sash unless otherwise indicated.

I. Fasteners: Noncorrosive and compatible with window members, trim, hardware, anchors, and other components.
   1. Exposed Fasteners: Do not use exposed fasteners to greatest extent possible. For application of hardware, use fasteners that match finish hardware being fastened.

2.4 ACCESSORIES

A. Subsills: Thermally broken , extruded-aluminum subsills in configurations indicated on Drawings.

B. Interior Trim: Extruded-aluminum profiles in sizes and configurations indicated on Drawings.

C. Panning Trim: Extruded-aluminum profiles in sizes and configurations indicated on Drawings.

D. Receptor System: Thermally broken, extruded-aluminum receptor system that anchors windows in place. Provide with sealed end dams.

2.5 INSECT SCREENS

A. General: Fabricate insect screens to integrate with window frame. Provide screen for each operable exterior sash. Screen wickets are not permitted.
1. Type and Location: Half, outside for sliding sashes.

B. Aluminum Frames: Manufacturer's standard aluminum alloy complying with SMA 1004 or SMA 1201. Fabricate frames with mitered or coped joints or corner extrusions, concealed fasteners, and removable PVC spline/anchor concealing edge of frame.
1. Tubular Framing Sections and Cross Braces: Roll formed from aluminum sheet.

C. Glass-Fiber Mesh Fabric: 18-by-14 or 18-by-16 mesh of PVC-coated, glass-fiber threads; woven and fused to form a fabric mesh resistant to corrosion, shrinkage, stretch, impact damage, and weather deterioration. Comply with ASTM D3656/D3656M.
1. Mesh Color: Manufacturer's standard .

D. Aluminum Wire Fabric: 18-by-16 mesh of 0.011-inch- diameter, coated aluminum wire.
1. Wire-Fabric Finish: Natural bright .

2.6 FABRICATION

A. Fabricate aluminum windows in sizes indicated. Include a complete system for assembling components and anchoring windows.

B. Glaze aluminum windows in the factory.

C. Weather strip each operable sash to provide weathertight installation.

D. Weep Holes: Provide weep holes and internal passages to conduct infiltrating water to exterior.

E. Complete fabrication, assembly, finishing, hardware application, and other work in the factory to greatest extent possible. Disassemble components only as necessary for shipment and installation.

2.7 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM's "Metal Finishes Manual" for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. 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.

2.8 ALUMINUM FINISHES

A. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.

B. Class I, Clear Anodic Finish: AA-M12C22A41 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 611.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine openings, substrates, structural support, anchorage, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Verify rough opening dimensions, levelness of sill plate, and operational clearances.

C. Examine wall flashings, vapor retarders, water and weather barriers, and other built-in components to ensure weathertight window installation.

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

3.2 INSTALLATION

A. Comply with manufacturer's written instructions for installing windows, hardware, accessories, and other components. For installation procedures and requirements not addressed in manufacturer's written instructions, comply with installation requirements in ASTM E2112.

B. Install windows level, plumb, square, true to line, without distortion or impeding thermal movement, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction to produce weathertight construction.

C. Install windows and components to drain condensation, water penetrating joints, and moisture migrating within windows to the exterior.

D. Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials.

3.3 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect aluminum window systems installation, including accessories.

B. Windows will be considered defective if they do not pass tests and inspections.

C. Prepare test and inspection reports.

3.4 ADJUSTING, CLEANING, AND PROTECTION

A. Adjust operating sashes and hardware for a tight fit at contact points and weather stripping for smooth operation and weathertight closure.

B. Clean exposed surfaces immediately after installing windows. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.
   1. Keep protective films and coverings in place until final cleaning.

C. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.

D. Protect window surfaces from contact with contaminating substances resulting from construction operations. If contaminating substances do contact window surfaces, remove contaminants immediately according to manufacturer's written instructions.

END OF SECTION 08 51 13

SECTION 09 91 13 - EXTERIOR PAINTING

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 surface preparation and the application of paint systems on the following exterior substrates:
   1. Concrete
   2. Concrete Masonry Units.
   3. Steel and Iron.
   4. Galvanized Steel.
   5. Hollow Metal Frames and Doors.
   6. Wood.
   7. Fiber-Cement.

B. Related Requirements:
   1. Section 07 46 46 "Fiber-Cement Siding."
   2. Section 08 11 13 "Hollow Metal Doors and Frames."

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.
   1. Include preparation requirements and application instructions.
   2. Indicate VOC content.

B. Samples for Initial Selection: For each type of topcoat product.

C. Samples for Verification: For each type of paint system and each color and gloss of topcoat.
   1. Submit Samples on rigid backing, 8 inches square.
   2. Apply coats on Samples in steps to show each coat required for system.
   3. Label each coat of each Sample.
   4. Label each Sample for location and application area.

D. Product Schedule: Use same designations indicated on Drawings and in the Exterior Painting Schedule to cross-reference paint systems and locations of application areas specified in this Section. Include color designations.

1.4 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. Paint Products: 5 percent, but not less than 1 gal. of each material and color applied.

1.5 QUALITY ASSURANCE

A. Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.
   1. Architect will select one surface to represent surfaces and conditions for application of each paint system.

a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft..
b. Other Items: Architect will designate items or areas required.

2. Final approval of color selections will be based on mockups.
   a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.
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.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.
   1. Maintain containers in clean condition, free of foreign materials and residue.
   2. Remove rags and waste from storage areas daily.

1.7 FIELD CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.

B. Do not apply paints in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product: Subject to compliance with requirements, provideSherwin-Williams Company (The); or comparable product by one of the following:
   1. Behr Paint Company; Behr Process Corporation.
   2. Benjamin Moore & Co.
   3. PPG Paints.
   4. Valspar Corporation (The).

B. Source Limitations: Obtain each paint product from single source manufacturer.

C. Products are indicated in Painting Schedule in Part 3 of this Specification Section.

2.2 PAINT PRODUCTS, GENERAL

A. Material Compatibility:
   1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer based on testing and field experience.
   2. For each coat in a paint system, provide products recommended in writing by topcoat manufacturer for use in paint system and on substrate indicated.

B. Colors: As selected by Architect from manufacturer's full range
   1. Include a total of five (5) different paint colors.

2.3 PRODUCTS

A. Products are indicated in Painting Schedule in Part 3 of this Specification Section.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
1. Concrete: 12 percent.
2. Fiber-Cement Board: 12 percent.
3. Masonry (Clay and Concrete Masonry Units): 12 percent.
4. Wood: 15 percent.

C. Verify suitability of substrates, including surface conditions and compatibility, with finishes and primers.

D. Proceed with coating application only after unsatisfactory conditions have been corrected.
1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and paint systems indicated.

B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection.

C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
1. Remove incompatible primers and reprime substrate with compatible primers or apply topcoat as required to produce paint systems specified in this Section.

D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.

E. Masonry Substrates:
1. Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceeds that permitted in manufacturer's written instructions.
2. Complete final tuckpointing of mortar joints and imperfections in concrete masonry units. Remove all excess mortar, grout, and concrete splatter from exposed painted surfaces of concrete masonry units.
3. Remove all soil staining from base of masonry walls.

F. Steel Substrates Indicated to be Field Primed: Remove rust, loose mill scale, and shop primer if any. Clean using methods recommended in writing by paint manufacturer but not less than the following:
1. SSPC-SP 3.

G. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and areas where shop paint is abraded. Paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.

H. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal, fabricated from coil stock, by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

I. Wood Substrates:
1. Scrape and clean knots. Before applying primer, apply coat of knot sealer as recommended in writing by topcoat manufacturer for exterior use in paint system indicated.
2. Sand surfaces that will be exposed to view, and remove sanding dust.
3. Prime edges, ends, faces, undersides, and backsides of wood.
4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

3.3 APPLICATION

A. Apply paints in accordance with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual."
1. Use applicators and techniques suited for paint and substrate indicated.
2. Paint surfaces behind movable items same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed items with prime coat only.
3. Paint both sides and edges of exterior doors and entire exposed surface of exterior door frames.
4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
5. Primers specified in the Exterior Painting Schedule may be omitted on items that are factory primed or factory finished if compatible with intermediate and topcoat coatings and acceptable to intermediate and topcoat paint manufacturers.

B. Tint undercoats same color as topcoat, but tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Provide sufficient difference in shade of undercoats to distinguish each separate coat.

C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

E. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:
1. Paint the following work where exposed to view:
a. Uninsulated metal.
b. Uninsulated plastic piping.
c. Pipe hangers and supports.
d. Metal conduit.
e. Plastic conduit.

3.4 FIELD QUALITY CONTROL

A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.
1. Contractor shall touch up and restore painted surfaces damaged by testing.
2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written instructions, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written instructions.

3.5 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
   1. Do not clean equipment with free-draining water and prevent solvents, thinners, cleaners, and other contaminants from entering into waterways, sanitary and storm drain systems, and ground.
   2. Dispose of contaminants in accordance with requirements of authorities having jurisdiction.
   3. Allow empty paint cans to dry before disposal.

B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 EXTERIOR PAINTING SCHEDULE

A. Products listed below are by The Sherwin-Williams Company unless otherwise indicated and are specified as Basis of Design. Equal products by one of the other approved companies listed in Part 2 of this Section are also acceptable.

B. Concrete Masonry Unit Substrates:
   1. Block Filler / Primer : Pro Industrial Heavy Duty Block Filler B42W150.
   2. Intermediate and Topcoat: Loxon Self-Cleaning Acrylic Coating LX14-50 Series.
      a. Coats: Two (2) minimum.
      b. Finish: Satin.

C. Steel and Iron Substrates:
   1. Primer: Shop primed. Spot prime as needed with Pro Industrial Pro-Cryl Universal Primer B66-1300 Series.
   2. Intermediate and Topcoat: Pro Industrial Acrolon 100 HS Water Based Urethane B65-520 Series.
      a. Coats: Two (2) minimum.
      b. Finish: Semi-Gloss.

D. Galvanized-Steel Substrates (unless otherwise indicated):
   1. Primer: Pro-Cryl Universal Primer, B66-1310 Series.
   2. Intermediate and Topcoat: Pro Industrial Acrylic Coating B66-650 Series.
      a. Coats: Two (2) minimum.
      b. Finish: Semi-Gloss.

E. Exterior Hollow Metal Frames and Doors: Exterior and Interior Sides.
   1. Primer: Shop primed. Spot Prime as needed with Pro Industrial Pro-Cryl Universal Primer B66-1300 Series.
   2. Intermediate and Topcoat: Pro Industrial Multi-Surface Acrylic B66-1560 Series.
      a. Coats: Two (2) minimum.
      b. Finish: Semi-Gloss.

F. Wood Substrates: Dugout Roof Framing and Decking.
   1. Primer: ProBlock Interior-Exterior Latex Primer-Sealer B51-600 Series.
   2. Intermediate and Topcoat: Pro Industrial Multi-Surface Acrylic B66-1560 Series.
      a. Coats: Two (2) minimum.
      b. Finish: Eg-Shel.

G. Wood Substrates: Scorer's Booth Exterior Stairs.
   1. Stain: SuperDeck Waterbourne Solid Color Deck Stain SD7-150 Series.
      a. Stair Tread and Landing Additive: Add H&C SharkGrip slip-resistant additive for texture to final coat of all stair treads and landings.
      b. Coats: Two (2) Thin.
      c. Finish: Slight Sheen.

H. Cementitious Composition Board Substrates: Siding, Trim and Panels .
   1. Primer: Shop Primed. Spot Prime as needed with Locon Concrete & Masonry Primer LX02-Series.
   2. Intermediate and Topcoat: Loxon Self-Cleaning Acrylic Coating LX14-50 Series.
      a. Coats: Two (2) minimum.
      b. Finish: Satin.

END OF SECTION 09 91 13

SECTION 09 91 23 - INTERIOR PAINTING

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 surface preparation and the application of paint systems on interior substrates:
   1. Concrete.
   2. Concrete Masonry Units.
   3. Wood.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.
   1. Include preparation requirements and application instructions.
   2. Indicate VOC content.

B. Samples for Initial Selection: For each type of topcoat product.

C. Samples for Verification: For each type of paint system and each color and gloss of topcoat.
   1. Submit Samples on rigid backing, 8 inches square.
   2. Apply coats on Samples in steps to show each coat required for system.
   3. Label each coat of each Sample.
   4. Label each Sample for location and application area.

D. Product Schedule: Use same designations indicated on Drawings and in the Interior Painting Schedule to cross-reference paint systems specified in this Section. Include color designations.

1.4 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. Paint Products: 5 percent, but not less than 1 gal. of each material and color applied.

1.5 QUALITY ASSURANCE

A. Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
   1. Architect will select one surface to represent surfaces and conditions for application of each paint system.
      a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft..
      b. Other Items: Architect will designate items or areas required.
   2. Final approval of color selections will be based on mockups.
      a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.
   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.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.
   1. Maintain containers in clean condition, free of foreign materials and residue.
   2. Remove rags and waste from storage areas daily.

1.7 FIELD CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.

B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures of less than 5 deg F above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide Sherwin-Williams Company (The), or comparable product by one of the following:
   1. Behr Paint Company; Behr Process Corporation.
   2. Benjamin Moore & Co.
   3. PPG Paints.
   4. Valspar Corporation (The).

B. Source Limitations: Obtain each paint product from single source manufacturer.

C. Products are indicated in Painting Schedule in Part 3 of this Specification Section.

2.2 PAINT PRODUCTS, GENERAL

A. Material Compatibility:
   1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
   2. For each coat in a paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.

B. Colors: As selected by Architect from manufacturer's full range

2.3 PRODUCTS

A. Products are indicated in Painting Schedule in Part 3 of this Specification Section.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
   1. Concrete: 12 percent.
   2. Masonry (Clay and CMUs): 12 percent.
   3. Wood: 15 percent.

C. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.

D. Proceed with coating application only after unsatisfactory conditions have been corrected.
   1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations applicable to substrates and paint systems indicated.

B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
   1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.

C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
   1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.

D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.

E. Masonry Substrates:
   1. Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceeds that permitted in manufacturer's written instructions.
   2. Complete final tuckpointing of mortar joints and imperfections in concrete masonry units. Remove all excess mortar, grout, and concrete splatter from exposed painted surfaces of concrete masonry units.
   3. Remove all soil staining from base of masonry walls.

F. Wood Substrates:
   1. Scrape and clean knots. Before applying primer, apply coat of knot sealer as recommended in writing by topcoat manufacturer for interior use in paint system indicated.
   2. Sand surfaces that will be exposed to view, and dust off.
   3. Prime edges, ends, faces, undersides, and backsides of wood.
   4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

3.3 APPLICATION

A. Apply paints according to manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual."
   1. Use applicators and techniques suited for paint and substrate indicated.
   2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
   3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
   4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
   5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.

B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.

C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

E. Painting Fire-Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:
   1. Paint the following work where exposed in equipment rooms:
      a. Uninsulated metal piping, excluding copper water lines.
      b. Uninsulated plastic piping.
      c. Pipe hangers and supports.
      d. Metal conduit.
      e. Plastic conduit.
   2. Paint the following work where exposed in occupied spaces:
      a. Uninsulated metal piping, excluding copper water lines.
      b. Uninsulated plastic piping.
      c. Pipe hangers and supports.
      d. Metal conduit.
      e. Plastic conduit.
      f. Other items as directed by Architect.
   3. Paint portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets that are visible from occupied spaces.

3.4 FIELD QUALITY CONTROL

A. Dry-Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry-film thickness.
   1. Contractor shall touch up and restore painted surfaces damaged by testing.
   2. If test results show that dry-film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry-film thickness that complies with paint manufacturer's written recommendations.

3.5 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
   1. Do not clean equipment with free-draining water and prevent solvents, thinners, cleaners, and other contaminants from entering into waterways, sanitary and storm drain systems, and ground.
   2. Dispose of contaminants in accordance with requirements of authorities having jurisdiction.
   3. Allow empty paint cans to dry before disposal.

B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 INTERIOR PAINTING SCHEDULE

A. Products listed below are by The Sherwin-Williams Company and PPG Paints unless otherwise indicated and are specified as basis of design. Equal products by one of the other approved companies listed in Part 2 of this Section are also acceptable.

B. Concrete Substrates, Traffic Surfaces:
   1. Latex Floor Enamel System :
      a. Back of House Areas: Silicate and Siliconate Polymer System:
         1) One Single Application: Euco Diamond Hard by The Euclid Chemical Co.

C. Concrete Masonry Unit Substrates: Concessions
   1. Block Filler / Primer: Pro Industrial Heavy Duty Block Filler B42W150.
   2. Intermediate and Topcoat: Pro Industrial Water Based Catalyzed Epoxy B73-300 Series.
      a. Coats: Two (2) minimum.
      b. Finish: Eg-Shel.

D. Finish Carpentry: Wood trim and Wood board paneling.
   1. Concessions:
      a. Primer: ProBlock Interior-Exterior Latex Primer-Sealer B51-600 Series.
      b. Intermediate and Topcoat: Pro Industrial Water Based Catalyzed Epoxy B73-300 Series.
         1) Coats: Two (2) minimum.
         2) Finish: Eg-Shel.
   2. Scorer's Booth:
      a. Primer: PrepRite ProBlock Interior-Exterior Latex Primer-Sealer B51-600 Series.
      b. Intermediate and Topcoat: Pro Industrial Pre-Catalyzed Epoxy K45-2150 Series.
         1) Coats: Two (2) minimum.
         2) Finish: Eg-Shel.

END OF SECTION 09 91 23

SECTION 10 75 16 - GROUND-SET FLAGPOLES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes ground-set flagpoles made from aluminum .

B. Owner-Furnished Material: Flags.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.
1. Include construction details, material descriptions, dimensions of individual components and profiles, operating characteristics, fittings, accessories, and finishes for flagpoles.

B. Shop Drawings: For each flagpole.
1. Include the following
a. Plans, elevations, and attachment details. Show general arrangement, jointing, fittings, accessories, grounding, anchoring, and support.
b. Section, and details of foundation system.

1.3 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For flagpoles to include in operation and maintenance manuals.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Spiral wrap flagpoles with heavy paper and enclose in a hard fiber tube or other protective container.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain flagpoles as complete units, including fittings, accessories, bases, and anchorage devices, from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Flagpole assemblies to withstand the effects of earthquake motions determined according to ASCE/SEI 7 .

B. Structural Performance: Flagpole assemblies, including anchorages and supports, to withstand design loads indicated within limits and under conditions indicated.
1. Wind Loads: Determine according to NAAMM FP 1001. Basic wind speed for Project location is as indicated on Drawings.
2. Base flagpole design on nylon or cotton flags of maximum standard size suitable for use with flagpole or flag size indicated, whichever is more stringent.

2.3 ALUMINUM FLAGPOLES

A. Aluminum Flagpoles: Cone -tapered flagpoles fabricated from seamless extruded tubing complying with ASTM B241/B241M, Alloy 6063, with a minimum wall thickness of 3/16 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. Acme Lingo Flagpoles.

b. American Flagpole.
c. Baartol Company.
d. Concord American Flagpole.
e. Eder Flag Manufacturing Company, Inc.
f. Ewing Flagpole Co., Inc.; Ewing Group Company.
g. Morgan-Francis Flagpoles and Accessories.
h. Pole-Tech Co., Inc.
i. US Flag & Flagpole Supply, LLC.

B. Exposed Height: 30 feet .

C. Construct flagpoles in one piece if possible. If more than one piece is necessary, comply with the following:
1. Fabricate shop and field joints without using fasteners, screw collars, or lead calking.
2. Provide flush hairline joints using self-aligning, snug-fitting, internal sleeves.

D. Metal Foundation Tube: Manufacturer's standard corrugated-steel foundation tube, 0.060-inch wall thickness with 3/16-inch steel bottom plate and support plate; 3/4-inch- diameter, steel ground spike; and steel centering wedges welded together. Galvanize foundation tube after assembly. Furnish loose hardwood wedges at top of foundation tube for plumbing pole.
1. Flashing Collar: Same material and finish as flagpole.

2.4 FITTINGS

A. Finial Ball: Flush-seam ball, sized as indicated or, if not indicated, to match flagpole-butt diameter.
1. 0.063-inch spun aluminum , finished to match flagpole .

B. Internal Halyard, Winch System: Manually operated winch with control stop device and removable handle, stainless steel cable halyard, and concealed revolving truck assembly with plastic-coated counterweight and sling. Furnish flush access door secured with cylinder lock. Finish truck assembly to match flagpole.
1. Halyard Flag Snaps: Stainless steel swivel snap hooks with neoprene or vinyl covers. Furnish two per halyard.

2.5 MISCELLANEOUS MATERIALS

A. Sand: ASTM C33/C33M, fine aggregate.

B. Elastomeric Joint Sealant: Single-component neutral-curing silicone joint sealant complying with requirements in Section 07 92 00 "Joint Sealants."

2.6 ALUMINUM FINISHES

A. Natural Satin Finish: AA-M32, fine, directional, medium satin polish; buff complying with AA-M20; seal aluminum surfaces with clear, hard-coat wax.

PART 3 - EXECUTION

3.1 PREPARATION

A. Prepare uncoated metal flagpoles that are set in foundation tubes by painting below-grade portions with a heavy coat of bituminous paint.

B. Foundation Excavation: Excavate to neat clean lines in undisturbed soil. Remove loose soil and foreign matter from excavation and moisten earth before placing concrete. Place and compact drainage material at excavation bottom.

C. Provide forms where required due to unstable soil conditions and for perimeter of flagpole base at grade. Secure and brace forms to prevent displacement during concreting.

D. Foundation Tube: Place foundation tube, center, and brace to prevent displacement during concreting. Place concrete. Plumb and level foundation tube and allow concrete to cure.

E. Sleeves: Locate and secure sleeves in forms by bracing to reinforcement and forms.

F. Place concrete, as specified in Section 03 30 00 "Cast-in-Place Concrete." Compact concrete in place by using vibrators. Moist-cure exposed concrete for no fewer than seven days or use nonstaining curing compound.

G. Trowel exposed concrete surfaces to a smooth, dense finish, free of trowel marks, and uniform in texture and appearance. Provide positive slope for water runoff to perimeter of concrete base.

3.2 FLAGPOLE INSTALLATION

A. General: Install flagpoles where indicated and according to Shop Drawings and manufacturer's written instructions.

B. Foundation Tube: Place flagpole in tube, seated on bottom plate between steel centering wedges, and install hardwood wedges to secure flagpole in place. Place and compact sand in foundation tube and remove hardwood wedges. Seal top of foundation tube with a 2-inch layer of elastomeric joint sealant and cover with flashing collar.

END OF SECTION 10 75 16

SECTION 11 68 33 – ATHLETIC FIELD EQUIPMENT

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. Softball Field Equipment.
2. Field Striping and Graphics.

B. Related Requirements:
1. Section 31 20 00 “Earth Moving” for rough grading of athletic field areas.
2. Section 32 31 13 “Chain Link Fences and Gates” for athletic field fencing and gates.
3. Section 32 92 00 “Turf and Grasses” for fine grading and lawn work associated with athletic fields.

1.3 DEFINITIONS

A. NCAA: The National Collegiate Athletic Association.

B. NFHS: National Federation of State High School Associations.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.
1. If applicable, include assembly, disassembly, and storage instructions for removable equipment.
2. Include model numbers, type of material, finishes, attachments, and details of construction.

B. Shop Drawings: For athletic field equipment.
1. Include plans, elevations, sections, details, and attachments to other work. Provide layout of installation showing location dimensions for each piece of equipment.
2. Include details of field assembly for removable equipment, connections, installation, mountings, inserts, and attachments to other work.

C. Submit color samples and warranties as specified.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Sample Warranty: For special warranty.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For athletic field equipment to include in emergency, operation, and maintenance manuals.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: Fabricator of products.

1.8 FIELD CONDITIONS

A. Field Measurements: Verify position and elevation of athletic field equipment and layout for athletic field.

1.9 COORDINATION

A. Coordinate installation of athletic field equipment with that of adjacent and related work.

1.10 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of athletic field equipment that fail in materials or workmanship within specified warranty period.
   1. Warranty Period: Refer to each product specified below.

PART 2 - PRODUCTS

2.1 MANUFACTURERS, GENERAL

A. Source Limitations: Obtain athletic field equipment from single source / manufacturer unless noted otherwise below.

2.2 GENERAL REQUIREMENTS

A. Equipment shall be provided complete as per manufacturer's standard catalog description and specifications for the numbers indicated on the Drawings. Equipment that is to be permanently installed shall be complete and ready for use prior to Substantial Completion.

B. Materials and finishes shall be non-corrosive in the type and quality of finish noted or as a part of the manufacturer's printed description or specifications.

C. All athletic field equipment and layouts are to conform to the most current edition of the “Court and Field Diagram Guide”, published by the National Federation of State High School Associations.

2.3 SOFTBALL FIELD EQUIPMENT

A. Basis-of-Design Product: Subject to compliance with requirements, provide equipment listed below based on basis of design listed below, or equal product by one of the following:
   1. Beacon Athletics. www.beaconathletics.com
   2. Douglas Industries, Inc. www.douglas-sports.com
   3. Gill Athletics. www.gillporter.com

4. Jaypro Sports,LLC. www.jayprosports.com
5. L. A. Steelcraft. www.lasteelcraft.com
6. Rawlings. www.rawlings.com
7. SportsEdge. www.sportsedge.com
8. Or approved equal by Architect.

B. General: Provide equipment complying with the requirements in the most current edition of the NFHS's "NFHS Baseball Rules Book."

C. Bases:
1. Basis-of-Design: Rawlings Model No. RW12902010 – Hollywood Impact Bases (Set of 3).
   a. Bases shall be premium, professional molded rubber construction that compresses upon impact, fortified with a Chevron design on the underside, including 6" stanchions on each. Bases shall be easily removable for storage.
      1) Dimensions: 14-3/4" x 14-3/4" x 2-1/4".
      2) Stanchion: 6" by 1-1/2" square.
      3) Color: White.
2. Warranty: Five (5) years from the date of Substantial Completion.

D. Base Anchors:
1. Basis-of-Design: Beacon Athletics CH Base Anchor, Heavy Duty (BSN Sports SKU 1462861) – All steel base anchoring system designed to be set in concrete, 1-1/2" Hollywood style sleeve.
   a. Foundation: Anchored in concrete footing per the manufacturer's installation instructions.
2. Warranty: Five (5) years from the date of Substantial Completion.

E. Base Anchor Plugs:
1. Basis-of-Design: MacGregor Universal Rubber Base Plug (Model BBRPUGS) (Set of 3).
   1) Color: Orange.
2. Warranty: Five (5) years from the date of Substantial Completion.

F. Home Plate:
1. Basis-of-Design: Rawlings Model No. RW12908170 – Hollywood Bury-All Home Plate
   a. Heavy duty home plate shall be made of highly quality, non-skid, molded premium rubber with waffled bottom.
      1) Dimensions: 20" x 19-3/8" x 1"
      2) Color: White with black trim.
2. Warranty: Five (5) years from the date of Substantial Completion.

G. Pitcher's Rubber:
1. Basis-of-Design: Rawlings Model No. 12909180 – Hollywood 4-Way Pitcher's Rubber
   a. The pitchers' rubber shall be made of ultra durable molded rubber, with an interior aluminum tube for professional grade strength.
      1) Dimensions: 24" x 6" x 6"
      2) Color: White.
2. Warranty: Five (5) years from the date of Substantial Completion.

H. Softball Foul Poles:
1. Basis-of-Design: SportsEdge Professional Grade, Model SEBBFP-30 Foul Poles (pair)
2. Pole Material: 2 piece heavy wall steel pipe.
   a. Foul pole designed to withstand up to 150 mph wind.
3. Pole Size: 5" SCH40, 5-9/16" OD.
4. Pole Height: 30'-0" above playing surface.
5. Type: Semi-permanent, in-ground sleeve mount with anti-rotation hardware.
6. Color: Yellow.
7. Wing Panels: heavy duty 11 gauge steel perforated metal panel.
   a. Size: (4) 18" x 60" panels totaling 240" height (top aligned with top of pole / bottom at 10'-0" above playing surface).
   b. Location: Fair side of the poles.

c. Color: Yellow.

8. Sleeves: SportsEdge Model FPS-30P Outdoor Ground Sleeve (pair)
   a. Foundation: Anchored in concrete footing below finished grade per the manufacturer's installation instructions.
9. Finish: The entire pole and wing panel assembly shall be finished in a durable and tough powder-coated yellow finish over zinc rich primer.
10. Warranty: Three (3) years from the date of Substantial Completion.

I. Backstop:
1. Basis-of-Design: SportsEdge Model No. SEPBS30 – Powerhouse Baseball Premier Backstop Net Systems
2. Custom size / configuration pole layout and net backstop system, refer to Drawings. Poles capped with lifting rings. Poles integrated into 36" tall masonry wall backstop.
3. Structural Poles: 8-5/8" outside diameter welded high tensile strength structural steel poles, 0.25" wall thickness with welded cap and integral lifting ring to prevent moisture from entering at the top and to ease in installation process.
   a. Height: 30'-0" above finished grade level with a minimum of 7'-6" foundation depth embedment.
   b. Center and Side Pole Spacing: Refer to Drawings.
   c. Foundation: Anchored in concrete footing per the manufacturer's installation instructions. Top of footing shall be below finished grade and shall slope down away from pole for drainage.
   d. Coating: Corrosion dipped, rust inhibitive, and finished with Premium STRYK 5388 coating to form a solid coating bonded with the substrate, preventing corrosion.
   e. Color: Black.
4. Cable and Tensioning System:
   a. All hardware including nuts, bolts, washers, etc, shall be hot-dipped galvanized.
   b. Heavy duty 3/16" galvanized cable with galvanized steel carabiners.
   c. Galvanized steel caribiners.
   d. Galvanized eyebolts embedded into top of masonry wall below at 4'-0" on centers (maximum) for bottom cable.
5. Netting:
   a. #42 HDPE twisted knotted netting.
   b. 3.75" Stretch Mesh.
   c. 1-7/8" Openings. Netting cut and hung on square.
   d. Full rope border that is hand tied around the entire perimeter.
   e. Color: Black.
   f. Yarn: 380 Denier, extruded HDPE fibers.
   g. Tensile Average: 220# breaking strength.
   h. Construction: 3 strand, Z twisted into S twist.
   i. Melting Point: 248 to 266 degress Fahrenheit.
6. Accessories: STRYK-5388 touch up coating.
7. Warranty: Ten (10) years from the date of Substantial Completion.

J. Fence Topper:
1. Basis-of-Design: Douglas Poly Cap Fence Topper.
   a. Topper: Weather treated and UV-protected pre-slit 4-1/2" diameter polyethylene corrugated construction.
   b. Ties: Secure with heavy duty, UV treated nylon, self-locking type ties every 3'-0" on center. Color of ties to match color of topper.
   c. Color: Bright Safety Yellow
2. Fence Topper Installation Tool: Include tools required for installation.
3. Warranty: Two (2) years from the date of Substantial Completion.

K. Outfield Distance Markers:
1. Basis-of-Design: Beacon Athletics – Tuffy Windscreen.

2. VIPPOL Matrix mesh windscreen with edging fully wrapped in VIPOL Matric webbing with end and corners double lock stitched finished. Numbers in CHROMA-BOND imprinting reducing the effects of fading. Attached to fence with heavy duty black durable nylon, self-locking type wire ties.
   a. Provide three (3) signs per field for foul line and center field distances.
   b. Construction: 1000 denier x 800 denier Vipol Matrix Mesh (18x14 ends/inch).
   c. Fabric Weight: 10 oz. per square yard. 78% Shading.
   d. Tensile Strength: 360 x 320 lbs.
   e. Sewn Hems: Three-ply hem with ends and corners sewn finished with two rows of lock-stitched thread.
   f. Thread: High heat bonded polyester with UV inhibitors built into yarn.
   g. Grommets: #2 brass grommets every 12” on all four sides.
3. Orientation: Vertical.
4. Size: 24” wide x 60” tall numbers.
5. Windscreen Color: As selected from standard colors.
6. Number Color: As selected from standard colors.
7. Warranty: Five (5) years from the date of Substantial Completion.

L. Permanent Field Markers:
1. Basis-of-Design: Jaypro Sports – 12 Piece Pro Line Layout and Marking System.
2. Provide one (1) complete set of twelve (12) field marks, starting tool, and 600’ cord.
3. Install for both foul lines and centerline of field.
4. Warranty: One (1) year from the date of Substantial Completion.

2.4 FIELD STRIPING AND GRAPHICS

A. Softball Field:
1. Field Lines: Layout field per the latest adopted NFHS requirements as well as what is graphically shown on Drawings. Mark fields using a non-toxic Field Marker / Line Striping Powder.
   a. Color: Pure White.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for field layout, installation tolerances, accurate locations, and other conditions affecting performance of the Work.
1. Verify critical dimensions.
2. Examine subgrades and footings.

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

3.2 INSTALLATION, GENERAL

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

B. Unless otherwise indicated, install athletic field equipment after other finishing operations, including grading, painting, are completed.

C. Permanently Placed Athletic Field Equipment and Components: Install rigid, level, plumb, square, and true; anchored securely to supporting structure; positioned at locations and elevations indicated; in proper relation to adjacent construction; and aligned with field layout.

D. Removable Athletic Field Equipment and Components: Assemble in place to verify that equipment and components are complete and in proper working order. Instruct Owner's designated personnel in properly handling, assembling, adjusting, disassembling, transporting, storing, and maintaining units.

E. Permanent Field Markers: Coordinate locations of field markers with Architect / Owner prior to installation.

F. Turn all extra materials over to Owner.

G. Repair minor damages to finish in accordance with manufacturer's instructions and as approved by Architect.

H. Remove and replace damaged components that cannot be successfully repaired, as determined by Architect.

3.3 ADJUSTING

A. Adjust the equipment during installation so that they are plumb and level.

B. Adjust removable components of athletic field equipment as required for accurate placement.

3.4 CLEANING

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

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

C. Remove temporary protective coverings.

D. Do not use harsh cleaning materials or methods that would damage finish.

E. Do not remove warning labels and decals.

3.5 PROTECTION

A. Protect installed equipment to ensure equipment will be without damage or deterioration at time of Substantial Completion.

END OF SECTION 11 68 33

SECTION 22 05 00 - COMMON WORK RESULTS FOR PLUMBING

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 QUALITY ASSURANCE

A. Electrical Characteristics for Plumbing Equipment: Contractor shall verify existing voltage available at the site prior to ordering equipment. If minimum energy ratings or efficiencies are specified, equipment shall comply with requirements.

1.3 COORDINATION

A. Arrange for pipe spaces, chases, slots, and openings in building structure during progress of construction, to allow for plumbing installations. Coordinate plumbing installation with all other trades

B. All equipment shall be installed in accordance with the manufacturer's drawings and recommendations.

C. The Contractor shall furnish and install all rough-in work and make final connections to all equipment requiring water, drains, and other mechanical work required for connection to equipment furnished under this contract.

1.4 CODES AND FEES

A. All work shall be installed in accordance with the applicable provisions of the local codes, latest adopted International Plumbing Code.

B. The Contractor shall pay for fees and inspections as may be required for water, sanitary sewer and all other systems requiring inspection by agencies having jurisdiction.

1.5 RECORD DRAWINGS

A. The Contractor shall maintain a marked up set of prints that reflect site conditions including location of valves, underground piping, equipment, etc. that have been changed to suit job conditions. Final payment shall not be made until such document(s) is turned over to the architect upon completion of the project.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

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 manufacturers specified.

2.2 JOINING MATERIALS

A. Refer to individual Division 22 piping Sections for special joining materials not listed below.

B. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.

C. Solvent Cements for Joining Plastic Piping:

1. PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.

2.3 DIELECTRIC FITTINGS

A. Description: Combination fitting of copper alloy and ferrous materials with threaded, solder-joint, plain, or weld-neck end connections that match piping system materials, installed between dissimilar metals.

B. Unions shall be installed on each side of all special valves, regulators, etc., on one side of each check valve and each trap, and at all equipment such as coils, tanks, compressors, pumps, etc., so that such equipment may be readily disconnected. No unions shall be placed in a location which will be inaccessible after completion of the building.

C. Dielectric Unions: Factory-fabricated, union assembly, for 250-psig minimum working pressure at 180 deg F.

1. Available Manufacturers:

a. Capitol Manufacturing Co.
b. Watts Industries, Inc.; Water Products Div.
c. Zurn Industries, Inc.; Wilkins Div.

2.4 MECHANICAL SLEEVE SEALS

A. Description: Modular sealing element unit, designed for field assembly, to fill annular space between pipe and sleeve.

1. Available Manufacturers:

a. Advance Products & Systems, Inc.
b. Metraflex Co.
c. Pipeline Seal and Insulator, Inc.

2. Sealing Elements: EPDM interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
3. Pressure Plates: Plastic. Include two for each sealing element.
4. Connecting Bolts and Nuts: Carbon steel with corrosion-resistant coating of length required to secure pressure plates to sealing elements. Include one for each sealing element.

2.5 SLEEVES

A. Steel Pipe: ASTM A 53, Type E, Grade B, Schedule 40, galvanized, plain ends.

2.6 ESCUTCHEONS

A. Description: Manufactured wall and ceiling escutcheons and floor plates, with an ID to closely fit around pipe, tube, and insulation of insulated piping and an OD that completely covers opening.

2.7 GROUT

A. Description: ASTM C 1107, Grade B, nonshrink and nonmetallic, dry hydraulic-cement grout.

1. Characteristics: Post-hardening, volume-adjusting, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
2. Design Mix: 5000-psi, 28-day compressive strength.
3. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 PIPING SYSTEMS - COMMON REQUIREMENTS

A. Install piping to permit valve servicing.

B. Install piping and hangers to allow application of insulation.

C. Install escutcheons for penetrations of walls, ceilings, and floors chrome plated, metal at all visible locations:

D. Underground, Exterior-Wall Pipe Penetrations: Install cast-iron "wall pipes" for sleeves. Seal pipe penetrations using mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.

1. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

E. Verify exact required rough-in dimensions with equipment manufacturer.

3.2 PIPING JOINT CONSTRUCTION

A. Join pipe and fittings according to the following requirements and Division 22 Sections specifying piping systems.

B. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.

C. Plastic Piping Solvent-Cement Joints: Clean and dry joining surfaces. Join pipe and fittings according to manufacturer’s instructions.

3.3 PIPE PRESSURE TESTING

A. Test all plumbing piping, following installation, but before it is covered or connected to the sewers or fixtures. Furnish necessary labor, materials and equipment for making tests. All leaks disclosed by testing shall be reworked in an approved manner and the leaking system shall then be retested until proved tight under pressure. Test all systems for watertightness as required by the authorities having jurisdiction, or in the absence of such requirements the minimum tests shall be made as follows:

1. Fill all sanitary drainage and vent piping with water and allow to stand thus filled for 3 hours without showing leaks. Piping may be tested in sections, but no sections shall be tested with less than a ten foot head. Air pressure testing with equivalent pressure is acceptable when cast iron piping is utilized. Plastic piping will not be permitted to be tested with air.
2. Test all water supply piping by applying a hydro-static pressure of not less than 125 pounds per square inch or 1½ times the working pressure, whichever is greater.

3.4 EXCAVATING AND BACKFILLING

A. Do all excavating and backfilling required for the installation of underground work required by the plumbing work.

B. Width of trench shall be not less than 18" wider than the pipe outside diameter. Minimum cover over top of water pipe shall not be less than the frost line for the area plus 6". Minimum cover for gas piping, sanitary sewer, and storm sewer shall be not less than 24".

C. Copper piping shall be laid on a 6" bed of sand and backfilled with sand to 12" above top of pipe. Complete backfilling with Washed #57 Stone to underside of building slab and outside of building to underside of pavement. The balance of the fill outside the building not under pavement shall be clean earth thoroughly tamped and crowned, void of stones larger than 4” diameter to allow for subsequent settlement. Compact to 100% density under buildings and paved areas. Protect copper piping at building slab penetration with sleeve or ½” thick “Armaflex” insulation.

D. PVC piping shall be laid on a 6" bed of Washed #57 Stone and backfilled with same stone to 12" above top of pipe. Complete backfilling with Washed #57 Stone to underside of building slab and outside of building to underside of pavement. The balance of the fill outside the building not under pavement shall be clean earth thoroughly tamped and crowned, void of stones larger than 4” diameter to allow for subsequent settlement. Compact to 100% density under buildings and paved areas.

3.5 PIPE PROTECTION

A. In concealed locations where piping, other than cast-iron or galvanized steel, is installed through holes or notches in studs, joists, rafters or similar members less than 1-1/2” from the nearest edge of the member, the pipe shall be protected by steel plates. Such shield plates shall have a minimal thickness of 0.0575 inch (No. 16 gage). Such plates shall cover the area of the pipe where the member is notched or bored and shall extend not less than 2” above sole plates and below top plates.

3.6 GUARANTEE

A. The Contractor shall guarantee all work to be in accordance with contract requirements and free from defective or inferior materials, equipment, and workmanship for a period of one year, and he shall guarantee that all equipment is of proper size and design and so installed as to produce the capacities and results specified and shown on the drawings.

3.7 SUBSTITUTIONS

A. Substitutions shall be allowed in accordance with Division 1. Substitution approval shall be at the sole discretion of the Engineer.

B. The contractor shall be responsible for verifying that all dimensions, weights, electrical and mechanical requirements of substituted materials and equipment meet project requirements. Any required modifications to other trades for substituted equipment shall be the responsibility of the contractor making the substitution.

3.8 SHOP DRAWINGS

A. Submit to the Architect for approval, within 30 days after receipt of Notice to Proceed with the work, detailed shop drawings of all equipment and all material required to complete the project. The shop drawing shall be complete as described herein.

B. The contractor shall verify all electrical requirements of equipment with the electrical service available before ordering said equipment.

C. Approved shop drawings do not mean that drawings have been checked in detail; said approval does not in any way relieve the Contractor from his responsibility or necessity of furnishing material or performing work as required by the contract drawings or specifications.

D. All shop drawings to be reviewed must bear the general contractor’s stamp indicating they have reviewed the items being submitted and their approval/comments attached. Submission without this stamp is grounds for rejection of the submittal package.

END OF SECTION

SECTION 22 05 05 - GENERAL-DUTY VALVES FOR DOMESTIC WATER

PART 1 - GENERAL

1.1 QUALITY ASSURANCE

A. Source Limitations for Valves: Obtain each type of valve from single source from single manufacturer.

B. NSF Compliance: NSF 61 for valve materials for potable-water service.

1.2 SUBMITTALS

A. Product Data: For all valves listed herein.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR VALVES

A. Valve Pressure and Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.

B. Valve Sizes: Same as upstream piping unless otherwise indicated.

C. Valves in Insulated Piping: With 2-inch stem extensions and the following features:

1. Ball Valves: With extended operating handle of non-thermal-conductive material, and protective sleeve that allows operation of valve without breaking the vapor seal or disturbing insulation.

D. Valve-End Connections:

1. Solder Joint: With sockets according to ASME B16.18.
2. Threaded: With threads according to ASME B1.20.1.

2.2 BRASS OR BRONZE BALL VALVES

A. Two-Piece, Full-Port, Brass or Bronze Ball Valves with Brass or Bronze Trim:

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. Conbraco Industries, Inc.; Apollo Valves.
b. Milwaukee Valve Company.
c. NIBCO INC.

2. Description:

a. Standard: MSS SP-110.
b. SWP Rating: 150 psig.
c. CWP Rating: 600 psig.
d. Body Design: Two piece.

e. Body Material: Bronze or forged brass.
f. Ends: Threaded.
g. Seats: PTFE or TFE.
h. Stem: Bronze or brass.
i. Ball: Chrome-plated brass.
j. Port: Full.

2.3 BRONZE SWING CHECK VALVES

A. Class 150, Bronze Swing Check Valves with Bronze Disc:

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. Kitz Corporation.
b. Milwaukee Valve Company.
c. NIBCO INC.

2. Description:

a. Standard: MSS SP-80, Type 3.
b. CWP Rating: 300 psig.
c. Body Design: Horizontal flow.
d. Body Material: ASTM B 62, bronze.
e. Ends: Threaded.
f. Disc: Bronze.

PART 3 - EXECUTION

3.1 VALVE INSTALLATION

A. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.

B. Locate valves for easy access and provide separate support where necessary.

C. Install valves in horizontal piping with stem at or above center of pipe.

D. Install valves in position to allow full stem movement.

E. Install check valves for proper direction of flow and as follows:

1. Swing Check Valves: In horizontal position with hinge pin level.

3.2 GENERAL REQUIREMENTS FOR VALVE APPLICATIONS

A. If valve applications are not indicated, use the following:

1. Shutoff Service: Ball, butterfly valves.

3.3 DOMESTIC, HOT- AND COLD-WATER VALVE SCHEDULE

A. Pipe NPS 2 and Smaller:

1. Bronze and Brass Valves: May be provided with solder-joint ends instead of threaded ends.
2. Ball Valves: Two piece, full port, brass or bronze with bronze trim.
3. Bronze Swing Check Valves: Class 150, bronze disc.

END OF SECTION

SECTION 22 05 10 - HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 PERFORMANCE REQUIREMENTS

A. Design supports for multiple pipes, including pipe stands, capable of supporting combined weight of supported systems, system contents, and test water.

PART 2 - PRODUCTS

2.1 STEEL PIPE HANGERS AND SUPPORTS

A. Available Manufacturers:

1. B-Line Systems, Inc.; a division of Cooper Industries.
2. Grinnell Corp.
3. Globe Pipe Hanger Products Inc.

B. Galvanized, Metallic Coatings: Pregalvanized or hot dipped.

C. Nonmetallic Coatings: Plastic coating, jacket, or liner.

D. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion for support of bearing surface of piping.

2.2 THERMAL-HANGER SHIELD INSERTS

A. Description: 100-psig minimum, compressive-strength insulation insert encased in sheet metal shield.

B. Insulation-Insert Material: Water-repellent treated, ASTM C 533, Type I calcium silicate or ASTM C 552, Type II cellular glass with vapor barrier.

C. For Clamped Systems: Insert and shield shall cover entire circumference of pipe.

D. For Clevis or Band Hangers: Insert and shield shall cover lower 180 degrees of pipe.

E. Insert Length: Extend 2 inches beyond sheet metal shield for cold piping operating below ambient air temperature.

2.3 FASTENER SYSTEMS

A. Mechanical-Expansion Anchors: Insert-wedge-type zinc-coated steel, for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

1. Available Manufacturers:

a. B-Line Systems, Inc.; a division of Cooper Industries.
b. Hilti, Inc.

c. ITW Ramset/Red Head.

2.4 EQUIPMENT SUPPORTS

A. Description: Welded, shop- or field-fabricated equipment support made from structural-steel shapes.

PART 3 - EXECUTION

3.1 HANGER AND SUPPORT APPLICATIONS

A. Use hangers and supports with galvanized, metallic coatings for piping and equipment that will not have field-applied finish.

B. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.

3.2 PIPING SUPPORT

A. Support spacing of piping hangers shall not exceed the following:

1. Copper Tube:

a. 1-1/4 NPS and smaller – 6’ horizontal – 3/8” rod dia., 10’ vertical.
b. 1-1/2 NPS and 2 NPS – 10’ horizontal – 3/8” rod dia., 10’ vertical.

3.3 ATTACHMENTS

A. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel Clevises (MSS Type 14): For 120 to 450 deg F piping installations.
2. Malleable-Iron Sockets (MSS Type 16): For attaching hanger rods to various types of building attachments.
3. Steel Weldless Eye Nuts (MSS Type 17): For 120 to 450 deg F piping installations.

B. Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, support

1. From concrete using inserts
2. From beams using beam clamps, rivets or bolts
3. From blocks using toggle or thru-bolts.
4. Do not use plastic anchors, adhesives or explosive charges.
5. Do not support from roof deck.
6. Fasten supports to building in the following order of preference:

a. Steel Framing
b. Concrete
c. Masonry
d. Wood Sheathing

C. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Protection Shields (MSS Type 40): 12 Inch minimum length or of length recommended by manufacturer to prevent crushing insulation, if greater.
2. Thermal-Hanger Shield Inserts: For supporting insulated pipe.

3.4 HANGER AND SUPPORT INSTALLATION

A. On all pipe, provide hanger within 18” of each elbow or fitting and within 18” of connection to each piece of equipment.

B. Pipes passing through walls shall not bear on construction.

C. Pipe Slopes: Install hangers and supports to provide specified slope for drainage piping.

END OF SECTION

SECTION 22 05 15 - IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

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. Pipe labels.

1.3 SUBMITTALS

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

B. Samples: For color, letter style, and graphic representation required for each identification material and device.

1.4 COORDINATION

A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

PART 2 - PRODUCTS

2.1 PIPE LABELS

A. Manufacturers: Subject to compliance with requirements, acceptable manufacturers offering products that may be incorporated into the Work include, but are not limited to, to those specified.

1. Craftmark Duramark
2. Seton Set Mark

B. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service, and showing flow direction.

C. Pretensioned, Snap-Around Pipe Labels: Precoiled, semirigid plastic formed to cover full circumference of pipe and to attach to pipe without fasteners or adhesive.

D. Pipe Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings and an arrow indicating flow direction.

1. Flow-Direction Arrows: Integral with piping system service lettering to accommodate both directions, or as separate unit on each pipe label to indicate flow direction.
2. Lettering Size: Minimum 1-1/2 inches high.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.

3.2 PIPE LABEL INSTALLATION

A. Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:

1. Near each valve and control device.
2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
3. Near penetrations through walls, floors, ceilings, and inaccessible enclosures.
4. Near major equipment items and other points of origination and termination.
5. Spaced at maximum intervals of 30 feet along each run. Reduce intervals to 15 feet in areas of congested piping and equipment.

B. Pipe Label Color Schedule:

1. Domestic Water Piping – Cold Water:

a. Background Color: Green.
b. Letter Color: White.

2. Domestic Water Piping – Hot Water:

a. Background Color: Yellow.
b. Letter Color: Black.

END OF SECTION

SECTION 22 05 20 - PLUMBING INSULATION

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. Insulation Materials:

a. Mineral fiber.

2. Insulating cements.
3. Adhesives.
4. Mastics.
5. Sealants.
6. Factory-applied jackets.
7. Tapes.
8. Securements.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated herein. Include thermal conductivity, thickness, and jackets (both factory and field applied, if any).

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Skilled, qualified tradesmen who are employed by a company whose sole business is the sale and installation of commercial/industrial insulation. This company shall have been in business a minimum of 10 years. Plumbing contractors shall not install insulation.

1.5 COORDINATION

A. Coordinate size and location of insulation shields specified in Division 22 Section "Hangers and Supports for Plumbing Piping and Equipment."

B. Coordinate clearance requirements with piping Installer for piping insulation application and equipment Installer for equipment insulation application. Establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.

1.6 SCHEDULING

A. Schedule insulation application after pressure testing systems and, where required, after installing and testing heat tracing. Insulation application may begin on segments that have satisfactory test results.

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS

A. Comply with requirements in Part 3 schedule articles for where specific insulating materials shall be applied.

B. Products shall not contain asbestos, lead, mercury, or mercury compounds.

C. Mineral-Fiber, Preformed Pipe Insulation:

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

a. Johns Manville Micro-Lok.
b. Knauf Insulation.
c. Owens Corning Fiberglas Pipe Insulation.

2. Type I, 850 deg F Materials: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 547, Type I, Grade A, with factory-applied ASJ-SSL. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

D. Polyolefin

1. Polyolefin insulation **Is Not** permitted to be used on this project.

2.2 ADHESIVES

A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated.

2.3 MASTICS

A. Materials shall be compatible with insulation materials, jackets, and substrates; comply with MIL-C-19565C, Type II.

2.4 TAPES

A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C 1136.

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

a. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0835.
b. Compac Corp.; 104 and 105.
c. Ideal Tape Co., Inc., an American Biltrite Company; 428 AWF ASJ.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions for compliance with requirements for installation and other conditions affecting performance of insulation application.

1. Verify that systems and equipment to be insulated have been tested and are free of defects.
2. Verify that surfaces to be insulated are clean and dry.
3. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 GENERAL INSTALLATION REQUIREMENTS

A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of equipment and piping including fittings, valves, and specialties.

B. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of equipment and pipe system as specified in insulation system schedules.

C. Install insulation with least number of joints practical.

D. At vapor barrier, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.

1. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with mastic or sealing compound recommended by insulation material manufacturer.

2. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.

E. Install insulation continuously through hangers and around anchor attachments. All hangers shall be of a type that will allow insulation products to be installed in an un-interrupted manner, without breaks or disruptions in the integrity of the vapor barrier.

F. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

3.3 GENERAL PIPE INSULATION INSTALLATION

A. Insulation Installation on Fittings and Valves and Flanges.

1. Install insulation over fittings and valves and flanges with continuous thermal and vapor-retarder integrity, unless otherwise indicated.
2. Insulate copper pipe elbows using preformed fitting insulation or mitered fittings made from same material and density as adjacent pipe insulation. Each piece shall be butted tightly against adjoining piece and bonded with adhesive. Fill joints, seams, voids, and irregular surfaces with insulating cement finished to a smooth, hard, and uniform contour that is uniform with adjoining pipe insulation.
3. Insulate tee fittings with sectional pipe insulation of same material and thickness as used for adjacent pipe. Cut sectional pipe insulation to fit. Butt each section closely to the next and hold in place with tie wire. Bond pieces with adhesive.

3.4 MINERAL-FIBER INSULATION INSTALLATION

A. Insulation Installation on Straight Pipes and Tubes:

1. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
2. For insulation with factory-applied jackets, do not staple longitudinal tabs but secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.

3.5 PIPING INSULATION SCHEDULE, GENERAL

A. Acceptable preformed pipe and tubular insulation materials and thicknesses are identified for each piping system and pipe size range.

3.6 INDOOR PIPING INSULATION SCHEDULE

A. Domestic Cold Water, Hot Water: Copper.

1. All sizes, insulation shall be the following:

a. Mineral-Fiber, Preformed Pipe Insulation: 1 inch thick.

END OF SECTION

SECTION 22 05 25 - DOMESTIC WATER PIPING AND APPURTENANCES

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 SUBMITTALS

A. Product Data: For the following products:

1. Backflow preventers.
2. Water Pressure-Reducing Valves.
3. Thermometers.
4. Pressure gauges.
5. Strainers for domestic water piping.
6. Hose Bibbs.
7. Wall Hydrants.
8. Water hammer arresters.

1.3 QUALITY ASSURANCE

A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

B. Comply with NSF 61 for potable domestic water piping and components.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.

2.2 PIPE AND FITTINGS

A. Hard Copper Tube: ASTM B 88, Type L water tube, drawn temper.

1. Cast-Copper Solder-Joint Fittings: ASME B16.18, pressure fittings.
2. Wrought-Copper Solder-Joint Fittings: ASME B16.22, wrought-copper pressure fittings.
3. Copper Unions: MSS SP-123, cast-copper-alloy, hexagonal-stock body, with ball-and-socket, metal-to-metal seating surfaces, and solder-joint or threaded ends.

B. Soft Copper Tube: ASTM B88, Type “K”, soft drawn.

1. Wrought copper solder-joint fittings, and brazed joints.

2.3 PIPING JOINING MATERIALS

A. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.

B. Brazing Filler Metals: AWS A5.8/A5.8M, BCuP Series, copper-phosphorus alloys for general-duty brazing unless otherwise indicated.

2.4 SPECIALTY VALVES

A. Comply with requirements in Division 22 Section "General-Duty Valves for Plumbing Piping" for general-duty metal valves.

2.5 BACKFLOW PREVENTERS

A. Reduced-Pressure-Principle Backflow Preventers:

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. FEBCO; SPX Valves & Controls.
   b. Watts Industries, Inc.; Water Products Div.
   c. Zurn Plumbing Products Group; Wilkins Div.

2. Standard: ASSE 1013.
3. Operation: Continuous-pressure applications.
4. Size: ½" – 2".
5. Body: Bronze for NPS 2 and smaller.
6. End Connections: Threaded for NPS 2 and smaller.
7. Configuration: Designed for horizontal, straight through flow.
8. Accessories:

   a. Valves: Ball type with threaded ends on inlet and outlet of NPS 2 and smaller.
   b. Air-Gap Fitting: ASME A112.1.2, matching backflow-preventer connection.

2.6 WATER PRESSURE-REDUCING VALVES

A. Water Regulators:

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. Conbraco Industries, Inc.
   b. Watts Industries, Inc.; Water Products Div.
   c. Zurn Plumbing Products Group; Wilkins Div.

2. Standard: ASSE 1003.
3. Pressure Rating: 300 PSIG (2070 kPa).
4. Size: 4" NPS and smaller
5. Body: Bronze for NPS 3 and smaller.
6. End Connections: Threaded for NPS 2 and smaller.

2.7 THERMOMETERS

A. Metal-Case, Liquid-In-Glass:

1. Available 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. Trerice, H. O. Co.
   b. Weiss Instruments, Inc.
   c. Weksler Instruments Operating Unit; Dresser Industries; Instrument Div.

2. Case: Die-cast aluminum or brass, 9” long.
3. Tube: Red or blue reading, organic-liquid filled, with magnifying lens.
4. Tube Background: Satin-faced, nonreflective aluminum with permanently etched scale markings.
5. Window: Glass or plastic.
6. Connector: Adjustable type, 180 degrees in vertical plane, 360 degrees in horizontal plane, with locking device.
7. Stem: Copper-plated steel, aluminum, or brass for thermowell installation and of length to suit installation.
8. Accuracy: Plus or minus 1 percent of range or plus or minus 1 scale division to maximum of 1.5 percent of range.
9. Thermowells provide pressure-tight, socket type metal fitting made for insertion into piping, and of same manufacturer as thermometer.

2.8 PRESSURE GAUGES

A. Direct-Mounting, Dial-Type Pressure Gages: Indicating-dial type complying with ASME B40.100.

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. Ashcroft Commercial Instrument Operations; Dresser Industries; Instrument Div.
   b. Trerice, H. O. Co.
   c. Weiss Instruments, Inc.

2. Case: Dry type, drawn steel or cast aluminum, 4-1/2-inch diameter.
3. Pressure-Element Assembly: Bourdon tube, unless otherwise indicated.
4. Pressure Connection: Brass, NPS 1/4, bottom-outlet type unless back-outlet type is indicated.
5. Movement: Mechanical, with link to pressure element and connection to pointer.
6. Dial: Satin-faced, nonreflective aluminum with permanently etched scale markings.
7. Pointer: Red or other dark-color metal.
8. Window: Glass or plastic.
9. Accuracy: Plus or minus 2 percent of middle half scale.
10. Vacuum-Pressure Range: 30-in. Hg of vacuum to 15 psig of pressure.
11. Range for Fluids under Pressure: Two times operating pressure.

2.9 STRAINERS FOR DOMESTIC WATER PIPING

A. Y-Pattern Strainers:

1. Available 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. Watts Industries, Inc.
b. Zurn Plumbing Products; Wilkins Division
c. Apollo

2. Pressure Rating: 125 psig minimum, unless otherwise indicated.
3. Body: Bronze for NPS 2 and smaller.
4. End Connections: Threaded for NPS 2 and smaller.
5. Screen: Stainless steel with round perforations, unless otherwise indicated.
6. Drain: Pipe plug.

2.10 HOSE BIBBS

A. Hose Bibbs:

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. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
b. Woodford Manufacturing Company.
c. Zurn Plumbing Products Group; Specification Drainage Operation.

2. Standard: ASME A112.18.1 for sediment faucets.
3. Body Material: Bronze. Chrome plated in exposed public applications.
4. Seat: Bronze, replaceable.
5. Supply Connections: NPS 1/2 or NPS 3/4 threaded or solder-joint inlet.
6. Outlet Connection: Garden-hose thread complying with ASME B1.20.7.
7. Pressure Rating: 125 psig.
8. Vacuum Breaker: Integral nonremovable, drainable, hose-connection vacuum breaker complying with ASSE 1011.
9. Include operating key with each operating-key hose bibb.
10. Include integral wall flange with each chrome- or nickel-plated hose bibb.

2.11 WALL HYDRANTS

A. Nonfreeze Wall Hydrants:

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. Josam Company.
b. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
c. Woodford Manufacturing Company.
d. Zurn Plumbing Products Group; Specification Drainage Operation.

2. Standard: ASME A112.21.3M for exposed-outlet, self-draining wall hydrants.
3. Pressure Rating: 125 psig.
4. Operation: Loose key.
5. Casing and Operating Rod: Of length required to match wall thickness. Include wall clamp.
6. Inlet: NPS 3/4 (DN 20).
7. Outlet: With integral vacuum breaker and garden-hose thread complying with ASME B1.20.7.
8. Outlet: Exposed, with integral vacuum breaker and garden-hose thread complying with ASME B1.20.7.
9. Nozzle and Wall-Plate Finish: Rough bronze.
10. Operating Keys(s): Two with each wall hydrant.

2.12 WATER HAMMER ARRESTERS

A. Water Hammer Arresters:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. AMTROL, Inc.
b. Josam Company.
c. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
d. Zurn Plumbing Products Group; Specification Drainage Operation.

2. Standard: ASSE 1010 or PDI-WH 201.
3. Type: Metal bellows. Piston type will not be acceptable.
4. Size: ASSE 1010, Sizes AA and A through F or PDI-WH 201, Sizes A through F.

PART 3 - EXECUTION

3.1 PIPING SCHEDULE

A. Under-building-slab, domestic water, building service piping, NPS 4 and smaller, shall be the following:

1. Soft copper tube, ASTM B 88, Type K; wrought-copper solder-joint fittings; and brazed joints.

B. Aboveground domestic water piping, all sizes, shall be the following:

1. Hard copper tube, ASTM B 88, Type L; wrought- copper solder-joint fittings; and soldered joints.

3.2 DIELECTRIC FITTING INSTALLATION

A. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.

B. Dielectric Fittings for NPS 2 and Smaller: Use dielectric couplings or nipples.

3.3 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Install piping adjacent to equipment and machines to allow service and maintenance.

C. Connect domestic water piping to exterior water-service piping. Use transition fitting to join dissimilar piping materials.

D. Connect domestic water piping to water-service piping with shutoff valve; extend and connect to all fixtures and equipment in domestic water system.

3.4 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Piping Inspections:

1. Do not enclose, cover, or put piping into operation until it has been inspected and approved by authorities having jurisdiction.
2. During installation, notify authorities having jurisdiction at least one day before inspection must be made. Perform tests specified in presence of authorities having jurisdiction:

    a. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
    b. Final Inspection: Arrange final inspection for authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.

3. Reinspection: If authorities having jurisdiction find that piping will not pass tests or inspections, make required corrections and arrange for reinspection.

3.5 CLEANING

A. Clean and disinfect potable domestic water piping as follows:

1. Purge new piping and parts of existing piping that have been altered, extended, or repaired before using.
2. Use purging and disinfecting procedures prescribed by authorities having jurisdiction; if methods are not prescribed, use procedures described in either AWWA C651 or AWWA C652 or follow procedures described below:

    a. Flush piping system with clean, potable water until dirty water does not appear at outlets.
    b. Fill and isolate system according to either of the following:

        1) Fill system or part thereof with water/chlorine solution with at least 50 ppm of chlorine. Isolate with valves and allow to stand for 24 hours.
        2) Fill system or part thereof with water/chlorine solution with at least 200 ppm of chlorine. Isolate and allow to stand for three hours.

    c. Flush system with clean, potable water until no chlorine is in water coming from system after the standing time.
    d. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedures if biological examination shows contamination.

B. Prepare and submit reports of purging and disinfecting activities.

C. Clean interior of domestic water piping system. Remove dirt and debris as work progresses.

D. Provide Bacteriological Test Report prepared by a Certified Water Testing Laboratory.

3.6 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of domestic water piping. Install piping as indicated unless deviations to layout are approved by designer.

B. Install water-pressure-reducing valves downstream from shutoff valves.

C. Install domestic water piping level and plumb.

D. Install unions in copper tubing at final connection to each piece of equipment.

E. Install backflow preventers in each water supply to mechanical equipment and systems and to other equipment and water systems that may be sources of contamination. Comply with authorities having jurisdiction.

1. Locate backflow preventers where indicated on drawings.
2. Install drain for backflow preventers with atmospheric-vent drain connection with air-gap fitting, fixed air-gap fitting, or equivalent positive pipe separation of at least two pipe diameters in drain piping and pipe to floor drain. Locate air-gap device attached to or under backflow preventer. Simple air breaks are not acceptable for this application.
3. Do not install bypass piping around backflow preventers.

F. Install liquid-in-glass thermometers in the outlet of each domestic hot-water heater where indicated on water heater piping diagram.

G. Provide the following temperature ranges for thermometers:

1. Domestic Hot Water: 30 to 180 degree F, with 2-degree scale divisions.

H. Install direct-mounting thermometers and adjust vertical and tilted positions.

I. Install needle-valve and snubber fitting in piping for each pressure gauge.

J. Adjust faces of thermometers and gauges to proper angle for best visibility.

K. Install Y-pattern strainers for water on supply side of each water pressure-reducing valve.

L. Install water hammer arresters in all areas where indicated on plans including locations with solenoid valves, flush valves, and washer boxes in accordance with PDI-WH 201.

3.7 CONNECTIONS

A. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping and specialties.

3.8 FIELD QUALITY CONTROL

A. Perform the following tests and prepare test reports:

1. Test each reduced pressure backflow preventer according to authorities having jurisdiction and the device's reference standard.

B. Remove and replace malfunctioning domestic water piping specialties and retest.

3.9 ADJUSTING

A. Set field-adjustable pressure set points of water pressure-reducing valves.

END OF SECTION

SECTION 22 05 30 – DRAINAGE, WASTE, VENT PIPING AND APPURTENANCES

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 for soil, waste, and vent piping inside the building.

1.3 PERFORMANCE REQUIREMENTS

A. Components and installation shall be capable of withstanding the following minimum working pressure, unless otherwise indicated:

1. Soil, Waste, and Vent Piping: 10-foot head of water.

1.4 SUBMITTALS

A. Product Data: For pipe, drains, cleanouts, and fittings listed herein.

1.5 QUALITY ASSURANCE

A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

B. Comply with NSF 14, "Plastics Piping Systems Components and Related Materials," for plastic piping components. Include marking with "NSF-dwv" for plastic drain, waste, and vent piping; "NSF-drain" for plastic drain piping; "NSF-tubular" for plastic continuous waste piping; and "NSF-sewer" for plastic sewer piping.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

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

2.2 PIPING MATERIALS

A. Refer to Part 3 "Piping Applications" Article for applications of pipe, tube, fitting, and joining materials.

2.3 PVC PIPE AND FITTINGS

A. Solid-Wall PVC Pipe: ASTM D 2665, drain, waste, and vent.

1. PVC Socket Fittings: ASTM D 2665, socket type, made to ASTM D 3311, drain, waste, and vent patterns, Schedule 40.

2.4 CLEANOUTS

A. Exposed Metal Cleanouts:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Josam Company; Josam Div.
b. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
c. Zurn Plumbing Products Group; Specification Drainage Operation.

2. Standard: ASME A112.36.2M for cast iron for cleanout test tee.
3. Size: Same as connected drainage piping
4. Body Material: as required to match connected piping.
5. Closure: Countersunk, brass plug.
6. Closure Plug Size: Same as or not more than one size smaller than cleanout size.
7. Closure: Stainless-steel plug with seal.

B. Metal Floor Cleanouts:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Josam Company; Josam Div.
b. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
c. Zurn Plumbing Products Group; Specification Drainage Operation.

2. Standard: ASME A112.36.2M for adjustable housing cleanout.
3. Size: Same as connected branch.
4. Type: Adjustable housing.
5. Body or Ferrule: Cast iron.
6. Outlet Connection: Inside calk.
7. Closure: Brass plug with straight threads and gasket.
8. Adjustable Housing Material: Cast iron with threads set-screws or other device.
9. Frame and Cover Material and Finish: Nickel-bronze.
10. Frame and Cover Shape: Round.
11. Top Loading Classification: Heavy Duty.
12. Riser: ASTM A 74, Service class, cast-iron drainage pipe fitting and riser to cleanout.
13. Standard: ASME A112.3.1.
14. Size: Same as connected branch.
15. Housing: Stainless steel.
16. Closure: Stainless steel with seal.
17. Riser: Stainless-steel drainage pipe fitting to cleanout.

C. Cast-Iron Wall Cleanouts:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Josam Company; Josam Div.
b. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
c. Zurn Plumbing Products Group; Specification Drainage Operation.

2. Standard: ASME A112.36.2M. Include wall access.
3. Size: Same as connected drainage piping.
4. Body: as required to match connected piping.
5. Closure: Countersunk, brass plug.
6. Closure Plug Size: Same as or not more than one size smaller than cleanout size.
7. Wall Access: Round, flat, chrome-plated brass or stainless-steel cover plate with screw.
8. Wall Access: Round, nickel-bronze, wall-installation frame and cover.

2.5 FLOOR DRAINS

A. Cast-Iron Floor Drains:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Josam Company; Josam Div.
b. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
c. Zurn Plumbing Products Group; Specification Drainage Operation.

2. Standard: ASME A112.6.3.
3. Body Material: Gray iron.
4. Outlet: Bottom.
5. Backwater Valve: Not required.
6. Top or Strainer Material: Nickel bronze.
7. Top of Body and Strainer Finish: Nickel bronze.
8. Top Loading Classification: As specified on plans.

2.6 ROOF FLASHING ASSEMBLIES

A. Roof Flashing Assemblies:

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. Acorn Engineering Company; Elmdor/Stoneman Div.
b. Thaler Metal Industries Ltd.

B. Description: Manufactured assembly made of 4.0-lb/sq. ft., 0.0625-inch- thick, lead flashing collar and skirt extending at least 6 inches from pipe, with galvanized-steel boot reinforcement and counterflashing fitting.

1. Open-Top Vent Cap: Without cap.
2. Low-Silhouette Vent Cap: With vandal-proof vent cap.
3. Extended Vent Cap: With field-installed, vandal-proof vent cap.

2.7 FLASHING MATERIALS

A. Lead Sheet: ASTM B 749, Type L51121, copper bearing, with the following minimum weights and thicknesses, unless otherwise indicated:

1. General Use: 4.0-lb/sq. ft., 0.0625-inch thickness.
2. Vent Pipe Flashing: 3.0-lb/sq. ft., 0.0469-inch thickness.
3. Burning: 6-lb/sq. ft., 0.0938-inch thickness.

B. Copper Sheet: ASTM B 152/B 152M, of the following minimum weights and thicknesses, unless otherwise indicated:

1. General Applications: 12 oz./sq. ft..
2. Vent Pipe Flashing: 8 oz./sq. ft..

C. Zinc-Coated Steel Sheet: ASTM A 653/A 653M, with 0.20 percent copper content and 0.04-inch minimum thickness, unless otherwise indicated. Include G90 hot-dip galvanized, mill-phosphatized finish for painting if indicated.

D. Elastic Membrane Sheet: ASTM D 4068, flexible, chlorinated polyethylene, 40-mil minimum thickness.

E. Fasteners: Metal compatible with material and substrate being fastened.

F. Metal Accessories: Sheet metal strips, clamps, anchoring devices, and similar accessory units required for installation; matching or compatible with material being installed.

G. Solder: ASTM B 32, lead-free alloy.

H. Bituminous Coating: SSPC-Paint 12, solvent-type, bituminous mastic.

PART 3 - EXECUTION

3.1 PIPING APPLICATIONS

A. Aboveground, soil and waste piping shall be the following:

1. Solid-wall PVC pipe, PVC socket fittings, and solvent-cemented joints.

B. Aboveground, vent piping NPS 1-1/4” - 1-1/2” shall be the following:

1. Solid-wall PVC pipe, PVC socket fittings, and solvent-cemented joints.

C. Aboveground, vent piping NPS 2 (DN 50) shall be the following:

1. Solid-wall PVC pipe, PVC socket fittings, and solvent-cemented joints.

D. Underground, soil, waste, and vent piping shall be the following:

1. Solid wall PVC pipe, PVC socket fittings, and solvent-cemented joints.

E. Aboveground, condensate piping all sizes shall be the following:

1. Type “M” copper tube, wrought-copper solder-joints.

F. Underground, condensate piping all sizes shall be the following:

1. Solid-wall PVC pipe, PVC socket fittings and solvent-cemented joints.

3.2 PIPING INSTALLATION

A. Basic piping installation requirements are specified in Division 22 Section "Common Work Results for Plumbing."

B. Install seismic restraints on piping per local building codes.

C. Install cleanouts at grade and extend to where building sanitary drains connect to building sanitary sewers.

D. Install cleanout fitting with closure plug inside the building in sanitary force-main piping.

E. Install wall-penetration fitting at each service pipe penetration through foundation wall. Make installation watertight.

F. Make changes in direction for soil and waste drainage and vent piping using appropriate branches, bends, and long-sweep bends. Sanitary tees and short-sweep 1/4 bends may be used on vertical stacks if change in direction of flow is from horizontal to vertical. Use long-turn, double Y-branch and 1/8-bend fittings if 2 fixtures are installed back to back or side by side with common drain pipe. Straight tees, elbows, and crosses may be used on vent lines. Do not change direction of flow more than 90 degrees. Use proper size of standard increasers and reducers if pipes of different sizes are connected. Reducing size of drainage piping in direction of flow is prohibited.

G. Lay buried building drainage piping beginning at low point of each system. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream. Install required gaskets according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements. Maintain swab in piping and pull past each joint as completed.

H. Install soil and waste drainage and vent piping at the following minimum slopes, unless otherwise indicated:

1. Building Sanitary Drain: 2 percent downward in direction of flow for piping NPS 2 and smaller; 1 percent downward in direction of flow for piping NPS 3 and larger.
2. Vent Piping: 1 percent down toward vertical fixture vent or toward vent stack.

I. Install PVC soil and waste drainage and vent piping according to ASTM D 2665.

J. Install underground PVC soil and waste drainage piping according to ASTM D 2321.

K. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.

L. PVC piping will not be permitted in return air plenums.

3.3 JOINT CONSTRUCTION

A. Basic piping joint construction requirements are specified in Division 22 Section "Common Work Results for Plumbing."

B. PVC Nonpressure Piping Joints: Join piping according to ASTM D 2665.

3.4 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Connect soil and waste piping to exterior sanitary sewerage piping. Use transition fitting to join dissimilar piping materials.

C. Connect drainage and vent piping to all plumbing fixtures and drains.

3.5 CLEANING

A. Clean interior of piping. Remove dirt and debris as work progresses.

B. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.

C. Place plugs in ends of uncompleted piping at end of day and when work stops.

3.6 PROTECTION

A. Exposed PVC Piping: Protect plumbing vents exposed to sunlight with two coats of water-based latex paint.

3.7 INSTALLATION OF APPURTENANCES

A. Install cleanouts in aboveground piping and building drain piping according to the following, unless otherwise indicated:

1. Size same as drainage piping up to NPS 4. Use NPS 4 for larger drainage piping unless larger cleanout is indicated.
2. Locate at each change in direction of piping greater than 45 degrees.
3. Locate at minimum intervals of 50 feet for piping NPS 4 and smaller and 100 feet for larger piping.
4. Locate at base of each vertical soil and waste stack.

B. For floor cleanouts for piping below floors, install cleanout deck plates with top flush with finished floor.

C. For cleanouts located in concealed piping, install cleanout wall access covers, of types indicated, with frame and cover flush with finished wall.

D. Cleanout Types:

1. Exterior: Cast iron cutoff ferrule with round scoriated frame and cover, secured.
2. Finished Concrete Floors: Neolock Connection, with round Nikaloy scoriated frame and cover.
3. Ceramic Tile Floors: Neolock Connection, with round Nikaloy scoriated frame and cover.
4. Resilient Tile Floors: Neolock Connection, with round recessed Nikaloy smooth round frame and cover.
5. Wall: Smooth round stainless steel access cover with securing screw.
6. Carpet Floor: Neolock Connection with round Nikaloy scoriated frame and cover with carpet marker.
7. Note: Use clamping device on cleanouts than occur in floors having waterproof membrane.

E. Install deep-seal traps on floor drains.

F. Install escutcheons at wall, floor, and ceiling penetrations in exposed finished locations and within cabinets and millwork. Use deep-pattern escutcheons if required to conceal protruding pipe fittings.

3.8 FIELD QUALITY CONTROL

A. Perform tests and inspections and prepare test reports.

B. Tests and Inspections:

1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

3.9 PROTECTION

A. Protect drains during remainder of construction period to avoid clogging with dirt or debris and to prevent damage from traffic or construction work.

B. Place plugs in ends of uncompleted piping at end of each day or when work stops.

END OF SECTION

SECTION 22 05 40 - ELECTRIC DOMESTIC WATER HEATERS

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 electric water heaters:

1. Light-commercial electric water heaters.
2. Compression tanks.

1.3 SUBMITTALS

A. Product Data: For each type and size of water heater indicated herein. Include rated capacities, operating characteristics, furnished specialties, and accessories.

B. Warranty: Special warranty specified in this Section.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain same type of electric water heaters through one source from a single manufacturer where multiple water heaters are utilized on project.

B. Product Options: Drawings indicate size, profiles, and dimensional requirements of electric water heaters and are based on the specific system indicated.

C. 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.

D. ASME Compliance: Where indicated by model specified, fabricate and label commercial water heater storage tanks to comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.

E. Comply with NSF 61, "Drinking Water System Components - Health Effects; Sections 1 through 9," for all components that will be in contact with potable water.

1.5 COORDINATION

A. Coordinate size and location of concrete bases with Architectural and Structural Drawings.

1.6 WARRANTY

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

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

a. Structural failures including storage tank and supports.
b. Faulty operation of controls.
c. Deterioration of metals, metal finishes, and other materials beyond normal use.

2. Warranty Period(s): From date of Substantial Completion:

a. Light-Commercial Electric Water Heaters:

1) Storage Tank: Five years.
2) Controls and Other Components: Two years.

b. Compression Tanks: One year.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

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

2.2 LIGHT-COMMERCIAL ELECTRIC WATER HEATERS

A. Description: Comply with UL 174 for household, storage electric water heaters.

1. Available Manufacturers:

a. Bradford White Corporation.
b. Rheem Water Heater Div.; Rheem Manufacturing Company.
c. Ruud Water Heater Div.; Rheem Manufacturing Company.
d. Smith, A. O. Water Products Company.
e. State Industries, Inc.

2. Storage-Tank Construction: Steel, vertical arrangement.

a. Tappings: ASME B1.20.1 pipe thread.
b. Pressure Rating: 150 psig.
c. Interior Finish: Comply with NSF 61 barrier materials for potable-water tank linings, including extending lining material into tappings.

3. Factory-Installed Storage-Tank Appurtenances:

a. Anode Rod: Replaceable magnesium.
b. Dip Tube: Provide unless cold-water inlet is near bottom of tank.
c. Drain Valve: ASSE 1005.
d. Insulation: Comply with ASHRAE/IESNA 90.1 or ASHRAE 90.2.
e. Jacket: Steel with enameled finish.
f. Heat Trap Fittings: Inlet type in cold-water inlet and outlet type in hot-water outlet.
g. Heating Elements: Two; electric, screw-in immersion type; wired for simultaneous operation, unless otherwise indicated.
h. Temperature Control: Adjustable thermostat for each element.
i. Safety Control: High-temperature-limit cutoff device or system.
j. Relief Valve: ASME rated and stamped and complying with ASME PTC 25.3 for combination temperature and pressure relief valves. Include relieving capacity at least as great as heat input and include pressure setting less than water heater working-pressure rating. Select relief valve with sensing element that extends into storage tank.

2.3 COMPRESSION TANKS

A. Description: Steel pressure-rated tank constructed with welded joints and factory-installed butyl-rubber diaphragm. Include air precharge to minimum system-operating pressure at tank.

1. Available Manufacturers:

a. AMTROL Inc.
b. Armstrong Pumps, Inc.
c. Zurn Ind.

2. Construction:

a. Tappings: Factory-fabricated steel, welded to tank before testing and labeling. Include ASME B1.20.1, pipe thread.
b. Interior Finish: Comply with NSF 61 barrier materials for potable-water tank linings, including extending finish into and through tank fittings and outlets.
c. Air-Charging Valve: Factory installed.

2.4 WATER HEATER ACCESSORIES

A. Combination Temperature and Pressure Relief Valves: ASME rated and stamped and complying with ASME PTC 25.3. Include relieving capacity at least as great as heat input and include pressure setting less than water heater working-pressure rating. Select relief valves with sensing element that extends into storage tank.

B. Water Heater Stands: Factory-fabricated steel stand for floor mounting and capable of supporting water heater and water with bottom of water heater a minimum of 18 inches above the floor.

C. Water Heater Mounting Brackets: Water heater manufacturer's factory-fabricated steel bracket for wall mounting and capable of supporting water heater and water. Provide wall blocking where required.

D. Drain Pans: Corrosion-resistant metal with raised edge. Include dimensions not less than base of water heater and include drain outlet not less than NPS 3/4.

PART 3 - EXECUTION

3.1 WATER HEATER INSTALLATION

A. Install water heaters level and plumb, according to layout drawings, original design, and referenced standards. Maintain manufacturer's recommended clearances. Arrange units so controls and devices needing service are accessible.

B. Install seismic restraints as required for commercial water heaters. Anchor to substrate.

C. Install combination temperature and pressure relief valves in top portion of storage tanks. Use relief valves with sensing elements that extend into tanks. Extend commercial-water-heater relief-valve outlet, with drain piping same as domestic water piping in continuous downward pitch, and discharge by positive air gap onto closest floor drain.

D. Install water-heater drain piping as indirect waste to spill by positive air gap into open drains or over floor drains. Install hose-end drain valves at low points in water piping for water heaters that do not have tank drains. Refer to Division 22 Section "Domestic Water Piping Specialties" for hose-end drain valves.

E. Install thermometer on outlet piping of water heaters.

F. Fill water heaters with water - Before Energizing.

G. Charge compression tanks with air.

3.2 CONNECTIONS

A. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Install piping adjacent to water heaters to allow service and maintenance. Arrange piping for easy removal of water heaters.

C. Connect wiring according to Section "Low-Voltage Electrical Power Conductors and Cables."

3.3 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust field-assembled components and equipment installation, including connections on all large commercial water heaters. Report results in writing.

B. Perform the following field tests and inspections and prepare test reports:

1. Leak Test: After installation, test for leaks. Repair leaks and retest until no leaks exist.
2. Operational Test: After electrical circuitry has been energized, confirm proper operation.
3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

C. Remove and replace water heaters that do not pass tests and inspections and retest as specified above.

3.4 DEMONSTRATION

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

END OF SECTION

SECTION 22 05 50 - PLUMBING FIXTURES

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 SUBMITTALS

A. Product Data: For each type of plumbing fixture indicated. Include selected fixture and trim, fittings, accessories, appliances, appurtenances, equipment, and supports. Indicate materials and finishes, dimensions, construction details, and flow-control rates.

B. Shop Drawings: Diagram power, signal, and control wiring.

C. Operation and Maintenance Data: For plumbing fixtures to include in operation, and maintenance manuals.

1.3 COORDINATION

A. Contractor shall examine Architectural drawings for exact location and number of plumbing fixtures required. Architect/Engineer shall be notified of any discrepancies between the architectural and plumbing drawings prior to bidding. Failure to examine all drawings will not constitute a change order for fixtures to be added which were shown on one but not the other.

B. Refer to Architectural plans for rough-in dimensions. Do not scale plumbing drawings for rough-in dimensions.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain plumbing fixtures, faucets, and other components of each category through one source from a single manufacturer.

1. Exception: If fixtures, faucets, or other components are not available from a single manufacturer, obtain similar products from other manufacturers specified for that category.

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. Regulatory Requirements: Comply with requirements in ICC A117.1, "Accessible and Usable Buildings and Facilities"; and Public Law 101-336, "Americans with Disabilities Act"; for plumbing fixtures for people with disabilities.

D. Regulatory Requirements: Comply with requirements in Public Law 102-486, "Energy Policy Act," about water flow and consumption rates for plumbing fixtures.

E. NSF Standard: Comply with NSF 61, "Drinking Water System Components--Health Effects," for fixture materials that will be in contact with potable water.

F. Select combinations of fixtures and trim, faucets, fittings, and other components that are compatible.

PART 2 - PRODUCTS

2.1 PLUMBING FIXTURES

A. Specific manufacturers and model numbers of all plumbing fixtures and trim required for this project are indicated in the plumbing fixture schedule on the plumbing drawings. Items specified indicate the quality and appearance required.

B. China or enamel fixtures shall be white in color unless noted otherwise.

C. All fixtures designed for handicap use shall be mounted at handicap height as indicated on plans and herein.

D. Residential grade fixtures will not be accepted unless so specified as the quality and appearance required in the plumbing fixture schedule.

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include the following:

    a. Lavatory and Sink Faucets: Zurn, Kohler, T and S Brass, Chicago Faucet, Moen.
    b. Traps/Supplies/Stops: Zurn, McGuire.
    c. Wrap Kits: Trubro, Brocar, McGuire, Zurn.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine roughing-in of water supply and sanitary drainage and vent piping systems to verify actual locations of piping connections before plumbing fixture installation.

B. Examine cabinets, counters, floors, and walls for suitable conditions where fixtures will be installed.

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

3.2 INSTALLATION

A. Assemble plumbing fixtures, trim, fittings, and other components according to manufacturers' written instructions.

B. Install off-floor supports, affixed to building substrate, for wall-mounting fixtures.

1. Use carrier supports with waste fitting and seal for back-outlet fixtures.
2. Use carrier supports without waste fitting for fixtures with tubular waste piping.

C. Install back-outlet, wall-mounting fixtures onto waste fitting seals and attach to supports.

D. Install floor-mounting fixtures on closet flanges or other attachments to piping or building substrate.

E. Install wall-mounting fixtures with tubular waste piping attached to supports.

F. Utilize floor mounted carriers with extended arm supports for support of wall mounted china and enameled cast iron lavatories.

G. Install in-counter mounted fixtures and attached to casework.

H. Install fixtures level and plumb according to roughing-in drawings.

I. Install water-supply piping with stop on each supply to each fixture to be connected to water distribution piping. Attach supplies to supports or substrate within pipe spaces behind fixtures. Install stops in locations where they can be easily reached for operation.

J. Install trap and tubular waste piping on drain outlet of each fixture to be directly connected to sanitary drainage system.

K. Install tanks for accessible, tank-type water closets with lever handle mounted on wide side of compartment.

L. Install toilet seats on water closets.

M. Install faucet flow-control fittings with specified flow rates and patterns in faucet spouts if faucets are not available with required rates and patterns. Include adapters if required.

N. Install traps on fixture outlets.

1. Exception: Omit trap on fixtures with integral traps.
2. Exception: Omit trap on indirect wastes, unless otherwise indicated.

O. Install escutcheons at piping wall ceiling penetrations in exposed, finished locations and within cabinets and millwork. Use deep-pattern escutcheons if required to conceal protruding fittings. Escutcheons are specified in Division 22 Section "Common Work Results for Plumbing."

P. Seal joints between fixtures and walls, floors, and countertops using sanitary-type, one-part, mildew-resistant silicone sealant. Match sealant color to fixture color.

Q. Coordinate installation of all counter mounted sinks and lavatories with casework manufacturer’s shop drawings prior to installation. Install offset tailpieces where required to maintain required clearance for angled aprons. Locate sink or lavatory in casework as required to avoid conflict with counter apron.

3.3 CONNECTIONS

A. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Connect fixtures with water supplies, stops, and risers, and with traps, soil, waste, and vent piping. Use size fittings required to match fixtures.

C. See schedule on plans for connection sizes to fixtures.

D. Connect wall-hung urinals to waste piping with red brass nipples.

E. Each fixture, floor drain, and piece of equipment requiring connection to drainage system to have separate traps installed as close to fixture as possible.

3.4 FIELD QUALITY CONTROL

A. Verify that installed plumbing fixtures are categories and types specified for locations where installed.

B. Check that plumbing fixtures are complete with trim, faucets, fittings, and other specified components.

C. Inspect installed plumbing fixtures for damage. Replace damaged fixtures and components.

D. Test installed fixtures after water systems are pressurized for proper operation. Replace malfunctioning fixtures and components, then retest. Repeat procedure until units operate properly.

3.5 ADJUSTING

A. Operate and adjust faucets and controls. Replace damaged and malfunctioning fixtures, fittings, and controls.

B. Replace washers and seals of leaking and dripping faucets and stops.

3.6 CLEANING

A. Clean fixtures, faucets, and other fittings with manufacturers' recommended cleaning methods and materials. Do the following:

1. Remove faucet spouts and strainers, remove sediment and debris, and reinstall strainers and spouts.
2. Remove sediment and debris from drains.

B. After completing installation of exposed, factory-finished fixtures, faucets, and fittings, inspect exposed finishes and repair damaged finishes.

3.7 PROTECTION

A. Provide protective covering for installed fixtures and fittings.

B. Do not allow use of plumbing fixtures for temporary facilities unless approved in writing by Owner.

END OF SECTION

SECTION 23 05 00 - COMMON WORK RESULTS FOR HVAC

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. It shall be the contractor's responsibility to furnish and install complete all systems, equipment, and related items described under Division 23.

B. It shall be the Contractor's responsibility to determine the characteristics of electrical currents available to operate the mechanical equipment prior to ordering such equipment. All electrically operated equipment shall be designed for operation with the type of electric current available to the project.

C. It shall further be the Contractor's responsibility to locate, layout and make provisions for all openings required in precast or cast in place concrete slabs, etc., necessary to accommodate his work.

D. Provide labor, materials, tools, and services for a complete installation of equipment and systems specified herein and indicated on drawings.

E. Contractor agrees to assume responsibility for liability, workmanship and quality of materials concerning work sublet to others. Before part of contract is sublet, submit to Architect in writing names of proposed subcontractors and obtain written approval.

F. The Contractor shall furnish and install all rough-in work and make final connections to all equipment and mechanical work required for connection to equipment furnished under this contract.

G. The equipment shall be properly prepared structurally and mechanically ready to receive a single connection for each of the various mechanical items with all supply and return ductwork, piping, etc., internal to and part of the equipment installed by the equipment manufacturer or supplier.

H. All equipment shall be installed in accordance with manufacturer’s drawings and recommendations.

I. Verify all connections and rough-in locations with the Architect and / or the equipment supplier or contractor prior to the start of their work.

1.3 CODES AND FEES

A. All work shall be installed in accordance with the applicable provisions of the local codes, latest adopted International Mechanical Code, NFPA, UL, ASTM, ASHRAE, SMACNA, ASME and ANSI.

B. The Contractor shall pay for fees and inspections as may be required for all systems requiring inspection by agencies having jurisdiction.

1.4 ELECTRICAL WORK

A. All control wiring and conduit not shown on Electrical drawings shall be furnished and installed under Division 23 according to the National Electrical Code and Division 26 requirements.

B. All power wiring and conduit for items furnished under Division 23 shall be furnished and installed under Division 26.

C. All disconnects shall be furnished and installed by Division 26.

D. Toggle switches for 1/2 HP motors and less shall be furnished and installed by Division 26.

E. Wiring and conduit for solenoid valves, and control transformers including the transformers shall be furnished and installed by Division 23.

F. Division 26 shall install all starters, toggle switches, disconnects, and all wiring to the respective motor or device. Wiring and conduit from starter to a controller shall be by Division 23.

G. Definitions:

1. Power Wiring: Line voltage circuitry rough-in including conduit, boxes, conductors, etc. between the overcurrent protection and the equipment including the connection of the starters.
2. Control Wiring: Any voltage circuitry rough-in including conduit, boxes, conductors, etc. between control activator and the controller or starter.

H. Conduit: All power wiring and 120V control wiring shall be in conduit. Low voltage control wiring shall be installed in conduit where exposed, or in return air plenums, in masonry walls, or below slab.

1.5 VISIT TO JOB SITE

A. Before submitting bid, Contractor shall visit the job site for the purpose of examining the site and conditions under which the work must be performed. No extra will be allowed for situations arising from failure of Contractor to thoroughly familiarize himself with site and existing building conditions, including charges and requirements to utilities as shown for the project.

1.6 RECORD DRAWINGS

A. The Contractor shall maintain a set of prints that reflect site conditions including location of piping, equipment, etc. that have been changed to suit job conditions. The contractor shall prepare a corrected reproducible tracing of the project using the results of the record print. Final payment shall not be made until such document(s) is turned over to the architect upon completion of the project.

1.7 QUALITY ASSURANCE

A. Perform work of this section using skilled workers who are trained and experienced in the required crafts and who are knowledgeable and familiar with the specified requirements and the methods to be used for proper performance of the work.

1.8 COMPLETE WORK

A. Contractor shall provide and install all systems in complete working order. All items normally required for operation shall be provided.

1.9 SEISMIC DESIGN

A. Seismic restraints shall be provided in accordance with chapter 16 of the latest adopted International Building Code. Specific seismic requirements shall be determined by building site classification.

B. Seismic restraints shall not be required for the following installations:

1. Piping less than 1-1/4 inch inside diameter.

2. All piping suspended by individual hangers 12 inches or less in length from the top of the pipe to the supporting structure.

PART 2 - PRODUCTS

2.1 IDENTIFICATION

A. All air units, fans, etc., shall be labeled with drawing mark number and with description of area served, utilizing engraved plastic laminate nameplates.

B. All air unit thermostats shall be labeled with proper mark number identifying it with air unit it serves.

2.2 INDOOR ENVIRONMENTAL QUALITY – LOW EMITTING MATERIALS

A. All adhesive and sealants used on the interior of the building (inside the weatherproofing and applied on-site) shall comply with “South Coast Air Quality Management District (SCAQMD) Rule #1168", current VOC limits.

B. Paints and coatings used on the interior of the building shall comply with the following criteria for VOC limits:

1. Architectural paints, coatings and primers - Green Seal Standard GS-11, for Paints, Coatings, Stains and Sealers.
2. Anti-corrosive and anti-rust paints - 250 g/l per Green Seal Standard GC-03, Anti-Corrosive Paints, 2nd Edition, January 7, 1997.

2.3 SERVICE AND MAINTENANCE CONTRACT

A. The Contractor shall make arrangements to perform all the required servicing and maintenance of the heating, ventilating and air conditioning system, without cost to the owner, for a period of one year after date of substantial completion.

B. The servicing shall be complete in every respect and shall include but not be limited to the following: Replacing or washing of all filters as required for proper equipment operation, replacing bad belts, compressors, bearings, motors, controls, electric heaters, refrigerant specialties, couplings; cleaning drain pans and piping; replacing refrigerant and oil, bearing lubrication, and keeping equipment reasonably clean.

C. This service work shall be performed a minimum of three times a year. Filters may need changing more than 3 times depending on conditions. A written report shall be submitted to the Owner describing each visit. The date the service work starts shall be clearly identified in close out documents.

2.4 EQUIPMENT LIST, SHOP DRAWINGS AND SAMPLES

A. Submit to the Architect for approval, within 30 days after receipt of Notice to Proceed with the work, detailed shop drawings of all equipment and all material required to complete the project. The shop drawing shall be complete as described herein. The Contractor shall furnish the number of copies required by the General and Special Conditions of the Contract, but in no case less than six (6) copies.

B. All shop drawings to be submitted at one time in a 3-ring binder with cover and drawing index sheet. Electronic shop drawing submittals are acceptable.

C. The shop drawings shall be detailed, with dimensioned drawings or catalog cuts, showing construction, size, arrangement, operating clearances, performance characteristics and capacity.

Each item of equipment proposed shall be a standard catalog product of an established manufacturer and of equivalent quality, finish, and durability to that specified. Submission material and all shop drawings for the various items of equipment shall be marked with the respective mark number or identification of the equipment shown on the drawing or in the specification.

D. Provide a cover sheet for all major equipment, including but not limited to, air handling units and condensing units, that shall list in detail all accessories called for in specifications and on drawings that are being supplied. Also, list operating capacities shown in schedules or described on drawings. Failure to list these items will result in resubmittal. A copy of a standard catalog will not be sufficient. Shop drawings for controls shall contain a detailed sequence of operation.

E. Shop drawings shall show sizes and details of required concrete and steel machine foundation, location of anchor bolts, physical dimension of equipment, equipment weight or other pertinent data required for equipment support or installation.

F. The contractor shall verify all electrical requirements of equipment with the electrical service available before ordering said equipment.

G. Approved shop drawings do not mean that drawings have been checked in detail; said approval does not in any way relieve the Contractor from his responsibility or necessity of furnishing material or performing work as required by the contract drawings or specifications.

2.5 EQUIPMENT START-UP

A. Before final payment, provide architect and engineer with letter from each equipment supplier stating that equipment has been started and checked by factory qualified field service technicians and is installed and running satisfactory in every respect.

B. Letters are required for the following equipment: air handling units and condensing units.

PART 3 - EXECUTION

3.1 TEST

A. Test all piping, following installation, but before it is covered or connected to equipment. Furnish necessary labor, materials and equipment for making test. All leaks disclosed by testing shall be reworked in an approved manner and the leaking system shall then be retested until proved tight under pressure. Test all systems for watertightness (or gas-tightness) as required by the authorities having jurisdiction, or in the absence of such requirements the minimum tests shall be made as follows:

1. All refrigerant piping systems shall be tested at 200 pounds with dry nitrogen until all leaks have been made tight. After the pressure tests use suitable vacuum pump to evacuate the system to at least 1000 microns, then charge the system with refrigerant and oil as required. Prior to running the refrigerant equipment all safety and operating devices and controls shall be properly adjusted and tested for proper operation and protection of the equipment.

B. Test all heating, cooling and ventilating equipment. When installation is complete, all equipment shall be tested for proper operation and functioning as directed by Architect.

1. All equipment, motors, fans, etc., shall run at their required speed and be free from excessive vibration and noise. No bearings, journals, or any part of the motors shall heat to a temperature in excess of 40°C. above the temperature of the surrounding air.

2. The equipment, diffusers, registers, dampers, etc., shall be adjusted to deliver air at all outlets according to the amount of air shown on the drawings or as required to obtain adequate room temperature.
3. Architect reserves the right to require the Contractor to demonstrate the uniformity of heating and cooling in each area of the building.

3.2 COORDINATION

A. The mechanical work shall be installed as neatly as possible in the locations shown but shall be subject to such deviations, modifications and relocations as may be necessary to conform to the requirements of the architectural drawings and as necessary to avoid interferences with the structural work and the work of other trades, and interferences between the various trades. This shall be done at no cost to the Owner. No piping or equipment shall be installed which would require ceilings to be lower than required by drawings, unless approval is obtained from the Architect.

B. It is the responsibility of the General Contractor to coordinate the work of his subcontractors. To this end, the General Contractor shall require that the various subcontractors carefully examine and familiarize themselves with the architectural and structural drawings and drawings covering the work of other trades, and that they frequently consult with all other trades so that the work may be coordinated.

C. If necessary to coordinate and expedite the work, the Contractor shall prepare "interference drawings" and submit them to the Architect for approval. Such drawings shall show the work of the various trades involved, illustrate proposed details of construction and arrangement of equipment and apparatus, and clearly indicate any deviations from contract requirements.

D. Minor changes in arrangement may be made to suit unforeseen conditions, but no major deviation shall be made without written approval from the Architect. If any deviations are deemed necessary, submit all details of proposed changes and all reasons therefore, in writing, to the Architect for approval prior to making installation of such work.

E. Do not fabricate piping before interferences are verified. No extra will be allowed for piping fabricated in advance which cannot be used.

3.3 CUTTING AND REPAIRING

A. All chases, recesses, sleeves and other openings in masonry and concrete shall be built in as the construction work progresses, and it shall be the responsibility of the subcontractor to see that such chases, recesses, sleeves and other openings required for their work are properly located and installed. If this is not done by the subcontractor whose work required such accommodation, it shall be performed at his expense.

B. Structural members or finished work shall not be cut without the express permission of the Architect. Cutting shall be done neatly and patching or repairing shall match adjacent work.

3.4 PROTECTION AND CLEANING

A. Work shall be protected at all times. Pipe openings shall be closed with caps or plugs until permanent connections are made. Fixtures and equipment shall be covered, if necessary, to protect against dirt, water, chemical or mechanical damage or defacement. The installation of fixtures liable to damage shall be deferred by the Architect. Cover all machine openings and open ends of ductwork to prevent entry of dirt and debris as project construction progresses

B. Upon completion of the work and after all tests have been made and piping systems proven tight, clean all fixtures and equipment, traps, dirt pockets, circulating systems, filters, etc., and leave in correct operating condition. No air unit shall be operated without filters.

3.5 PAINTING

A. Painting of mechanical equipment, and exposed piping in finished spaces, or exposed on the exterior, shall be finished as specified under Division 09, PAINTING. All equipment exposed on the exterior furnished without factory finish shall be painted.

B. Equipment with a factory applied finish shall have scratches, chips, etc., primed and touched up with materials which will protect the surface and match the adjacent area.

3.6 OPERATING INSTRUCTIONS

A. Furnish the services of competent personnel to instruct the Owner's personnel in the proper operation and maintenance of all equipment, for a period of not less than 1 working day. All owner training sessions shall be videotaped and at the completion of training a DVD format copy of the video shall be given to the owner with all installation, operation, and maintenance manuals.

B. Furnish and deliver to the Owner three sets of operating instructions for all equipment installed under this contract, including shop drawings, piping diagrams, wiring diagrams, maintenance recommendations and information concerning replacement parts. This information must contain mechanical contractor names, equipment supplier names, contact personnel, telephone numbers, and facsimile telephone numbers. This information shall be contained in a three ring binder of suitable size, and labeled on the exterior with project name.

3.7 QUIETNESS OF OPERATION

A. All fans, motors and other apparatus shall be selected and installed for reasonably quiet operation. Any objectionable noise which develops shall be corrected before the work will be accepted. Equipment or duct connections and fittings which produces objectionable noise shall be adjusted or insulated so as to eliminate the noise or shall be removed and replaced by satisfactory equipment. Provide spring or rubber machine mounting isolators and flexible piping and duct connections where necessary to prevent transmission of vibration to building structure or to piping system.

3.8 GUARANTEE

A. The Contractor shall guarantee all work to be in accordance with contract requirements and free from defective or inferior materials, equipment, and workmanship for a period of one year, and he shall guarantee that all equipment is of proper size and design and so installed as to produce the capacities and results specified and shown on the drawings. Compressors shall have an extended 4 year warranty.

3.9 SUBSTITUTIONS

A. Substitutions shall be allowed in accordance with Division 01. Substitution approval shall be at the sole discretion of the Engineer.

B. Contractor shall note on shop drawings all major differences from specified material or equipment.

C. When making requests for substitutions, Contractor assumes the following responsibilities:

1. To have personally investigated the proposed substitute product and determined it is equal or superior in all respects to that specified.
2. To provide the same warranty for substitute that Contractor would for that specified:
3. To provide complete cost data, and waive all claims for additional costs related to substitution, which subsequently become apparent; and
4. To coordinate installation of the accepted substitute, making such changes as may be required for Work to be complete in all respects.

D. All requests for substitution must be submitted to the architect and engineer a minimum of 10 calendar days prior to project bid date. Such submission does not constitute approval. Only items or manufacturers specifically stated in the project specifications, drawings or addenda for use shall be considered as approved.

END OF SECTION

SECTION 23 05 10 - BASIC MATERIALS AND METHODS

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 BASIC REQUIREMENTS

A. Equipment and materials used in the work shall be in accordance with the contract documents, of the best quality and grade for use intended, shall be new and unused and shall be the manufacturer's latest standard or current model for which replacement parts are readily available.

B. Work shall be installed under the constant supervision of a competent superintendent and by skilled and competent mechanics experienced in the trade that contractor is practicing.

C. All apparatus and equipment shall be installed and connected in accordance with the best engineering practices and in accordance with the manufacturer's recommendations. All auxiliary piping, valves, electrical connections, etc., recommended by the manufacturer or required for proper operation shall be furnished and installed complete.

D. The work of this section is subject to the requirements of the Mechanical Common Work Results and the General and Supplemental Conditions in Division 01.

PART 2 - PRODUCTS

2.1 SLEEVES AND PLATES

A. All pipes that pass through masonry partitions and walls and concrete floor slabs shall be installed with standard weight galvanized steel sleeves. Sleeves through floors shall be long enough to project a minimum of 2" above finished floor. Sleeves shall be large enough for pipe, pipe insulation and required fire caulking. Sleeves in concrete shall be accurately located in the forms and secured in place to prevent displacement during pouring of concrete. Sleeves below grade in exterior walls shall be Link-Seal with wall penetration seal or approved substitution.

B. Sleeves in finished spaces shall finish flush with the finished wall surface. Sleeves for insulated refrigerant pipe shall be large enough to accommodate the insulation.

C. Pipes passing through masonry walls and partitions in finished spaces shall be fitted with metal escutcheons or collar plates. Plates occurring in painted walls or ceiling shall be prime coated for painting; other plates shall be chromium plated.

D. All pipe penetrations of fire rated floors or walls are to be protected. Space between metal pipe and wall or sleeve shall be protected with Hilti Fire Barrier Penetration Sealing System or approved substitute. Installation shall be in accordance with the manufacturer’s recommendations for the hourly fire rating of the partition. The system shall be U.L. listed. For insulated refrigerant pipe, continue insulation and vapor barrier through wall. The sleeve through the wall shall be large enough for the pipe, insulation and fire caulking.

E. PVC pipe passing through rated walls, ceilings or floors shall have Hilti UL Listed Fire Protection System or approved substitute. System number shall be as required by construction and rating.

2.2 VIBRATION ISOLATION AND EXPANSION COMPENSATION

A. The mechanical equipment shall be isolated from the structure by means of vibration isolators provided by a single manufacturer who shall design or select each isolator to suit the requirements of the various items of mechanical equipment installed at the locations indicated on the drawings.

B. Mechanical Equipment shall be isolated as follows:

1. All compressors shall be set on spring mounts incorporating leveling screws, noise isolation pads, and vertical limit stops, as called for on the drawings.

PART 3 - EXECUTION

3.1 GENERAL

A. Run exposed piping parallel to the principal parts of the building.

B. Piping and equipment shall be kept as close as possible to ceilings, walls, columns, etc., and shall be installed in such an orderly manner as to take up a minimum of space and allow a maximum of headroom, and all offsets, fittings, etc., required to accomplish this shall be furnished and installed, whether or not each offset and fitting is specifically shown or noted. Minimum clearances on exposed piping shall be maintained as specified under "Piping Clearances" herein.

3.2 PIPE INSTALLATION

A. Service pipe, valves, fittings, etc., shall be so installed that after the insulation cover is applied there will be not less than ½" clear space between the finished covering and other work and between the finished covering of parallel and adjacent pipes. The clearances on uninsulated pipe shall be measured from the point of greatest projection of the pipe fittings.

B. Fastenings to masonry walls shall be made with metal expansion sleeves, cinch anchors, toggle bolts, or equal. Fastenings to concrete shall be made with metal expansion sleeves, metal inserts. Wood plugs will not be acceptable in any case.

3.3 JOINTS IN PIPE

A. PVC pipe joints shall be made with cement recommended by pipe manufacturer. All joints shall be cleaned with approved solvent.

B. Type "L" copper pipe joints, except as otherwise specifically noted, shall be made with 95-5 plumber's solder and noncorrosive paste flux. Acid core solder shall not be used. Tubing shall be square cut on a sawing vise and reamed to remove burrs. Outside and inside of fittings and outside of pipe shall be well cleaned and steel wool used before soldering. Soldering operations shall be performed strictly in accordance with the recommendations of the manufacturer of the pipe and fittings. Joints in copper pipe Type "K" below grade shall be made with high temperature solder, silver solder, sil-fos, or equal.

C. Connections of copper pipe to ferrous pipe shall be made with Dielectric unions. Connections of metal pipe to non-metallic pipe shall be made with adapter. Connections of copper piping to equipment requiring threaded connections shall be made with adapters as specified.

END OF SECTION

SECTION 23 05 93 – TESTING, ADJUSTING AND BALANCING

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. The work required under this section includes all work necessary for the proper testing, adjusting and balancing of all air systems to achieve the results specified by the contract drawings and specifications.

1.3 SUBMITTALS

A. Certified TAB Reports: Submit four copies of reports prepared, as specified in this Section, on approved forms certified by TAB firm.

B. TAB Report Forms: Use standard forms from:

1. AABC's "National Standards for Testing and Balancing Heating, Ventilating, and Air Conditioning Systems.
2. NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems."
3. SMACNA's TAB "HVAC Systems - Testing, Adjusting, and Balancing."
4. TAB firm's forms approved by Architect.

1.4 QUALITY ASSURANCE

A. Work required under this section shall comply with American Society of Heating, Refrigerating and Air Conditioning Engineers, Inc. (ASHRAE), National Environmental Balancing Bureau (NEBB) or Associated Air Balance Councils (AABC), Recommendations Pertaining To Measure, Instruments, and Testing, Adjusting and Balancing by Certified technicians.

B. The mechanical contractor shall make arrangements with an independent balancing agency to balance all air flow to the flow rates indicated on the contract drawings and schedules. This shall include all split system heat pump air handlers. The balancing agency shall be one normally engaged in such work and **shall be either AABC or NEBB Certified**. Test and balance reports not prepared by an AABC or NEBB certified contractor will be rejected and the complete system shall be retested by an AABC or NEBB certified contractor at no cost to the owner. All test and balance reports shall be certified per AABC or NEBB.

C. Instrumentation Calibration: Calibrate instruments at least every six months or more frequently if required by instrument manufacturer.

1. Keep an updated record of instrument calibration that indicates date of calibration and the name of party performing instrument calibration.

D. Architect and engineer reserve the right to require the contractor to demonstrate the uniformity of heating and cooling in each area of the building.

E. All equipment, fans, motors, etc., shall run at their required speeds and be free from excessive vibration and noise. No bearings, journals, or any part of the motors shall heat to a temperature in excess of 40°C above the temperature of the surrounding air.

1.5 COORDINATION

A. Coordinate the efforts of factory-authorized service representatives for systems and equipment, HVAC controls installers, and other mechanics to operate HVAC systems and equipment to support and assist TAB activities.

PART 2 - PRODUCTS

(Not Using)

PART 3 - EXECUTION

3.1 INSPECTION AND REPORTS

A. Prior to the start of any test and balancing work, a representative of the test and balancing agency shall visit the project for the purpose of inspecting the work in place and shall prepare and submit a written report to the mechanical contractor and engineer stating work which is to be completed before testing and balancing can proceed. Do not proceed with testing and balancing until all items listed in said report have been completed. Failure to do this will render the test and balance report null and void. If the report is deemed null and void, all testing must be performed again at no additional cost to the owner, in the presence of the architect and/or engineer. The contractor shall reimburse the architect and/or engineer for any expenses and time related to supervision of system re-testing.

B. The testing and balancing agency shall record the test results in tabulated formats for both cooling and heating conditions and shall submit a minimum of three copies to the architect for review and approval. A copy of the completed and approved report shall be placed in each copy of the facility operating and maintenance manuals as stated hereinbefore.

3.2 AIR BALANCING

A. The air balance shall include the following air tests in accordance with the following requirements. Test all air systems with new, clean filters in place.

1. Test and record fan total CFM (design and actual).
2. Test and record fan RPM (design and actual.)
3. Test and record fan motor horsepower, amperage, voltage, and RPM (rated and actual.)
4. Record fan motor manufacturer, model and serial numbers and service factor (actual.)

5. Record motor starter size (actual.)
6. Test and record diffuser, register and grille CFM (preliminary, design and actual) for supply air.
7. Record each system supply air temperature, (dry bulb and wet bulb) in heating and cooling modes.
8. Record air temperature and humidity in each room at time of air balance.
9. Record AHU type, location, manufacturer, model number, and serial number.
10. Check fan rotation on all fan units.
11. Check filters for cleanliness prior to balancing. Test only with new, clean filters of the type specified in place.
12. Record the date, time, outside temperature and outside humidity at the time of recording unit temperatures.

3.4 TESTING TOLERANCES

A. Air balancing shall be as follows:

1. Heat Pumps ± 5%

END OF SECTION

SECTION 23 07 00 - HVAC INSULATION

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. Work required under this section consists of insulation for piping systems and equipment as hereinafter specified.

B. The work of this section is subject to the requirements of the Mechanical Common Work Results and Basic Material Specifications.

1.3 QUALITY ASSURANCE

A. All materials used for insulation of pipe and ducts and equipment covered in this section shall be UL listed. Fire hazard ratings shall be as follows:

1. Flame spread of 25, and smoke development of 50 for all duct insulation and other insulation located in ceiling plenums or rooms utilized for return air plenums.
2. Flame spread of 25 and smoke development of 200 for other pipe and equipment insulation.

B. Increase the insulation thickness of ½" on all piping outside the building insulation envelope and weatherproof with 0.016" thick aluminum jacket with aluminum fitting covers.

C. All insulation and thicknesses are selected to meet the International Energy Conservation Code.

PART 2 - PRODUCTS

2.1 FLEXIBLE TUBULAR ELASTOMERIC

A. Provide fire-retardant closed-cell slip-on flexible type. Product must be guaranteed by manufacturer to have continuous operational temperature limit of not less than 180°F and a minimum "R" value of 3.57 at 75°F 50% RH. Provide insulation for the following:

1. Refrigerant suction and hot gas bypass lines - ½" thick on lines 1" or less - 1" thick on lines larger than 1". Install a 0.016" thick aluminum jacket on insulation outside the building.

PART 3 - EXECUTION

3.1 GENERAL

A. Install all insulation products in strict accordance with manufacturer's instructions.

B. All items requiring service provide removable insulation caps of insulation equal in thickness to pipe covering.

C. Cover and repair all joints, rips, tears, punctures, staples, insulpins, and other breaks in the insulation vapor barrier jacket with sections of foil tape to match the insulation vapor barrier facing. The integrity of the insulation vapor barrier shall be maintained.

D. No insulation shall be cut where a hanger is located.

E. Flexible tubular elastomeric piping installation shall be as follows:

1. Install pipe insulation by slitting tubular sections and applying onto piping or tubing. Alternately, whenever possible, slide unslit sections over the open ends of piping or tubing. All seams and butt joints shall be adhered and sealed using Armstrong 520 Adhesive. When using AP Armaflex SS only the butt joints shall be adhered using 520 Adhesive.
2. Insulation shall be pushed on the pipe, never pulled. Stretching of insulation may result in open seams and joints.
3. All edges shall be clean cut. Rough or jagged edges of the insulation shall not be permitted. Proper tools such as sharp knives must be used.
4. Seams shall be staggered when applying multiple layers of insulation.
5. All fittings shall be insulated with the same insulation thickness as the adjacent piping. All seams and mitered joints shall be adhered with 520 Adhesive.

END OF SECTION

SECTION 23 23 00 – REFRIGERANT PIPING

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. The work included under this section of the specification includes all work necessary for the complete installation of a refrigerant piping system.

PART 2 - PRODUCTS

2.1 REFRIGERANT PIPING SYSTEM

A. The refrigerant piping shall be Type L copper with wrought copper fittings and high temperature solder joints, Sil-Fos, or approved equal. The piping system shall include but not be limited to the following: liquid line solenoid valves, hot gas bypass and control where noted, charging valves sight glass with moisture indicator, liquid line strainer drier, flexible connectors where required. The piping shall be installed according to the diagrams furnished by the manufacturer's Engineer for approval prior to installation. The piping system shall be tested at 200 pounds with dry nitrogen until all leaks have been made tight. After the pressure test use suitable vacuum pump to evacuate the system to a least 1000 microns, then charge the system with refrigerant, all safety and operating devices and controls shall be properly adjusted and tested for proper operation and protection of the equipment.

PART 3 - EXECUTION

3.1 Route all refrigerant piping between condensing units and evaporator coils by the most direct route possible in order to minimize refrigerant line length.

3.2 All refrigerant piping must be supported from the building structure and affixed to the structure.

3.3 Reasonable measures should be taken to insure that the installed refrigerant piping forms no traps for the system lubricating oil.

3.4 All refrigerant suction and hot gas lines shall be insulated with flexible tubular elastomeric insulation as required in section 23 07 00 “HVAC Insulation” hereinbefore.

END OF SECTION 23 23 00

SECTION 23 81 50 - DUCTLESS SPLIT SYSTEM HEAT PUMPS

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.

B. Common Work results for HVAC 23 05 00.

C. Insulation, Section 23 07 00.

D. Refrigerant Piping, Section 23 23 00.

1.2 SUMMARY

A. Section Includes:

1. The work required under this section includes all work necessary for the complete installation of ductless split system units.

B. The work of this section is subject to the requirements of the Mechanical General Provisions and Basic Materials Specifications.

1.3 SUBMITTALS

A. Provide drawings indicating dimensions, rough-in connections, electrical characteristics, unit performance, agency listings, and connection requirements.

B. Provide manufacturer’s installation and start-up instructions.

C. Provide manufacturer’s color selection charts.

D. At job closeout, provide manufacturer’s installation, operation and maintenance data along with product warranty certificate.

1.4 WARRANTY

A. Provide one-year warranty on all parts and five year warranty for refrigeration compressors.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Furnish and install where shown on plans, ductless split system units of sizes and capacities shown on the schedule. The units shall include the indoor evaporator section and the outdoor condenser section. Approved manufacturers shall be as follows:

1. Daikin
2. Mitsubishi

2.2 WALL HUNG EVAPORATOR SECTION

A. Provide wall hung heat pump units as shown on schedule. Provide hanger brackets and or trim kits as applicable.

B. Cabinet shall be constructed of high impact polystyrene, with structural stiffeners and powder coated finish. Inlet panel construction of high impact polystyrene with perforated steel inlet grille.

C. Discharge grille shall be high temperature Noryl with adjustable vanes.

D. Condensate drain pans shall be galvanized steel with anti-corrosion coating.

E. Fan shall be tangential type, directly mounted to the motor shaft. Motor shall be PSC type with overload protection.

F. Filter shall be permanent, washable and user accessible.

G. Coil shall be seamless copper tubing, arranged in staggered configuration, with enhanced aluminum fins, tested to 460 PSIG. Tubes shall be mechanically expanded for secure bonding to fin shoulder. Connections are sweat type.

H. Controls shall include relays and connections for condensing unit.

1. Wall mounted 24V thermostat with fan, and heat/cool switch.

2.3 CONDENSER SECTION

A. Provide a single zone condensing unit with 4-way reversing valve, solenoid activated by 24V, energized for cooling operation. Provide unit with a TXV with internal check valve to provide proven operation through all temperature ranges in heat pump mode.

B. Cabinet shall be constructed of G-60 galvannealed steel, finished with corrosion inhibiting, high-gloss, powder coated. Fan guard shall be heavy-gauge, vinyl dipped wire, or stamped integral to cabinet.

C. Compressor shall be hermetically sealed, high efficiency type. Motor shall be PSC type with internal overload protection. Compressor shall be installed on resilient mountings. Minimum unit SEER and minimum COP in reverse cycle heating mode shall be as scheduled on drawings.

D. The condensing unit and evaporator section shall be precharged with refrigerant. Unit refrigeration valves shall be solid brass for sweat connection.

E. The condenser coil shall be seamless, copper tubing, arranged in staggered configuration, with enhanced aluminum fins. The tubes shall be mechanically expanded for secure bonding to fin shoulder.

F. The condenser fan shall be high efficiency propeller type, directly connected to the totally enclosed PSC motor. The motor shall be internally and thermally protected. The condensing unit shall be draw-through design.

G. System options shall include low ambient operation to 30 degrees F. Other system options shall be as noted on schedule.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine equipment, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

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

3.2 INSTALLATION

A. Install unit in accordance with manufacturer's recommendations.

B. Verify prior to bidding that all units meet all electrical characteristics shown in the contract documents. This shall include voltage, phase, full load amps, and overcurrent protection. Coordinate exact electrical requirements with the electrical contractor prior to rough-in.

END OF SECTION

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, Division 26.

1.2 SUMMARY

A. Section Includes:

1. Electrical equipment coordination and installation.
2. Common electrical installation requirements

1.3 SCOPE

A. The work to be performed under this section shall require the contractor to provide all, labor, materials, equipment, and services proper to the installation of the work indicated on the electrical drawings, the principle features of which are as follows:

1. A power wiring system for distribution of power throughout the building.
2. Lighting fixtures, lamps and lighting controls.
3. A system of conduit, outlets, cabinets for the installation of wiring and equipment for the communications facilities.
4. Conduit, conductors, outlets and disconnect switches, and connections for the heating, ventilation, air conditioning and plumbing facilities.
5. Temporary wiring.

B. The drawings indicate the general character, scope and arrangement of the electrical installation. Request for any change or departure from these drawings must be submitted to the Architect for approval.

C. The contractor shall be governed by the present specifications together with the current recommendations and regulations of the following:

1. City Electrical Code
2. State Electrical Code
3. Rules of the Electric Utility Company
4. National Electrical Code
5. International Energy Conservation Code
6. International Building Code
7. N.E.M.A. Standards
8. N.F.P.A. Codes
9. Underwriters Laboratory Standards

D. Obtain all permits and inspections required for the work and pay all fees and costs thereof.

E. No changes in contract price will be allowed for alternate work which requires approximately the same amount of material and labor. The owner reserves the right to relocate any equipment up to 10 feet in any direction prior to rough-in.

1.4 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" and shall be furnished as required.

D. Coordinate sleeve selection and application with selection and application of firestopping specified in Division 07 Section "Penetration Firestopping."

E. Before submitting bid, Contractor shall visit the job site for the purpose of examining the site and conditions under which the work must be performed. No adjustment to the contract will be allowed for situations arising from failure of Contractor to thoroughly familiarize himself with site and existing building conditions, including charges and requirements from utilities as shown for the project. Contractor shall verify that connections to existing equipment are as indicated on drawings and specifications. Any deviations shall be reported to the Engineer immediately. Any deviations shall be reported prior to bidding.

F. Wiring for Mechanical Equipment:

1. All power wiring and conduit for items Furnished under Division 23 shall be furnished and installed under Division 26. See 6a. Verify the electrical characteristics of items to be connected with equipment nameplate data and drawings prior to rough-in.
2. All disconnects shall be furnished and installed by Division 26.
3. Manual motor starters for ½ HP motors and less shall be furnished and installed by Division 26.
4. Wiring and conduit for solenoid valves, and control transformers including the transformers shall be furnished and installed by Division 23.
5. Division 26 shall install all starters, toggle switches, disconnects, and all wiring to the respective motor or device. Wiring and conduit from starter to the controller or control device and any interlocked dampers shall be by Division 23.
6. Definitions:

    a. Power wiring: Line voltage circuitry rough-in including conduit, boxes, conductors, etc. between the overcurrent protection and the equipment including the connection of the starters by Division 26.
    b. Control wiring: Any voltage circuitry rough-in including conduit, boxes, conductors, etc. between control activator and the controller or starter by Division 23.

7. Conduit: All power wiring and line-voltage control wiring shall be in conduit.

G. Connect all motors with an 18” length of liquidtight flexible metal conduit. Use proper type connectors and anchors with this type conduit.

H. Refer to architectural drawings for details such as finishes, dimensions, materials, etc. Refer to equipment plans for exact location of electrical connections, which are dimensioned prior to any rough-in of work. Confirm any dimensioned drawings with equipment rough-in drawings.

I. Protection of Roof:

1. Coordinate electrical work with roofing work in regard to any electrical items which may pierce or otherwise affect the roof.
2. Arrange for any cutting or repairing to roofing which might already be installed when an electrical installation is made.
3. Roof penetrations shall not void roofing warranty. Penetrations shall be coordinated with roofing supplier holding the warranty. Electrical contractor shall coordinate with roofing supplier for installation of pre-molded pipe seal or field fabricated pipe penetration as applicable. Electrical contractor to include all costs and coordination with and for roofing penetrations, new or existing.
4. Routing of electrical wiring thru ductwork, and penetrations of ductwork or roof curbs is not allowed.

J. Record Drawings:

1. Furnish reproducible record drawings showing the changes and modifications that occurred during the construction period.
2. The job supervisor shall maintain a set of prints in the job office to be used to illustrate and note the job changes as they occur. These drawings shall be kept current daily.

K. Temporary Power Wiring: Throughout the building, provide one pigtail lampholder for every 100 square feet. Provide a 100-watt incandescent (or comparable compact fluorescent, HID, or LED) lamp in each pigtail; Provide a 120-volt GFCI duplex plug receptacle for every 500 square feet and with at least one in each room of 200 square feet or more. Wiring shall be with grounded type non- metallic sheath cable. Conform to the National Electrical Code and the requirements of OSHA. All temporary power wiring, devices, and supports shall be completely removed prior to project completion.

L. Wiring to and connection of all kitchen equipment shall be included in the electrical contract work. Equipment shall be properly prepared to receive a single connection with all wiring internal to the equipment installed by the equipment supplier. Verify all connections and rough-in location with the equipment supplier and approved equipment submittal documents prior to start of work.

M. Include in the bid price all utility company costs relative to the types of new or modified services planned. Before submitting bid, Contractor shall contact the Electric Utility Company, the Telephone Company, the Cable Television Company and any other utility or service providers to whose services the project shall be connected. The Contractor shall verify with each company the final service arrangements and all costs involved which are to be included in the bid price. The services illustrated on the drawings are based on information which was available at the time of releasing the project for bidding.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 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. Where minimum clearances are indicated, measure to any protruding fasteners, supports, or other components.

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. Do not obstruct 7’-0” minimum clear headroom along service and egress paths. If project conditions require an installation below 7’-0” along such paths, notify the Architect prior to rough-in.

D. Equipment: Install to facilitate service, maintenance, repair and/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.

3.2 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."

END OF SECTION

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. Section Includes:

1. Building wires and cables rated 600 V and less.
2. Connectors, splices, and terminations rated 600 V and less.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 CONDUCTORS AND CABLES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. General Cable Technologies Corporation.
2. Service Wire Co.
3. Southwire Company.

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 1277, UL 1685, and NFPA 70 for Type TC-ER cable used in Variable Frequency Controller circuits.

D. Conductors: Copper, complying with NEMA WC 70/ICEA S-95-658.
1. Conductor Insulation: Comply with NEMA WC 70/ICEA S-95-658 for Type THHN/THWN-2 or Type XHHW-2.
2. PV Conductor Insulation: Comply with UL 4703.

2.2 CONNECTORS AND SPLICES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. 3M Electrical Products.
2. Hubbell Power Systems, Inc.
3. ILSCO.

4. O-Z/Gedney; a brand of Emerson Industrial Automation.
5. Service Wire Co.
6. Thomas & Betts Corporation, A Member of the ABB Group.

B. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated; listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

PART 3 - EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

A. Feeders: 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-2 or Type XHHW-2, single conductors in raceway.

B. Feeders: Type THHN/THWN-2 or Type XHHW-2, single conductors in raceway.

C. Feeders in Cable Tray: Type XHHW-2, single conductors larger than No. 1/0 AWG, tray rated.

D. Branch Circuits, Including in Crawlspaces: Type THHN/THWN-2, single conductors in raceway.

E. Branch Circuits Concealed in Concrete, below Slabs-on-Grade, and underground: Type THHN/THWN-2 or Type XHHW-2, single conductors in raceway.

F. Cord Drops and Portable Appliance Connections: Type SOOW with ground, hard service cord with stainless-steel, wire-mesh, strain relief device at terminations to suit application.

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, which will not damage cables or raceway.

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-486B.

B. Make splices, terminations, and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.

C. Wiring at Outlets: Install conductor at each outlet, with at least 300 mm of slack.

3.5 IDENTIFICATION

A. Identify and color-code conductors and cables according to the "Identification for Electrical Systems" Section.

B. Identify each spare conductor at each end with identity number and location of other end of conductor and identify as spare conductor. Cap or tape spare conductors at each end.

3.6 FIRESTOPPING

A. Apply fire stopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly.

3.7 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. After installing conductors and cables and before electrical circuitry has been energized, test all conductors for compliance with requirements.

2. Perform each of the following visual and electrical tests:

a. Inspect exposed sections of conductor and cable for physical damage and correct connection according to the single-line diagram.
b. Test bolted connections for high resistance using one of the following:

1) A low-resistance ohmmeter.
2) Calibrated torque wrench.

c. Inspect compression applied connectors for correct cable match and indentation.
d. Inspect for correct identification.
e. Inspect cable jacket and condition.
f. Insulation-resistance test on each conductor with respect to ground and adjacent conductors. Apply a potential of 500-V dc for 300-V rated cable and 1000-V dc for 600-V rated cable for one-minute duration.
g. Continuity test on each conductor and cable.
h. Uniform resistance of parallel conductors.

B. Cables will be considered defective if they do not pass tests and inspections.

END OF SECTION

SECTION 26 05 26 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes grounding and bonding systems and equipment, plus the following special applications:

1. Underground distribution grounding.
2. Ground bonding common with lightning protection system.
3. Foundation steel electrodes.

1.2 ACTION SUBMITTALS

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

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Burndy; Part of Hubbell Electrical Systems.
2. ERICO International Corporation.
3. ILSCO.
4. O-Z/Gedney; a brand of Emerson Industrial Automation.
5. Thomas & Betts Corporation, a Member of the ABB Group.

2.2 SYSTEM DESCRIPTION

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.

2.3 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. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG conductor, 6 mm in diameter.
4. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
5. Bonding Jumper: Copper tape, braided conductors terminated with copper ferrules; 41 mm wide and 1.6 mm thick.

C. Grounding Bus: Predrilled rectangular bars of annealed copper, in cross section, with 7.14-mm holes spaced 28 mm apart. Stand-off insulators for mounting shall comply with UL 891 for use in switchboards, 600 V and shall be Lexan or PVC, impulse tested at 5000 V.

2.4 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.

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-type wire terminals, and long-barrel, two-bolt connection to ground bus bar.

2.5 GROUNDING ELECTRODES

A. Ground Rods: Copper-clad steel; 19 mm by 3 m.

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 copper conductor, No. 4/0 AWG minimum, unless noted otherwise on the drawing.

1. Bury at least 600 mm below grade.
2. Duct-Bank Grounding Conductor: Bury 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. Provide isolated ground bus in the panelboards and switchboards as required.

D. Grounding Bus: Install in electrical equipment rooms, in rooms housing service equipment, and elsewhere as indicated. Ground Bus shall be readily accessible and available for use by communications installers.

1. Install bus horizontally, on insulated spacers 50 mm minimum from wall, 150 mm above finished floor unless otherwise indicated. Minimum length of bus shall be 12”

E. Conductor Terminations and Connections:

1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
2. Underground Connections: Welded connectors or compression 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 or compression 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 SEPARATELY DERIVED SYSTEMS

A. Generator: Install grounding electrode(s) at the generator location. The electrode shall be connected to the equipment grounding conductor and to the frame of the generator.

3.4 GROUNDING UNDERGROUND DISTRIBUTION SYSTEM COMPONENTS

A. Comply with IEEE C2 grounding requirements.

B. 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 copper conductor not less than No. 2/0 AWG for ground ring and for taps to equipment grounding terminals. Bury ground ring not less than 150 mm from the foundation. This is the minimum requirement; provide additional grounding per local codes and utility requirements.

3.5 EQUIPMENT GROUNDING

A. Install insulated equipment grounding conductors with all feeders and branch circuits.

B. Isolated Grounding Receptacle Circuits: Install an insulated equipment grounding conductor connected to the receptacle grounding terminal. 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. Provide separate isolated grounding bus in panelboards and switchboards with isolated ground requirements. Provide isolated ground conductor in feeders.

C. 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.

3.6 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 Bonding Common with Lightning Protection System: Comply with NFPA 780 and UL 96 when interconnecting with lightning protection system. Bond electrical power system ground directly to lightning protection system grounding conductor at closest point to electrical service grounding electrode. Use bonding conductor sized same as system grounding electrode conductor and install in conduit.

C. Ground Rods: Drive rods until tops are 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.

D. 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.

E. 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 18 m apart.

F. Ground Ring: Install a grounding conductor, electrically connected to each building structure ground rod and to each steel corner column and every other steel column, extending around the perimeter of building.

1. Install copper conductor not less than No. 4/0 AWG for ground ring and for taps to building steel.
2. Bury ground ring not less than 600 mm from building's foundation.

G. Bond grounding conductor and grounding electrode conductor to reinforcing steel per National Electrical Code requirements.

3.7 FIELD QUALITY CONTROL

A. 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 service disconnect enclosure grounding terminal and as required by the National Electrical Code. 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.

B. Grounding system will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports.

D. Report measured ground resistances that exceed 10 ohms.

E. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Designer promptly and include recommendations to reduce ground resistance.

END OF SECTION

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. Section Includes:

1. Hangers and supports for electrical equipment and systems.
2. Construction requirements for concrete bases.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame Rating: Class 1.
2. Self-extinguishing according to ASTM D 635.

2.2 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

A. Steel Slotted Support Systems: Comply with MFMA-4 factory-fabricated components for field assembly.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. GS Metals Corp.
b. G-Strut.
c. Unistrut; Part of Atkore International.

2. Material: Galvanized steel.
3. Channel Width: minimum, other dimensions as required.
4. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
5. Channel Dimensions: Selected for applicable load criteria.

B. Conduit and Cable Support Devices: Steel hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.

C. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for nonarmored 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 made of malleable iron.

D. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M steel plates, shapes, and bars; black and galvanized.

E. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:

1. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel, for use in hardened portland cement concrete, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used. Plastic expansion anchors of any type shall not be used.
2. Concrete Inserts: Steel or malleable-iron, slotted support system units are similar to MSS Type 18 units and comply with MFMA-4 or MSS SP-58.
3. Clamps for Attachment to Steel Structural Elements: MSS SP-58 units are suitable for attached structural element.
4. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
5. Toggle Bolts: All-steel springhead type.
6. Hanger Rods: Threaded steel.

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 unless requirements in this Section are stricter.

B. Comply with requirements for raceways and boxes specified in Section 26 05 33 "Raceways and Boxes for Electrical Systems."

C. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for EMTs, IMCs, and RMCs as required by NFPA 70. Minimum rod size shall be 6 mm in diameter. Where conduit supported is 2-1/2” trade size or larger, minimum rod size shall be 3/8 inch (10mm) in diameter.

D. 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 25 percent in future without exceeding specified design load limits.

1. Secure raceways and cables to these supports with single-bolt conduit clamps.

E. Spring-steel clamps designed for supporting single conduits without bolts may be used for 38-mm and smaller raceways serving branch circuits and communication systems above suspended ceilings and for fastening such 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, EMTs, IMCs, and RMCs may be supported by openings through structure members, according to 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 90 kg.

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. To Steel: Beam clamps (MSS SP-58, Type 19, 21, 23, 25, or 27), complying with MSS SP-69.
6. To Light Steel: Sheet metal screws.
7. 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.

E. Drill holes for expansion anchors in concrete at locations and to depths that avoid the need for reinforcing bars. Anchoring in concrete with post tension cables not allowed unless noted otherwise.

3.3 CONCRETE BASES

A. Construct concrete bases of dimensions indicated but not less than 100 mm larger in both directions than supported unit, and so anchors will be a minimum of 10 bolt diameters from edge of the base. Bases shall be not less than 4 inches (100 mm) thick.

B. Use 20.7-MPa, 28-day compressive-strength concrete. Concrete materials, reinforcement, and placement requirements are specified in Division 03, Section “Miscellaneous Cast-in-Place Concrete”.

C. Anchor equipment to concrete base as follows:

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.

3.4 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 0.05 mm.

B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION

SECTION 26 05 33 - RACEWAYS 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. Section Includes:

1. Metal conduits, tubing, and fittings.
2. Nonmetal conduits, tubing, and fittings.
3. Metal wireways and auxiliary gutters.
4. Surface raceways.
5. Boxes, enclosures, and cabinets.
6. Handholes and boxes for exterior underground cabling.

1.3 DEFINITIONS

A. RMC: Galvanized rigid steel conduit/Rigid Metal Conduit.

B. GRS: See RMC.

1.4 ACTION SUBMITTALS

A. Product Data: For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.

B. Shop Drawings: For custom enclosures and cabinets. Include plans, elevations, sections, and attachment details.

PART 2 - PRODUCTS

2.1 METAL CONDUITS, TUBING, AND FITTINGS

A. Manufacturers: Subject to compliance with requirements, provide products by but not limited to one of the following:

1. Allied Tube & Conduit; a part of Atkore International.
2. Western Tube and Conduit Corporation.
3. Wheatland Tube Company.

B. Listing and Labeling: Metal conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. RMC: Comply with ANSI C80.1 and UL 6.

D. EMT: Comply with ANSI C80.3 and UL 797 – steel or aluminum.

E. FMC: Comply with UL 1; zinc-coated steel or aluminum.

F. LFMC: Flexible steel conduit with PVC jacket and complying with UL 360.

G. Fittings for Metal Conduit: Comply with NEMA FB 1 and UL 514B.

1. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 886 and NFPA 70.
2. Fittings for EMT shall be steel, set screw or compression type.
3. Expansion Fittings: PVC or steel to match conduit type, complying with UL 651, rated for environmental conditions where installed, and including flexible external bonding jumper.

H. Joint Compound for RMC: Approved, as defined in NFPA 70, by authorities having jurisdiction for use in conduit assemblies, and compounded for use to lubricate and protect threaded conduit joints from corrosion and to enhance their conductivity.

2.2 NONMETALLIC CONDUITS, TUBING, AND FITTINGS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. CANTEX INC.
2. Carlon: Thomas & Betts Corporation,

B. Listing and Labeling: Nonmetallic conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. RNC: Type EPC-40-PVC, complying with NEMA TC 2 and UL 651 unless otherwise indicated.

D. Fittings for RNC: Comply with NEMA TC 3; match to conduit or tubing type and material.

E. Solvents and Adhesives: As recommended by conduit manufacturer.

2.3 METAL WIREWAYS AND AUXILIARY GUTTERS

A. Metal wireways are **not allowed** unless shown on the drawings. Refer to Part 3.2.

B. Manufacturers: Subject to compliance with requirements, provide products by but not limited to one of the following:

1. B-line, an Eaton business.
2. Hoffman; a brand of Pentair Equipment Protection.
3. Square D.

C. Description: Sheet metal, complying with UL 870 and NEMA 250, Type 1, Type 3R, Type 4, or Type 12 as required for application, and sized according to NFPA 70.

1. Metal wireways installed outdoors shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

D. Fittings and Accessories: Include covers, 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 or Flanged-and-gasketed type unless otherwise indicated.

F. Finish: Manufacturer's standard enamel finish.

2.4 SURFACE RACEWAYS

A. Listing and Labeling: Surface raceways and tele-power poles shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Surface Metal Raceways: Galvanized steel with snap-on covers complying with UL 5. Manufacturer's standard enamel finish in color selected by Architect.

1. Manufacturers: Subject to compliance with requirements, provide products by but not limited to one of the following:

    a. Hubbell Incorporated; Wiring Device-Kellems.
    b. Panduit Corp.
    c. Wiremold / Legrand.

C. Surface Nonmetallic Raceways: Two- or three-piece construction, complying with UL 5A, and manufactured of rigid PVC with texture and color selected by Architect from manufacturer's standard colors. Product shall comply with UL 94 V-0 requirements for self-extinguishing characteristics.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Hubbell Incorporated.
    b. Panduit Corp.
    c. Wiremold / Legrand.

2.5 BOXES, ENCLOSURES, AND CABINETS

A. Manufacturers: Subject to compliance with requirements, provide products by but not limited to one of the following:

1. Crouse-Hinds, an Eaton business.
2. EGS/Appleton Electric.
3. O-Z/Gedney; a brand of Emerson Industrial Automation.
4. RACO; Hubbell.

B. General Requirements for Boxes, Enclosures, and Cabinets: Boxes, enclosures, and cabinets installed in wet locations shall be listed for use in wet locations.

C. Sheet Metal Outlet and Device Boxes: Comply with NEMA OS 1 and UL 514A.

D. Cast-Metal Outlet and Device Boxes: Comply with NEMA FB 1, ferrous alloy, Type FD, with gasketed cover.

E. Nonmetallic Outlet and Device Boxes: Comply with NEMA OS 2 and UL 514C.

F. Luminaire Outlet Boxes: Nonadjustable, designed for attachment of luminaire weighing 23 kg. Outlet boxes designed for attachment of luminaires weighing more than 23 kg shall be listed and marked for the maximum allowable weight.

G. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.

H. Cast-Metal Access, Pull, and Junction Boxes: Comply with NEMA FB 1 and UL 1773, galvanized, cast iron with gasketed cover.

I. Box extensions used to accommodate new building finishes shall be of same material as recessed box.

J. Device Box Dimensions: 100 mm square by 60 mm deep.

K. Gangable boxes are allowed where multiple wiring devices require it.

L. Hinged-Cover Enclosures: Comply with UL 50 and NEMA 250, Type 1, Type 3R, Type 4, or Type 12 as required by location with continuous-hinge cover with flush latch unless otherwise indicated.

1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
2. Interior Panels: Steel; all sides finished with manufacturer's standard enamel.

M. Cabinets:

1. NEMA 250, Type 1, Type 3R, or Type 12 as required by location. 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.
6. Nonmetallic cabinets shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.6 HANDHOLES AND BOXES FOR EXTERIOR UNDERGROUND WIRING

A. General Requirements for Handholes and Boxes:

1. Boxes and handholes for use in underground systems shall be designed and identified as defined in NFPA 70, for intended location and application.
2. Boxes installed in wet areas shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Polymer-Concrete Handholes and Boxes with Polymer-Concrete Cover: Molded of sand and aggregate, bound together with polymer resin, and reinforced with steel, fiberglass, or a combination of the two.

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. Oldcastle Precast, Inc.
b. Quazite: Hubbell Power Systems, Inc.

2. Standard: Comply with SCTE 77.
3. Configuration: Designed for flush burial with open bottom unless otherwise indicated.

4. Cover: Weatherproof, secured by tamper-resistant bolts and having structural load rating consistent with enclosure and handhole location.
5. Cover Finish: Nonskid finish shall have a minimum coefficient of friction of 0.50.
6. Cover Legend: Molded lettering, "ELECTRIC" or as noted.
7. Conduit Entrance Provisions: Conduit-terminating fittings shall mate with entering ducts for secure, fixed installation in enclosure wall.
8. Handholes 300 mm Wide by 600 mm Long and Larger: Have inserts for cable racks and pulling-in irons installed before concrete is poured.

2.7 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 an 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. Above-ground Outdoors: Apply raceway products as specified below unless otherwise indicated:

1. Exposed Conduit: RMC, unless noted otherwise.
2. Concealed Conduit, Aboveground: RMC, unless noted otherwise.
3. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
4. Boxes and Enclosures, Aboveground: NEMA 250, Type 3R.

B. Above-ground Indoors: Apply raceway products as specified below unless otherwise indicated:

1. Exposed, Not Subject to Severe Physical Damage: EMT.
2. Exposed and Subject to Severe Physical Damage: RMC. Raceway locations include the following:

    a. Loading dock.
    b. Corridors used for traffic of mechanized carts, forklifts, and pallet-handling units.

3. Concealed in Ceilings and Interior Walls and Partitions: EMT.
4. Encased in concrete or mortar: RNC.
5. Damp or Wet Locations: RMC.
6. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment):

    a. Dry Locations: FMC.
    b. Dusty, Damp, or Wet Locations: LFMC.

7. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4 in institutional and commercial kitchens and damp or wet locations.

C. Underground: Apply raceway products as specified below unless otherwise indicated:

1. Below slab, within the building footprint: RNC, Type EPC-40-PVC.
2. Underground, beyond the building footprint: RNC, Type EPC-40-PVC.
3. Underground, within 5 feet (1.5 m) of roadways, driveways, or parking areas: RNC, Type EPC-80-PVC
4. Underground, intended for use by wiring exceeding 600 volts to ground: RNC, Type EPC-80-PVC, unless specifically noted to be Schedule 40.

D. Minimum Raceway Size: 21-mm trade size 21.

1. Underground, beyond the building footprint: 1-inch (25-mm) trade size 27.

E. Raceway Fittings: Compatible with raceways and suitable for use and location.

1. Rigid Steel Conduit: Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.
2. EMT: Use set-screw or compression type steel fittings. Comply with NEMA FB 2.10.
3. Flexible Conduit: Use only fittings listed for use with flexible conduit. Comply with NEMA FB 2.20.

F. Install surface raceways only where indicated on Drawings.

3.2 INSTALLATION

A. Comply with all applicable NECA Standards for installation requirements except where requirements on Drawings or in this section are stricter. Comply with NFPA 70 Chapter 3.

B. Where above slab, maintain not less than 150 mm separation from parallel runs of flues and pipes. Below slab, maintain not less than 12 inches (300 mm) separation from parallel runs of pipes. Install horizontal raceway runs above water and steam piping.

C. Complete raceway installation before starting conductor installation.

D. Comply with requirements in "Hangers and Supports for Electrical Systems" for hangers and supports.

E. Arrange stub-ups so curved portions of bends are not visible above finished slab.

F. Install no more than the equivalent of three 90-degree bends in any conduit run except for control wiring conduits, for which fewer bends are allowed. Support within 300 mm of changes in direction.

G. Field bending shall be according to NFPA 70 minimum radii requirements. Use only equipment specifically designed and manufacturer approved for material and site involved. Open flame shall not be used.

H. Conceal conduit and EMT within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.

I. Support conduit within 300 mmof enclosures to which attached.

J. Raceways Underground, beyond the building footprint:

1. Minimum cover depth, measured from finished grade to top of raceway, shall comply with NFPA 70 Article 300 and the following:

a. Wiring over 600 volts: 42 inches (1065 mm) with warning tape.
b. Secondary wiring, between utility transformer and service entrance equipment: 24 inches (610 mm) with warning tape.

c. Within 5 feet (1.5 m) of roadways, driveways, and parking areas: 24 inches (610 mm) with warning tape.
d. Branch and feeder wiring: 18 inches (460 mm) with warning tape.

2. Where raceways cross between areas with different minimum cover depth requirements, such as at the edge of a parking area or leaving the building footprint, the transition shall occur in the less-strict area.
3. Arrange raceways to avoid areas planned for trees or large landscaping.
4. Where routed parallel with other underground system structures, maintain 5 feet (1.5 m) separation between raceway and foreign system structure.

K. Raceways Embedded in Slabs, within the building footprint:

1. Run conduit below reinforcement. Arrange raceways to cross building expansion joints at right angles with expansion fittings. In no case shall conduit be run in such a manner as to be exposed to saw cutting.
2. Transition from RNC to RMC before rising above floor.

a. Exception: Where raceway turns up concealed in masonry block walls and terminates at a flush-mounted device box not more than 48 inches (1220 mm) above finished floor, elbow fitting and vertical raceway shall be permitted to be Type EPC-80-PVC. Protect such installations from damage or obstruction by debris during installation of masonry.

L. Stub-ups to Above Recessed Ceilings:

1. Use EMT or RMC for raceways.
2. Use a conduit bushing or insulated fitting to terminate stub-ups not terminated in hubs or at enclosures.

M. 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.

N. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings.

O. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install bushings on conduits up to 35mm trade size and insulated throat bushings on 41-mm trade size and larger conduits terminated with locknuts. Install insulated throat metal grounding bushings on service conduits.

P. Install raceways square to the enclosure and terminate at enclosures with locknuts. Install locknuts hand tight plus 1/4 turn more.

Q. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure to assure a continuous ground path.

R. Cut conduit perpendicular to the length. For conduits 53-mm trade size and larger, use roll cutter or a guide to make cut straight and perpendicular to the length.

S. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 90-kg tensile strength. Leave at least 300 mm of slack at each end of pull wire and secure each end to adjacent structure. Cap underground raceways designated as spare above grade alongside raceways in use.

T. Surface Raceways:

1. Install surface raceway with a minimum 50-mmradius control at bend points.

2. Secure surface raceway with screws or other anchor-type devices at intervals not exceeding 1200 mm and with no less than two supports per straight raceway section. Support surface raceway according to manufacturer's written instructions. Tape, glue, and plastic expansion anchors are not acceptable support methods.

U. Install raceway sealing fittings at accessible locations according to NFPA 70 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 according to NFPA 70.

V. Install devices to seal raceway interiors at accessible locations. Locate seals so no fittings or boxes are between the seal and the following changes of environments. Seal the interior of all raceways at the following points:

1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
2. Where an underground service raceway enters a building or structure.
3. Where otherwise required by NFPA 70.

W. Comply with manufacturer's written instructions for solvent welding RNC and fittings.

X. Expansion-Joint Fittings:

1. Install in each run of aboveground RNC that is located where environmental temperature change may exceed 17 deg C and that has straight-run length that exceeds 7.6 m. Install in each run of aboveground RMC conduit that is located where environmental temperature change may exceed 55 deg C and that has straight-run length that exceeds 30 m.
2. Install expansion fittings at all locations where conduits cross building or structure expansion joints.
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 time of installation. Install conduit supports to allow for expansion movement.

Y. Flexible Conduit Connections: Comply with NEMA RV 3. Use a maximum of 1830 mm of flexible conduit for recessed and semi-recessed luminaires, 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.
3. Use FMC for recessed and semi-recessed luminaires.
4. Arrange flexible conduit to minimize torque force and strain on fittings.

Z. Mount boxes at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements. Install boxes with height measured to center of box unless otherwise indicated.

AA. 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 and plumb. Prepare block surfaces to provide a flat surface for a raintight connection between box and cover plate or supported equipment and box.

BB. Horizontally separate boxes mounted on opposite sides of walls so they are not in the same vertical channel. Reference drawing for additional information. Provide appropriately rated fire stopping and sound barrier for each box.

CC. Locate boxes so that cover or plate will not span different building finishes or interfere with trim installation.

DD. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for the purpose.

EE. Fasten junction and pull boxes to, or support from building structure. Do not support boxes by conduits.

FF. Junction and/or pull boxes, and wireways, shall not contain conductors from more than six line-to-neutral branch circuits (or an equivalent number of line-to-line circuits) unless indicated on the drawings or approved via written Request for Information (RFI).

1. Requests shall detail locations and sizes of all such large junction or pull boxes and wireways proposed and include the following:

    a. Explain the construction advantage which would be provided by use of such enclosures instead of individual raceways.
    b. Proposed conduits to be connected and circuits to be contained in each enclosure.
    c. Enclosure size, enclosure fill, and applicable ampacity adjustment factor calculations, all per NEC based on planned conduit and conductors.
    d. Note: Submit RFI prior to rough-in or ordering materials. RFI may not be approved even if calculations are compliant with Code.

2. Where wireways and large junction or pull boxes are installed, ensure the following:

    a. Branch circuits routed through a common junction or pull box shall not originate from more than one panelboard.
    b. Conductors shall be routed neatly and orderly, and associated ungrounded (hot) and grounded (neutral) on the same circuit shall be grouped per NEC 200.4 (exceptions to this Section shall not be utilized in this application).
    c. Conductors shall be clearly labeled, indicating panel and circuit number.
    d. Provide a typed directory affixed in a plastic sleeve to the outside of the enclosure indicating circuits present within the enclosure.

GG. Set metal floor boxes level and flush with finished floor surface.

HH. 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. Cover Requirements – Comply with the greatest requirements of NEC 300.5 and the following. Cover is to be measured from the top of the raceway to finished grade. Where not otherwise noted, minimum cover requirements shall be:

    a. Branch and Feeder Circuits Under Interior Building Slab: Fully below planned concrete thickness.
    b. Branch and Feeder Circuits under Driveways and Parking Areas: 24 inches (600 mm) with warning tape.
    c. Branch and Feeder Circuits at locations not specified above: 18 inches (450 mm) with warning tape.
    d. Secondary Service Entrance Circuits: 24 inches (600 mm) with warning tape.
    e. Primary Circuits over 600 volts: 42 inches (1050 mm) or as directed by Utility Provider, whichever is greater, with warning tape.

2. Sleeve conduits where they pass through foundation walls above footings. Do not route through footings. Coordinate lowered footings with General Contractor where required to maintain minimum cover requirements throughout.
3. Excavate trench bottom to provide firm and uniform support for conduit. Prepare trench bottom as specified in "Earth Moving" for pipe less than 150 mm in nominal diameter. Slope trench bottom to allow conduits to drain.
4. Install backfill as specified in Division 31, Section "Earth Moving."
5. 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 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."
6. Install manufactured duct elbows for stub-ups at poles and equipment and at building entrances through floor unless otherwise indicated. Encase elbows for stub-up ducts throughout length of elbow.
7. Install manufactured rigid steel conduit elbows for stub-ups at poles and equipment and at building entrances through floor.

    a. Couple steel conduits to ducts with adapters designed for this purpose, and encase coupling with 75 mm of concrete for a minimum of 300 mm on each side of the coupling.
    b. For stub-ups at equipment mounted on outdoor concrete bases and where conduits penetrate building foundations, extend steel conduit horizontally a minimum of 1500 mm from edge of foundation or equipment base. Install insulated grounding bushings on terminations at equipment.

8. Underground Warning Tape: Comply with requirements in Division 26, Section "Identification for Electrical Systems." Where required, install at least 6 inches (150 mm) below finished grade, directly above conduit, with at least 12 inches (300 mm) of fill between tape and top 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 12.5-mm sieve to 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 25 mm above finished grade.

D. Install handholes with bottom not less than 4” (100 mm) below frost line.

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 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 AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies.

3.6 FIRESTOPPING

A. Install firestopping at penetrations of fire-rated floor and wall assemblies.

3.7 PROTECTION

A. Protect coatings, finishes, and cabinets from damage and deterioration.

1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
2. Repair damage to PVC coatings, galvanized finishes, or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION

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. This Section includes the following:

1. Conduit, ducts, and duct accessories for direct-buried and concrete-encased duct banks, and in single duct runs.
2. Handholes and boxes.
3. Manholes.

1.3 DEFINITION

A. RNC: Rigid nonmetallic conduit.

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, boxes.
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. Ladder details.
5. Grounding details.
6. Dimensioned locations of cable rack inserts, pulling-in and lifting irons, and sumps.
7. Joint details.

C. Shop Drawings for Factory-Fabricated Handholes and 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 and handholes, as required by ASTM C 858.

F. Qualification Data: For professional engineer and testing agency.

G. Source quality-control test reports.

H. Field quality-control test reports.

1.5 QUALITY ASSURANCE

A. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated.

B. Comply with ANSI C2.

C. 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 Owner no fewer than two days in advance of proposed interruption of electrical service.
2. Do not proceed with interruption of electrical service without Architect's or Owner's written permission.

1.8 COORDINATION

A. Coordinate layout and installation of ducts, manholes, handholes, and 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 manholes, handholes, and 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 described below 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 5 percent 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. 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. ARNCO Corp.
2. Beck Manufacturing.
3. Cantex, Inc.
4. CertainTeed Corp.; Pipe & Plastics Group.
5. Condux International, Inc.
6. ElecSys, Inc.
7. Electri-Flex Company.
8. IPEX Inc.
9. Lamson & Sessions; Carlon Electrical Products.
10. Manhattan/CDT; a division of Cable Design Technologies.
11. Spiraduct/AFC Cable Systems, Inc.

D. 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.

E. Duct Accessories:

1. Duct Separators: Factory-fabricated rigid PVC interlocking spacers, sized for type and sizes of ducts with which used, and selected 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 BOXES

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. Carder Concrete Products.
2. Christy Concrete Products.
3. Elmhurst-Chicago Stone Co.
4. Oldcastle Precast Group.
5. Riverton Concrete Products; a division of Cretex Companies, Inc.
6. Utility Concrete Products, LLC.
7. Utility Vault Co.
8. Wausau Tile, Inc.

C. Comply with ASTM C 858 for design and manufacturing processes.

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 box.

1. Frame and Cover: Weatherproof cast-iron frame, with cast-iron cover with recessed cover hook eyes and tamper-resistant, captive, cover-securing bolts.
2. Frame and Cover: Weatherproof steel frame, with steel cover with recessed cover hook eyes and tamper-resistant, captive, cover-securing bolts.
3. Frame and Cover: Weatherproof steel frame, with hinged steel access door assembly with tamper-resistant, captive, cover-securing 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 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." As indicated for each service.
7. Configuration: Units shall be designed for flush burial and have 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 BOXES OTHER THAN PRECAST CONCRETE

A. Description: Comply with SCTE 77.

1. Color: Green.
2. Configuration: Units shall be designed for flush burial and have 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." "TELEPHONE." Or As indicated for each service.
6. Direct-Buried Wiring Entrance Provisions: Knockouts equipped with insulated bushings or end-bell fittings, selected 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 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.

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.

E. High-Density Plastic Boxes: Injection molded of high-density polyethylene or copolymer-polypropylene. Cover shall be 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. Nordic Fiberglass, Inc.
    c. PenCell Plastics.

2.5 PRECAST MANHOLES

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. Carder Concrete Products.
2. Christy Concrete Products.
3. Elmhurst-Chicago Stone Co.
4. Oldcastle Precast Group.
5. Riverton Concrete Products; a division of Cretex Companies, Inc.
6. Utility Concrete Products, LLC.
7. Utility Vault Co.
8. Wausau Tile, Inc.
9. Or approved equal.

C. Comply with ASTM C 858 and with interlocking mating sections, complete with accessories, hardware, and features.

1. 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 roofs of manholes, 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.

2. Duct Entrances in Manhole 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 manholes to facilitate racking of cable.

D. Concrete Knockout Panels: 1-1/2 to 2 inches thick, for future conduit entrance and sleeve for ground rod.

E. Joint Sealant: Asphaltic-butyl material with adhesion, cohesion, flexibility, and durability properties necessary to withstand maximum hydrostatic pressures at the installation location with the ground-water level at grade.

2.6 UTILITY STRUCTURE ACCESSORIES

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. Bilco Company (The).
2. Campbell Foundry Company.
3. Carder Concrete Products.
4. Christy Concrete Products.
5. East Jordan Iron Works, Inc.
6. Elmhurst-Chicago Stone Co.
7. McKinley Iron Works, Inc.
8. Neenah Foundry Company.
9. NewBasis.

10. Oldcastle Precast Group.
11. Osburn Associates, Inc.
12. Pennsylvania Insert Corporation.
13. Riverton Concrete Products; a division of Cretex Companies, Inc..
14. Strongwell Corporation; Lenoir City Division.
15. Underground Devices, Inc.
16. Utility Concrete Products, LLC.
17. Utility Vault Co.
18. Wausau Tile, Inc.

C. Manhole Frames, Covers, and Chimney Components: Comply with structural design loading specified for manhole.

1. Frame and Cover: Weatherproof, gray cast iron complying with ASTM A 48/A 48M, Class 30B with milled cover-to-frame bearing surfaces; diameter, 29 inches.

   a. Cover Finish: Nonskid finish shall have a minimum coefficient of friction of 0.50.
   b. Special Covers: Recess in face of cover designed to accept finish material in paved areas.

2. Cover Legend: Cast in. Selected to suit system.

   a. Legend: "ELECTRIC-LV" for duct systems with power wires and cables for systems operating at 600 V and less.
   b. Legend: "ELECTRIC-HV" for duct systems with medium-voltage cables.
   c. Legend: "SIGNAL" for communications, data, and telephone duct systems.

3. Manhole Chimney Components: Precast concrete rings with dimensions matched to those of roof opening.

   a. Mortar for Chimney Ring and Frame and Cover Joints: Comply with ASTM C 270, Type M, except for quantities less than 2.0 cu. ft. where packaged mix complying with ASTM C 387, Type M, may be used.

D. Manhole Sump Frame and Grate: ASTM A 48/A 48M, Class 30B, gray cast iron.

E. 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.

F. Pulling Eyes in Nonconcrete Walls: Eyebolt with reinforced fastening, 1-1/4-inch- diameter eye, rated 2500-lbf minimum tension.

G. 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.

H. Bolting Inserts for Concrete Utility Structure Cable Racks and Other Attachments: Flared, threaded inserts of noncorrosive, chemical-resistant, nonconductive thermoplastic material; 1/2-inch ID by 2-3/4 inches deep, flared to 1-1/4 inches minimum at base.

1. Tested Ultimate Pullout Strength: 12,000 lbf minimum.

I. Expansion Anchors for Installation after Concrete Is Cast: Zinc-plated, carbon-steel-wedge type with stainless-steel expander clip with 1/2-inch bolt, 5300-lbf rated pullout strength, and minimum 6800-lbf rated shear strength.

J. Cable Rack Assembly: Steel, hot-dip galvanized, except insulators.

1. Stanchions: T-section or channel; 2-1/4-inch nominal size; punched with 14 holes on 1-1/2-inch centers for cable-arm attachment.
2. Arms: 1-1/2 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.

K. Cable Rack Assembly: Nonmetallic. Components fabricated from nonconductive, fiberglass-reinforced polymer.

1. Stanchions: Nominal 36 inches high by 4 inches wide, with minimum of 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.

L. 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. Capable of withstanding temperature of 300 deg F 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.

M. Fixed Manhole Ladders: Arranged for attachment to roof or wall and floor of manhole. Ladder and mounting brackets and braces shall be fabricated from hot-dip galvanized steel.

N. Portable Manhole Ladders: UL-listed, heavy-duty fiberglass specifically designed for portable use for access to electrical manholes. Minimum length equal to distance from deepest manhole floor to grade plus 36 inches. One required.

O. Cover Hooks: Heavy duty, designed for lifts 60 lbf and greater. Two required.

2.7 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 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 the 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 UNDERGROUND DUCT APPLICATION

A. Ducts for Electrical Cables Over 600 V: RNC, NEMA Type EPC-40 EB-20-PVC, in concrete-encased duct bank, unless otherwise indicated.

B. Ducts for Electrical Feeders 600 V and Less: RNC**,** NEMA Type EPC-40 or EB-20-PVC, in concrete-encased duct bank, unless otherwise indicated.

C. Ducts for Electrical Feeders 600 V and Less: RNC**,** NEMA Type EPC-80 or EPC-40-PVC, in direct-buried duct bank, unless otherwise indicated.

D. Ducts for Electrical Branch Circuits: RNC, NEMA Type EPC-40-PVC, in direct-buried duct bank, unless otherwise indicated.

E. Underground Ducts for Telephone, Communications, or Data Circuits: RNC, NEMA Type EPC-40-PVC, in direct-buried duct bank, unless otherwise indicated.

F. Underground Ducts Crossing Driveways Roadways and Railroads: RNC, NEMA Type EPC-40-PVC, encased in reinforced concrete.

3.2 UNDERGROUND ENCLOSURE APPLICATION

A. Handholes and 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: Precast concrete, AASHTO HB 17, H-20 structural load rating.
3. Units in Sidewalk and Similar Applications with a Safety Factor for Nondeliberate Loading by Vehicles: Precast concrete, AASHTO HB 17, H-10 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 vertical loading.

3.3 EARTHWORK

A. Excavation and Backfill: Comply with Division 22 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 topsoiling, fertilizing, liming, seeding, sodding, sprigging, and mulching. Comply with Division 32 Sections "Turfs and Grasses" and "Plants."

D. Cut and patch existing pavement in the path of underground ducts and utility structures according to Division 01 Section "Cutting and Patching."

3.4 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 48 inches, 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 Manholes and 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 feet 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 feet 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/Common Work Results for Communications/Common Work Results for Electronic Safety and Security."

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 5 spacers per 20 feet 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 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 5 spacers per 20 feet 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 22 Section "Earth Moving" for pipes less than 6 inches in nominal diameter.
4. Install backfill as specified in Division 22 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 22 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.

3.5 INSTALLATION OF CONCRETE MANHOLES, HANDHOLES, AND BOXES

A. Cast-in-Place Manhole Installation:

1. Finish interior surfaces with a smooth-troweled finish.
2. Windows for Future Duct Connections: Form and pour concrete knockout panels 1-1/2 to 2 inches thick, arranged as indicated.
3. Cast-in-place concrete, formwork, and reinforcement are specified in Division 03 Section "Cast-in-Place Concrete."

B. Precast Concrete Handhole and Manhole 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.

C. Elevations:

1. Manhole Roof: Install with rooftop at least 15 inches below finished grade.
2. Manhole Frame: In paved areas and trafficways, set frames flush with finished grade. Set other manhole frames 1 inch above finished grade.
3. Install handholes with bottom below the frost line, 18” below grade.
4. Handhole Covers: In paved areas and trafficways, set surface flush with finished grade. Set covers of other handholes 1 inch above finished grade.
5. Where indicated, cast handhole cover frame integrally with handhole structure.

D. Drainage: Install drains in bottom of manholes where indicated. Coordinate with drainage provisions indicated.

E. Manhole Access: Circular opening in manhole roof; sized to match cover size.

1. Manholes with Fixed Ladders: Offset access opening from manhole centerlines to align with ladder.
2. Install chimney, constructed of precast concrete collars and rings to support frame and cover and to connect cover with manhole roof opening. Provide moisture-tight masonry joints and waterproof grouting for cast-iron frame to chimney.

F. Waterproofing: Apply waterproofing to exterior surfaces of manholes and handholes after concrete has cured at least three days. Waterproofing materials and installation are specified in Division 07 Section "Elastomeric Sheet Waterproofing." 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 days.

G. Dampproofing: Apply dampproofing to exterior surfaces of manholes and handholes after concrete has cured at least three days. Dampproofing materials and installation are specified in Division 07 Section "Bituminous Dampproofing." After ducts have been connected and grouted, and before backfilling, dampproof joints and connections and touch up abrasions and scars. Dampproof exterior of manhole chimneys after mortar has cured at least three days.

H. Hardware: Install removable hardware, including pulling eyes, cable stanchions, and cable arms, and insulators, as required for installation and support of cables and conductors and as indicated.

I. Fixed Manhole Ladders: Arrange to provide for safe entry with maximum clearance from cables and other items in manholes.

J. 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 anchors for each cable stanchion.

K. Warning Sign: Install "Confined Space Hazard" warning sign on the inside surface of each manhole cover.

3.6 INSTALLATION OF HANDHOLES AND BOXES OTHER THAN PRECAST CONCRETE

A. Install handholes and boxes level and plumb and with orientation and depth coordinated with connecting ducts to minimize bends and deflections required for proper entrances. Use 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 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: In paved areas and trafficways, set so cover surface will be flush with finished grade. Set covers of other handholes 1 inch above finished grade.

D. Install handholes and boxes with bottom below the frost line, 18” 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 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, 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.

3.7 GROUNDING

A. Ground underground ducts and utility structures according to Division 26 Section "Grounding and Bonding for Electrical Systems."

3.8 FIELD QUALITY CONTROL

A. Perform the following tests and inspections and prepare test reports:

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 80 percent 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.

3.9 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

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. This Section includes the following:

1. Identification for raceway and metal-clad cable.
2. Identification for conductors and communication and control cable.
3. Underground-line warning tape.
4. Warning labels and signs.
5. Instruction signs.
6. Equipment identification labels.
7. Miscellaneous identification products.

1.3 SUBMITTALS

A. Product Data: For each electrical identification product indicated.

B. 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 NFPA 70.

B. Comply with 29 CFR 1910.145.

1.5 COORDINATION

A. Coordinate identification names, abbreviations, colors, and other features with requirements in the Contract Documents, 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 CONDUCTOR AND COMMUNICATION- AND CONTROL-CABLE IDENTIFICATION MATERIALS

A. Color-Coding Conductor Tape: Colored, self-adhesive vinyl tape not less than 3 mils thick by 1 to 2 inches wide.

B. Marker Tapes: Vinyl or vinyl-cloth, self-adhesive wraparound type, with circuit identification legend machine printed by thermal transfer or equivalent process.

C. Write-On Tags: Polyester tag, 0.010 inch thick, with corrosion-resistant grommet and polyester or nylon tie for attachment to conductor or cable.

1. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.

2.2 UNDERGROUND-LINE WARNING TAPE

A. Description: Permanent, bright-colored, continuous-printed, polyethylene tape.

1. Not less than 6 inches wide by 4 mils thick.
2. Compounded for permanent direct-burial service.
3. Embedded continuous metallic strip or core.
4. Printed legend shall indicate type of underground line.

2.3 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.

2.4 INSTRUCTION SIGNS

A. Engraved laminated acrylic or melamine plastic, minimum 1/16 inch thick for signs up to 20 sq. in. and 1/8 inch 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.

2.5 EQUIPMENT IDENTIFICATION LABELS

A. 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.

2.6 MISCELLANEOUS IDENTIFICATION PRODUCTS

A. Cable Ties: Fungus-inert, self-extinguishing, 1-piece, self-locking, Type 6/6 nylon cable ties.

1. Minimum Width: 3/16 inch.

2. Tensile Strength: 50 lb, minimum.
3. Temperature Range: Minus 40 to plus 185 deg F.
4. Color: Black, except where used for color-coding.

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 APPLICATION

A. Accessible Raceways and Cables of Auxiliary Systems: Identify the following systems with color-coded, self-adhesive vinyl tape applied in bands or snap-around, color-coding bands:

1. Fire Alarm System: Red.
2. Fire-Suppression Supervisory and Control System: Red and yellow.
3. Combined Fire Alarm and Security System: Red and blue.
4. Security System: Blue and yellow.
5. Mechanical and Electrical Supervisory System: Green and blue.
6. Telecommunication System: Green and yellow.
7. Control Wiring: Green and red.

B. Power-Circuit Conductor Identification: For primary and secondary conductors No. 1/0 AWG and larger in vaults, pull and junction boxes, manholes, and handholes use color-coding conductor tape. Identify source and circuit number of each set of conductors. For single conductor cables, identify phase in addition to the above.

C. Branch-Circuit Conductor Identification: Where there are conductors for more than three branch circuits in same junction or pull box, use color-coding conductor tape. Identify each ungrounded conductor according to source and circuit number.

D. Conductors to Be Extended in the Future: Attach write-on tags to conductors and list source and circuit number.

E. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, signal, sound, intercommunications, voice, and data 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 Operation and Maintenance Manual.

F. Locations of Underground Lines: Identify with underground-line warning tape for power, lighting, communication, and control wiring and optical fiber cable. Install underground-line warning tape for both direct-buried cables and cables in raceway.

G. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Comply with 29 CFR 1910.145 and apply self-adhesive warning labels. Identify system voltage with black letters on an orange background. Apply to exterior of door, cover, or other access.

1. 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.

2. Equipment Requiring Workspace Clearance According to NFPA 70: Unless otherwise indicated, apply to door or cover of equipment but not on flush panelboards and similar equipment in finished spaces.

H. Instruction Signs:

1. Operating Instructions: 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.
2. Emergency Operating Instructions: Install instruction signs with white legend on a red background with minimum 3/8-inch- high letters for emergency instructions at equipment used for power transfer.

I. Equipment Identification Labels: On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and 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: Self-adhesive, engraved, laminated acrylic or melamine label. Unless otherwise indicated, provide a single line of text with 1/2-inch- high letters on 1-1/2-inch-high label; where 2 lines of text are required, use labels 2 inches high.
b. Outdoor Equipment: Engraved, laminated acrylic or melamine label.
c. Elevated Components: Increase sizes of labels and letters to those appropriate for viewing from the floor.

2. Equipment to Be Labeled:

a. Panelboards, electrical cabinets, and enclosures.
b. Access doors and panels for concealed electrical items.
c. Transformers.
d. Disconnect switches.
e. Enclosed circuit breakers.
f. Motor starters.
g. Push-button stations.
h. Contactors.
i. Remote-controlled switches, dimmer modules, and control devices.

3.2 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 non adhesive signs and plastic labels with screws and auxiliary hardware appropriate to the location and substrate.

F. System Identification Color Banding for Raceways and Cables: Each color 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 maximum intervals in straight runs, and at 25-foot maximum intervals in congested areas.

G. Color-Coding for Phase and Voltage Level Identification, 600 V and Less: Use the colors listed below for ungrounded service feeder branch-circuit service, feeder, and branch-circuit conductors.

1. Color shall be factory applied or, for sizes larger than No. 10 AWG if authorities having jurisdiction permit, field applied.
2. Colors for 208/120-V Circuits:

    a. Phase A: Black.
    b. Phase B: Red.
    c. Phase C: Blue.

3. Colors for 480/277-V Circuits:

    a. Phase A: Brown.
    b. Phase B: Orange.
    c. Phase C: Yellow.

4. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches 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.

H. Aluminum Wraparound Marker Labels and Metal Tags: Secure tight to surface of conductor or cable at a location with high visibility and accessibility.

I. Underground-Line Warning Tape: During backfilling of trenches install continuous underground-line warning tape directly above line at 6 to 8 inches below finished grade. Use multiple tapes where width of multiple lines installed in a common trench or concrete envelope exceeds 16 inches overall.

J. Painted Identification: Prepare surface and apply paint according to Division 09 painting Sections.

END OF SECTION

SECTION 26 09 23 - 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. Section Includes:

1. Time switches.
2. Photoelectric switches.
3. Standalone daylight-harvesting switching controls.
4. Indoor occupancy sensors.
5. Outdoor motion sensors.
6. Lighting contactors.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Show installation details for occupancy and light-level sensors.

1. Interconnection diagrams showing field-installed wiring.
2. Include diagrams for power, signal, and control wiring.

1.4 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For each type of lighting control device to include in emergency, operation, and maintenance manuals.

PART 2 - PRODUCTS

2.1 TIME SWITCHES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Intermatic, Inc.
2. NSi Industries LLC.

B. Electronic Time Switches: Solid state, programmable, with alphanumeric display; complying with UL 917.

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. Contact Configuration: DPST.
3. Contact Rating: 20-A ballast load, 20-A LED rating, 120-/240-V ac.
4. Programs: Eight on-off set points on a 24-hour schedule and an annual holiday schedule that overrides the weekly operation on holidays.
5. Circuitry: Allow connection of a photoelectric relay as substitute for on-off function of a program on selected channels.
6. Astronomic Time: Selected channels.
7. Automatic daylight savings time changeover.
8. Battery Backup: Not less than seven days reserve, to maintain schedules and time clock.

C. Electromechanical-Dial Time Switches: Comply with UL 917.

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. Contact Configuration: DPST.
3. Contact Rating: 20-A ballast load, 20-A LED rating, 120/240/277-V ac.
4. Circuitry: Allows connection of a photoelectric relay as a substitute for the on-off function of a program.
5. Astronomic time dial.
6. Eight-Day Program: Uniquely programmable for each weekday and holidays.
7. Skip-a-day mode.
8. Wound-spring reserve carryover mechanism to keep time during power failures, minimum of 16 hours.

2.2 OUTDOOR PHOTOELECTRIC SWITCHES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Cooper Industries, Inc.
2. Intermatic, Inc.
3. NSi Industries LLC.

B. Description: Solid state, with DPST dry contacts rated for 4625-VA tungsten or 1800-VA inductive, 20-A LED rating, to operate connected load, complying with UL 773.

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. Light-Level Monitoring Range: 16.14 to 108 lux, with an adjustment for turn-on and turn-off levels within that range.
3. Time Delay: Thirty-second minimum, to prevent false operation.
4. Lightning Arrester: Air-gap type.
5. Mounting: Twist lock complying with NEMA C136.10, with base.

2.3 INDOOR OCCUPANCY SENSORS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Cooper Industries, Inc.
2. Lithonia Lighting; Acuity Brands Lighting, Inc.
3. Lutron Electronics Co., Inc.

4. Philips Lighting Controls.
5. Sensor Switch, Inc.
6. Watt Stopper.

B. General Requirements for Sensors: Wall- or ceiling-mounted, solid-state indoor occupancy sensors with a separate power pack.

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. Operation: Unless otherwise indicated, turn lights on when coverage area is occupied, and turn them off when unoccupied; with a time delay for turning lights off, adjustable over a minimum range of 1 to 15 minutes.
3. Sensor Output: Contacts rated to operate the connected relay, complying with UL 773A. Sensor is powered from the power pack.
4. Power Pack: Dry contacts rated for 20-A ballast load at 120- and 277-V ac, 20-A LED rating, for 13-A tungsten at 120-V ac, and for 1 hp at 120-V ac. Sensor has 24-V dc, 150-mA, Class 2 power source, as defined by NFPA 70.
5. Mounting:

    a. Sensor: Suitable for mounting in any position on a standard outlet box.
    b. Relay: Externally mounted through a 13-mm knockout in a standard electrical enclosure.
    c. Time-Delay and Sensitivity Adjustments: Recessed and concealed behind hinged door.

6. Indicator: Digital display, to show when motion is detected during testing and normal operation of sensor.
7. Bypass Switch: Override the "on" function in case of sensor failure.
8. Automatic Light-Level Sensor: Adjustable from 21.5 to 2152 lux; turn lights off when selected lighting level is present.

C. Dual-Technology Type: Ceiling mounted; detect occupants in coverage area using PIR and ultrasonic detection methods. The particular technology or combination of technologies that control on-off functions is selectable in the field by operating controls on unit.

1. Sensitivity Adjustment: Separate for each sensing technology.
2. Detector Sensitivity: Detect occurrences of 150-mm-minimum movement of any portion of a human body that presents a target of not less than 232 sq. cm, and detect a person of average size and weight moving not less than 305 mm in either a horizontal or a vertical manner at an approximate speed of 305 mm/s.
3. Detection Coverage (Standard Room): Detect occupancy anywhere within a circular area of 93 sq. m when mounted on a 2440-mm-high ceiling.

2.4 SWITCHBOX-MOUNTED OCCUPANCY SENSORS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Lithonia Lighting; Acuity Brands Lighting, Inc.
2. Lutron Electronics Co., Inc.
3. Sensor Switch, Inc.
4. Watt Stopper.

B. General Requirements for Sensors: Automatic-wall-switch occupancy sensor, suitable for mounting in a single gang switchbox.

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. Operating Ambient Conditions: Dry interior conditions, 0 to 49 deg C.

3. Switch Rating: Not less than 800-VA fluorescent at 120 V, 1200-VA fluorescent at 277 V, and 800-W incandescent, 600VA LED rating.

C. Wall-Switch Sensor Tag WS1:

1. Standard Range: 180-degree field of view, field adjustable from 180 to 40 degrees; with a minimum coverage area of 196 sq. m.
2. Sensing Technology: Dual technology - PIR and ultrasonic.
3. Switch Type: SP, field selectable automatic "on," or manual "on" automatic "off."
4. Voltage: Match the circuit voltage; dual-technology type.
5. Ambient-Light Override: Concealed, field-adjustable, light-level sensor from 108 to 1600 lux. The switch prevents the lights from turning on when the light level is higher than the set point of the sensor.
6. Concealed, field-adjustable, "off" time-delay selector at up to 30 minutes.
7. Concealed "off" time-delay selector at 30 seconds, and 5, 10, and 20 minutes.
8. Adaptive Technology: Self-adjusting circuitry detects and memorizes usage patterns of the space and helps eliminate false "off" switching.

2.5 LIGHTING CONTACTORS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Eaton Corporation.
2. Siemens.
3. Square D.

B. Description: Electrically operated and electrically held, combination-type lighting contactors 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). Minimum 30 amperes, match circuit voltage.
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, matching the NEMA type specified for the enclosure.

2.6 CONDUCTORS AND CABLES

A. Power Wiring to Supply Side of Remote-Control Power Sources: Not smaller than No. 12 AWG. Comply with requirements in Section 26 05 19 "Low-Voltage Electrical Power Conductors and Cables."

B. Classes 2 and 3 Control Cable: Multi-conductor cable with stranded-copper conductors not smaller than No. 18 AWG. Compatible with manufacturers requirement

C. Class 1 Control Cable: Multi-conductor cable with stranded-copper conductors not smaller than No. 16 AWG. Compatible with manufacturers requirement

PART 3 - EXECUTION

3.1 SENSOR INSTALLATION

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 systems, and partition assemblies.

B. 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 Section 26 05 19 "Low-Voltage Electrical Power Conductors and Cables." Minimum conduit size is 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 Section 26 05 53 "Identification for Electrical Systems."

1. Identify controlled circuits in lighting contactors.
2. Identify circuits or luminaires 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 tests and inspections with the assistance of a factory-authorized service representative:

1. Operational Test: After installing time switches and sensors, and after electrical circuitry has been energized, start units to confirm proper unit operation.
2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

B. Lighting control devices will be considered defective if they do not pass tests and inspections.

C. Prepare test and inspection reports.

3.6 ADJUSTING

A. Occupancy Adjustments: When requested within 3 months from date of Substantial Completion, provide on-site assistance in adjusting sensors to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.

1. For occupancy and motion sensors, verify operation at outer limits of detector range. Set time delay to suit Owner's operations.
2. For daylighting controls, adjust set points and deadband controls to suit Owner's operations.
3. Align high-bay occupancy sensors using manufacturer's laser aiming tool.

3.7 DEMONSTRATION

A. Coordinate demonstration of products specified in this Section with demonstration requirements for low-voltage, programmable lighting control systems specified in Section 26 09 43.13 "Addressable-Fixture Lighting Controls" and Section 26 09 43.23 "Relay-Based Lighting Controls."

B. Train Owner's maintenance personnel to adjust, operate, and maintain lighting control devices.

END OF SECTION

SECTION 26 22 00 - LOW-VOLTAGE TRANSFORMERS

PART 1 - GENERAL

1.1 SUMMARY

A. The transformers and all components shall be designed, manufactured and tested in accordance with the latest applicable standards of ANSI, NEMA and UL.

B. Transformers shall meet the requirements of the most current version of federal law 10 CFR Part 431 "Energy Efficiency Program for Certain Commercial and Industrial Equipment".

C. To ensure the onsite performance of the transformer, efficiencies shall be shown that are measured per a specific, provided testing procedure which shows one-line diagram of the testing environment, lists the equipment & calibration dates, and be available per appointment to have customer witness testing of the transformers. Efficiencies shall be measured with linear (resistive), 50% linear & 50 % non-linear (computer), and an all non-linear loading on a representative 75KVA transformer to show performance in a variety of electrical environments.

1.2 REFERENCE STANDARDS

A. The transformer and all components shall be designed, manufactured and tested in accordance with the latest applicable standards of ANSI, NEMA, NFPA, IEEE and UL, specifically, but not limited to:

1. Comply with NFPA 70	National Electrical Code
2. ANSI / NEMA ST-20	Dry Type Transformers for General Applications
3. IEEE C 57.110-1998	IEEE Recommended Practice for establishing transformer capability when feeding non-sinusoidal load currents.
4. IEEE 1100	Recommended Practice for Power and Grounding Sensitive Electronic Equipment
5. Federal Register 10 CFR Part 431	Energy Conservation Program for Commercial and Industrial Equipment: Energy Conservation Standards for Distribution Transformers
6. UL Standard 1561	Standard for Dry-Type General Purpose and Power Transformers

1.3 SUBMITTALS

A. Product Data:

1. Outline dimensions and weights
2. Ratings including:

    a. kVA
    b. Primary and secondary voltage
    c. Taps (number of and configuration)
    d. Design impedance
    e. Insulation class and temperature rise

f. NEMA ST-20 audible sound level.

3. Product data sheets
4. Linear (resistive) load efficiencies at.
5. Connection diagrams.
6. Seismic certification and equipment anchorage details.

1.3 REGULATORY REQUIREMENTS

A. All transformers shall be UL listed and bear the UL label tested per UL standard 1561 “Standard for Dry-Type General Purpose and Power Transformers”.

1.4 DELIVERY, STORAGE AND HANDLING

A. Equipment shall be handled and stored in accordance with manufacturer’s instructions. These instructions shall be included with the equipment at time of shipment.

B. Deliver transformers individually wrapped for protection and mounted on shipping skids.

C. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or plastic cover to protect units from dirt, water, construction debris, and traffic.

D. Do not stack transformers

E. Temporary Heating: Apply temporary heating according to manufacturer’s written instructions within the enclosure of each ventilated-type unit throughout periods during which equipment is not energized and is not in a space that is continuously under normal control of temperature and humidity.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to project provide products by but not limited to one of the following:

1. Eaton Corporation / Cutler-Hammer.
2. Siemens
3. Schneider Electric/Square D
4. Hammond Power Solutions
5. ABB/General Electric.

2.2 RATINGS

A. kVA and voltage ratings shall be as shown on the drawings.

B. Transformers shall be designed for continuous operation at rated kVA, for 24 hours a day, 365 days a year operation, with normal life expectancy as defined in ANSI C57.96.

C. Transformer sound levels shall not exceed ANSI and NEMA levels for self-cooled ratings.

D. Transformers shall meet the requirements of the most current version of federal law 10 CFR Part 431 "Energy Efficiency Program for Certain Commercial and Industrial Equipment" as listed below:

3-PH kVA	Minimum Efficiency
15	97.89
30	98.23
45	98.40
75	98.60
112.5	98.74
150	98.83
225	98.94
300	99.02
500	99.14
750	99.23
1000	99.28

2.3 CONSTRUCTION

A. Core and Coil Assemblies:

1. Transformer core shall be constructed with high-grade, non-aging electrical steel with high magnetic permeability, and low hysteresis and eddy current losses. Maximum magnetic flux densities shall be substantially below the saturation point. The transformer core volume shall allow efficient transformer operation at 10% above the nominal tap voltage. The core laminations shall be tightly clamped and compressed.
2. The core and coil assembly shall be impregnated with non-hydroscopic, thermosetting varnish and cured to reduce hot spots and seal out moisture. The internal core and coil assembly shall be installed on vibration-absorbing pads.
3. All insulation materials shall be flame-retardant and shall not support combustion as defined in ASTM Standard Test Method D635.
4. Transformers shall be of two-winding construction. The primary winding shall be a delta, three-wire connection and the secondary winding shall be wye with a wye field connection.
5. Primary and secondary windings shall be wound of electrical grade aluminum with continuous wound construction. All terminals and bussing shall be aluminum. The lug bodies are aluminum but designed and rated to accept CU/AL.
6. Transformers shall be insulated with a UL recognized 220 degrees C insulation system. Winding temperature rise shall not exceed 150C.
7. Required performance shall be obtained without exceeding the above indicated temperature rise in a 40 degrees C maximum ambient, and a 24 hour average ambient of 30 degrees C.
8. The neutral bus shall be configured to accommodate 200% of the rated current
9. Windings shall have a BIL of 10 KV.

B. Taps:

1. Three-phase transformers rated 15 through 225 kVA shall be provided with six 2-1/2% taps, two above and four below rated primary voltage. Three-phase transformers rated greater than 225 kVA shall be provided with manufacturer's standard taps for that rating.

C. Wiring / Terminations:

1. Transformer primary and secondary terminal provisions shall allow the field installed cable lugs to be front-connected and easily accessible when the front cover of the transformer is removed. Front access may be limited for sizes 225 kVA through 500 kVA. The lug bodies are aluminum but designed and rated to accept CU/AL conductors.
2. External cable shall be rated 75 degrees C for ventilated designs. Connectors should be selected on the basis of the type and cable size used to wire the specific transformer.

D. Enclosure:

1. The enclosure shall be made of heavy-gauge steel and shall be finished utilizing a continuous process of degreasing, cleaning, and phosphatizing, followed by electrostatic deposition of a polymer polyester powder coating and baking.
2. Enclosures shall be finished with ANSI 61 color.
3. All transformers shall be equipped with a wiring compartment suitable for conduit entry and large enough to allow convenient wiring. Wire bending space shall be in compliance with the NEC.
4. The maximum temperature of the enclosure shall not exceed 90 degrees C (50 degrees C above a 40 degree C ambient).
5. Ventilation shall be natural convection. Forced air ventilation of any kind is not acceptable.
6. The core of the transformer shall be visibly grounded to the enclosure using copper conductors sized per NFPA 70 Table 250.122.
7. Enclosure construction shall be ventilated, NEMA 2, drip-proof, with lifting provisions. All ventilation openings shall be protected against falling dirt.
8. Where indicated, provide weather shields for outdoor units. When properly installed, weather shields shall provide a NEMA 3R enclosure rating.

2.4 WARRANTY

A. Manufacturer shall provide a 1-year warranty as a minimum standard for transformers included in the scope of this specification. Warranty shall start at substantial completion of project.

PART 3 - EXECUTION

3.1 FACTORY TESTING

A. The following standard factory tests shall be performed on the equipment provided under this section. All tests shall be in accordance with the latest version of ANSI and NEMA standards.

1. Ratio tests at the rated voltage connection and at all tap connections.
2. Polarity and phase relation tests on the rated voltage connection.
3. Applied potential tests.
4. Induced potential test.
5. No-load and excitation current at rated voltage on the rated voltage connection.

B. Per manufacturer's ISO 9001 standard, transformer manufacturer shall maintain a permanent record of the results of the above tests. Provide written test reports for review.

3.2 INSTALLATION OF TRANSFORMERS

A. Install transformers as indicated, complying with manufacturer's written instructions, applicable requirements of NEC, NEMA, ANSI and IEEE standards, and in accordance with recognized industry practices to ensure that products fulfill requirements.

B. Coordinate transformer installation work with electrical raceway and wire/cable work, as necessary for proper interface.

C. Install units on vibration mounts; comply with manufacturer's indicated installation method if any.

D. Connect transformer units to electrical wiring system; comply with requirements of other Electrical Work sections.

3.3 GROUNDING

A. Provide equipment grounding connections, sufficiently tight to assure permanent and effective ground. Provide a separately derived grounding point for each transformer. Extend grounding conductor to an earth electrode and building steel. Where available, connect to a cold water main.

3.4 TESTING

A. Prior to energizing, perform all manufacturer recommended tests.

B. Upon completion of installation of transformers, energize primary circuit at rated voltage and frequency from normal power source and test transformers, including, but not limited to, audible sound levels, to demonstrate capability and compliance with requirements. Where possible, correct malfunctioning units at the site, then retest to demonstrate compliance; otherwise, remove and replace with new units and proceed with retesting. Test voltage and connect tap setting for an acceptable no load voltage level.

3.5 ADJUSTING

A. Record transformer secondary voltage at each unit for at least 48 hours of typical occupancy load. Adjust transformer taps to provide optimum voltage conditions at secondary terminals. Optimum is defined as not exceeding nameplate voltage plus 10 percent and not being lower than nameplate voltage minus 3 percent at maximum load conditions. Submit recording and tap settings as test results. After adjustment, record transformer secondary voltage at each unit for at least 48 additional hours of typical occupancy. Re-adjust as required.

B. Output Settings Report: Prepare a written report recording final output voltages and tap settings.

3.6 CLEANING

A. Vacuum dirt and debris; do not use compressed air to assist in cleaning.

END OF SECTION

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. Panelboards.
2. Lighting and appliance branch-circuit panelboards.

1.3 DEFINITIONS

A. ATS: Acceptance testing specification.

B. GFCI: Ground-fault circuit interrupter.

C. GFEP: Ground-fault equipment protection.

D. MCCB: Molded-case circuit breaker.

E. SPD: Surge protective device.

F. VPR: Voltage protection rating.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of panelboard.

1. Include materials, switching and overcurrent protective devices, SPDs, accessories, and components indicated.
2. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.

1.5 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. Keys: Two spares for each type of panelboard cabinet lock.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: ISO 9001 or 9002 certified.

1.7 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.

1.8 WARRANTY

A. Manufacturer's Warranty: Manufacturer agrees to repair or replace panelboards that fail in materials or workmanship within specified warranty period.

1. Panelboard Warranty Period: 12 months from date of Substantial Completion.

B. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace SPD that fails in materials or workmanship within specified warranty period.

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

PART 2 - PRODUCTS

2.1 PANELBOARDS COMMON REQUIREMENTS

A. Fabricate and test panelboards according to IEEE 344 to withstand seismic forces at project location.

B. 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.

C. 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.

D. Comply with NEMA PB 1, UL 50, UL 67, Federal Specification W-P-115C.

E. Comply with NFPA 70.

F. Enclosures: Flush and Surface-mounted, dead-front cabinets.

1. Rated for environmental conditions at installed location.

a. Indoor Dry and Clean Locations: NEMA 250, Type 1, flush or surface-mounted as indicated on drawings.
b. Outdoor Locations: NEMA 250, Type 3R, surface-mounted.
c. Wash-Down Areas: NEMA 250, Type 4X, stainless steel, surface-mounted.
d. Other Wet or Damp Indoor Locations: NEMA 250, Type 4, surface-mounted.
e. Indoor Locations Subject to Dust, Falling Dirt, and Dripping Noncorrosive Liquids: NEMA 250, Type 12, surface-mounted.
f. Kitchens: NEMA 250, Type 1, flush-mounted. Provide with stainless steel door where located in dishwashing spaces or noted on drawings.

2. Height: Enclosures up to 90 inches (2.3 m) may be utilized if space permits.
3. Hinged Front Cover: Entire front trim hinged to box and with standard door within hinged trim cover. Trims shall cover all live parts and shall have no exposed hardware.
4. 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: Galvanized steel.

G. Incoming Mains:

1. Location: Top or Bottom per installation requirements.
2. Main Breaker: Main lug interiors up to 400 amperes shall be field convertible to main breaker.

H. Phase, Neutral, and Ground Buses:

1. Material: Hard-drawn copper, 98 percent conductivity.
    a. Bus shall be fully rated the entire length.

2. Interiors shall be factory assembled into a unit. Replacing switching and protective devices shall not disturb adjacent units or require removing the main bus connectors.
3. Equipment Ground Bus: Adequate for feeder and branch-circuit equipment grounding conductors; bonded to box.
4. Isolated Ground Bus: Adequate for branch-circuit isolated ground conductors; insulated from box.
5. Full-Sized Neutral: Equipped with full-capacity bonding strap for service entrance applications. Mount electrically isolated from enclosure. Do not mount neutral bus in gutter.

I. Conductor Connectors: Suitable for use with conductor material and sizes.

1. Material: Hard-drawn copper, 98 percent conductivity.
2. Terminations shall allow use of 75 deg C rated conductors without derating.
3. Size: Lugs suitable for indicated conductor sizes, with additional gutter space, if required, for larger conductors.
4. Main and Neutral Lugs: Mechanical type, with a lug on the neutral bar for each pole in the panelboard.
5. Ground Lugs and Bus-Configured Terminators: Mechanical type, with a lug on the bar for each pole in the panelboard.
6. Feed-Through Lugs: Mechanical type, suitable for use with conductor material. Locate at opposite end of bus from incoming lugs or main device.
7. Subfeed (Double) Lugs: Mechanical type suitable for use with conductor material. Locate at same end of bus as incoming lugs or main device.

J. NRTL Label: Panelboards shall be labeled by an NRTL acceptable to authority having jurisdiction for use as service equipment where noted on drawing or required by code with one or more main service disconnecting and overcurrent protective devices.

K. Future Devices: Panelboards shall have mounting brackets, bus connections, filler plates, and necessary appurtenances required for future installation of devices.

1. Percentage of Future Space Capacity: 20 percent minimum include spaces and spares as noted on drawing.

L. Panelboard Short-Circuit Current Rating: Fully rated to interrupt symmetrical short-circuit current available at terminals. Assembly listed by an NRTL for 100 percent interrupting capacity. Series rated not allowed.

2.2 PERFORMANCE REQUIREMENTS

A. Surge Suppression: Factory installed as an integral part of indicated panelboards, complying with UL 1449 current edition.

2.3 POWER PANELBOARDS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Eaton.
2. Siemens Energy.
3. Square D; by Schneider Electric.
4. ABB/General Electric.

B. Panelboards: NEMA PB 1, distribution type.

C. Doors: Door-in-door construction with concealed hinges; secured with multipoint latch with tumbler lock; keyed alike. Outer door shall permit full access to the panel interior. Inner door shall permit access to breaker operating handles and labeling, but current carrying terminals and bus shall remain concealed.

1. Doors: Concealed hinges secured with multipoint latch with tumbler lock; keyed alike.

D. Mains: Circuit breaker or Lugs only as noted on drawing.

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 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: as required.

2.4 OVERCURRENT PROTECTIVE DEVICES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Eaton.
2. Siemens Energy.
3. Square D; by Schneider Electric.
4. ABB/General Electric.

B. MCCB: Comply with UL 489, with interrupting capacity to meet available fault currents.

1. Thermal-Magnetic Circuit Breakers:

a. Inverse time-current element for low-level overloads.
b. Instantaneous magnetic trip element for short circuits.
c. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.

2. GFCI Circuit Breakers: Single- and double-pole configurations with Class A ground-fault protection (6-mA trip).
3. GFEP Circuit Breakers: Class B ground-fault protection (30-mA trip).

4. Subfeed Circuit Breakers: Vertically mounted.
5. MCCB Features and Accessories:

    a. Standard frame sizes, trip ratings, and number of poles.
    b. Breaker handle indicates tripped status.
    c. UL listed for reverse connection without restrictive line or load ratings.
    d. Lugs: Mechanical style, suitable for number, size, trip ratings, and conductor materials.
    e. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and HID lighting circuits.
    f. Ground-Fault Protection: Integrally mounted relay and trip unit with adjustable pickup and time-delay settings, push-to-test feature, and ground-fault indicator.
    g. Shunt Trip: Voltage as required trip coil energized from separate circuit, set to trip at 75 percent of rated voltage.
    h. Handle Clamp: Loose attachment, for holding circuit-breaker handle in on position.

2.5 IDENTIFICATION

A. Panelboard Label: Manufacturer's name and trademark, voltage, amperage, number of phases, and number of poles shall be located on the interior of the panelboard door.

B. Breaker Labels: Faceplate shall list current rating, UL and IEC certification standards, and AIC rating.

C. Circuit Directory: Directory card inside panelboard door, mounted in transparent card holder.

1. Circuit directory shall identify specific purpose with detail sufficient to distinguish it from all other circuits.

2.6 ACCESSORY COMPONENTS AND FEATURES

A. Accessory Set: Include tools and miscellaneous items required for overcurrent protective device test, inspection, maintenance, and operation.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify actual conditions with field measurements prior to ordering panelboards to verify that equipment fits in allocated space in, and comply with, minimum required clearances specified in NFPA 70.

B. Receive, inspect, handle, and store panelboards according to NEMA PB 1.1.

C. Examine panelboards before installation. Reject panelboards that are damaged, rusted, or have been subjected to water saturation.

D. Examine elements and surfaces to receive panelboards for compliance with installation tolerances and other conditions affecting performance of the Work.

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

3.2 INSTALLATION

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. Comply with NECA 1.

C. Install panelboards and accessories according to NEMA PB 1.1.

D. Equipment Mounting:

1. Install floor mounted panelboards on cast-in-place concrete equipment base(s) nominal 4". Concrete compressive strength equal to floor concrete.
2. Attach panelboard to the vertical finished or structural surface behind the panelboard. Provide support backing for gypsum board walls.

E. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from panelboards.

F. Mounting Height for Wall-Mounted Equipment:
1. In Dwelling Units: Mount top-most operable device at 48 inches (1220 mm) above finished floor.
2. In other than Dwelling Units:
   a. Enclosures not greater than 54 inches (1370 mm) tall, mount top of enclosure 72 inches (1830 mm) above finished floor.
   b. Enclosures greater than 54 inches (1370 mm) tall, mount bottom of enclosure 18 inches (460 mm) above finished floor.
   c. Notwithstanding the above, ensure top-most operable device is mounted not greater than 79 inches (2000 mm) above finished floor, per NFPA 70 Article 240.24.

G. Mount panelboard cabinet plumb and rigid without distortion of box.

H. Mount recessed panelboards with fronts uniformly flush with wall finish and mating with back box.

I. Mounting panelboards with space behind is recommended for damp, wet, or dirty locations. The steel slotted supports in the following paragraph provide an even mounting surface and the recommended space behind to prevent moisture or dirt collection. Mount panelboards to steel slotted supports 16 mm in depth. Orient steel slotted supports vertically.

J. Install overcurrent protective devices and controllers not already factory installed.

1. Set field-adjustable, circuit-breaker trip ranges.
2. Tighten bolted connections and circuit breaker connections using calibrated torque wrench or torque screwdriver per manufacturer's written instructions.

K. Make grounding connections and bond neutral for services and separately derived systems to ground. Make connections to grounding electrodes, separate grounds for isolated ground bars, and connections to separate ground bars.

L. Install filler plates in unused spaces.

M. Stub six 21-EMT empty conduits from panelboard into accessible ceiling space or space designated to be ceiling space in the future. Stub six 21-EMT empty conduits into raised floor space or below slab not on grade.

N. Arrange conductors in gutters into groups and bundle and wrap with wire ties after completing load balancing.

3.3 IDENTIFICATION

A. Identify field-installed conductors, interconnecting wiring, and components; install warning signs complying with requirements in Section 26 05 53 "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. Handwritten directories are not acceptable. Install directory inside panelboard door.

C. Panelboard Nameplates: Label each panelboard with a black with white lettering laminated nameplate.

D. Device Nameplates: Label each branch circuit device in power panelboards with a black with white lettering laminated nameplate.

E. Install warning signs complying with requirements in National Electrical Code and local codes.

3.4 FIELD QUALITY CONTROL

A. Acceptance Testing Preparation:

1. Test insulation resistance for each panelboard bus, component, connecting supply, feeder, and control circuit.
2. Test continuity of each circuit.

B. Tests and Inspections:

1. Perform each visual and mechanical inspection and electrical test for low-voltage air circuit breakers stated in NEMA PB 1.1-2013, “General Instructions for Proper Installation, Operation, and Maintenance of Panelboards Rated 600 Volts or Less” prior to energizing.

2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

C. Panelboards will be considered defective if they do not pass tests and inspections.

D. Prepare test and inspection reports. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

3.5 ADJUSTING

A. Adjust moving parts and operable components to function smoothly and lubricate as recommended by manufacturer.

B. Set field-adjustable circuit-breaker trip ranges.

C. Load Balancing: After Substantial Completion, but not more than 60 days after Final Acceptance, measure load balancing and make circuit changes. Prior to making circuit changes to achieve load balancing, inform.

1. Measure loads during period of normal facility operations.

2. Perform circuit changes to achieve load balancing outside normal facility operation schedule or at times directed by the Owner. Avoid disrupting services such as fax machines and on-line data processing, computing, transmitting, and receiving equipment.
3. After changing circuits to achieve load balancing, recheck loads during normal facility operations. Record load readings before and after changing circuits to achieve load balancing.
4. Tolerance: Maximum difference between phase loads, within a panelboard, shall not exceed 20 percent.

3.6 PROTECTION

A. Temporary Heating: Prior to energizing panelboards, apply temporary heat to maintain temperature according to manufacturer's written instructions.

END OF SECTION

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. Section Includes:

1. Receptacles and associated device plates.
2. Receptacles with integral SPDs.
3. Receptacles with integral GFCI protection.
4. Receptacles with integral USB charging ports.
5. Isolated-ground receptacles.
6. Tamper-resistant receptacles.
7. Weather-resistant receptacles.
8. Pendant cord-connector devices.
9. Toggle switches.

1.3 DEFINITIONS

A. GFCI: Ground-fault circuit interrupter.

B. Pigtail: Short lead used to connect a device to a branch-circuit conductor.

C. SPD: Surge Protective Device.

D. TVSS: Transient voltage surge suppressor. See SPD.

E. USB: Universal Serial Bus

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: Physical samples of all standard device and trim plate finishes.

1.5 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For wiring devices to include in all manufacturers' packing-label warnings and instruction manuals that include labeling conditions.

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. SPD, USB, and GFCI enabled Receptacles: One for every 25 of each type and color installed, but no fewer than two of each.
2. Wiring devices utilizing modular plug-in connectors: One for every 25 of each type and color installed, but no fewer than two of each.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Eaton (Wiring Devices - Arrow Hart).
2. Leviton Manufacturing Co., Inc.
3. Pass & Seymour; Legrand North America, LLC.
4. Wiring Device-Kellems; Hubbell Incorporated, Commercial and Industrial.

B. Source Limitations: Obtain each type of wiring device and associated wall plate from single source from single manufacturer.

2.2 GENERAL WIRING-DEVICE REQUIREMENTS

A. Wiring Devices, Components, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application. All wiring devices shall be minimum specification grade. Commercial grade not allowed.

B. Construction of thermoplastic polymer body with brass current-carrying and grounding contacts and parts. Structural parts and terminal screws shall be plated steel unless indicated otherwise. Wiring terminals shall accept No. 14-10 AWG solid conductors.

C. Comply with NFPA 70.

D. Devices that are manufactured for use with modular plug-in connectors may be substituted under the following conditions:

1. Connectors shall comply with UL 2459 and shall be made with stranded building wire.
2. Devices shall comply with the requirements in this Section.

E. Devices for Owner-Furnished Equipment:

1. Receptacles: Match plug configurations.
2. Cord and Plug Sets: Match equipment requirements.

2.3 STRAIGHT-BLADE RECEPTACLES

A. Specification Grade Convenience Receptacles, 125 V, 20 A, two-pole, three-wire: Duplex configuration except where indicated to be single configuration. Comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498, and FS W-C-596. Federal Specification grade. Commercial grade not allowed.

B. Equipment Connection Receptacles: Voltage, amperage, poles, and configurations as indicated on the drawings. Match plug configuration. Grounding type. Comply with NEMA WD 1, NEMA WD 6, UL 498, and FS W-C-596 where applicable.

C. Specialty Device Types and Functions: Where indicated on the drawings, specification or hospital grade straight-blade receptacles shall be provided with a combination of one or more of the following integral features, compliant with the additional standards listed:

1. Tamper Resistant: Equipped with internal shutters that operate only when a compatible plug is inserted in the receptacle. Comply with UL 498 Supplement SD and marked TR.
2. Decorator Style: Smooth face configured for use with a single-opening wall plate.
3. Weather Resistant: Equipped with corrosion resistant metal parts and suitable nylon parts for use in damp or wet locations and exposed to sunlight. Comply with UL 498 Supplement SE and marked WR.
4. Isolated-Ground: Equipment grounding contacts shall be connected only to the green grounding screw terminal of the device and with inherent electrical isolation from mounting strap. Isolation shall be integral to receptacle construction and not dependent on removable parts.
5. USB: Equipped with dual USB ports, one Type A and one Type C, 5 V dc, 5.1 A per receptacle (minimum), 15 W per port, 25 W total minimum, in addition to duplex 125 V, 20 A line-voltage receptacles. Comply with UL 1310, USB 3.1 compatible.
6. GFCI: Equipped with 4-6mA trip GFCI protection. Comply with UL 943 Class A. Include self-testing function with LED indicator light to show when device has malfunctioned and no longer provides proper GFCI protection. Device shall fail ‘off.’ Non-feed thru type, except where indicated to provide protection to downstream devices. Shall also be Weather Resistant type when utilized outdoors or in damp or wet locations.
7. SPD or TVSS: Equipped with integral SPD in line to ground, line to neutral, and neutral to ground. LED indicator light and audible indication. Metal-oxide varistors; with a nominal clamp-level rating of 400 V and minimum single transient pulse energy dissipation of 240 J, according to IEEE C62.41.2 and IEEE C62.45. Comply with UL 1449.
8. Controlled: Split-circuit duplex receptacle. One outlet shall be marked with the word “Controlled” and the “controlled receptacle marking symbol” defined by NFPA 70 and connected to the control system. The second outlet shall not be marked and be connected to normal power.

2.4 PENDANT CORD-CONNECTOR DEVICES

A. Description:

1. Matching, locking-type plug and receptacle body connector, heavy-duty grade.
2. NEMA WD 6 Configurations L5-20P and L5-20R.
3. Comply with UL 498 and FS W-C-596.
4. Body: Thermoplastic polymer with screw-open, cable-gripping jaws and provision for attaching external cable grip.
5. External Cable Grip: Woven wire-mesh type made of high-strength, galvanized-steel wire strand, matched to cable diameter, and with attachment provision designed for corresponding connector.

2.5 CORD AND PLUG SETS

A. Description:

1. Match voltage and current ratings and number of conductors to requirements of equipment being connected.
2. Cord: Rubber-insulated, stranded-copper conductors, with Type SOW-A jacket; with green-insulated grounding conductor and ampacity of at least 130 percent of the equipment rating.
3. Plug: Thermoplastic polymer body and integral cable-clamping jaws. Match cord and receptacle type for connection.

2.6 TOGGLE SWITCHES

A. 120/277 V, 20 A, grounding type, rated for 1 HP load at 120 V, 2 HP load at 277 V. 1500 V withstand rating. Comply with NEMA WD 1, UL 20, and FS W-S-896. Federal Specification grade. Commercial grade not allowed. Single-Pole, Two-Pole, Three-Way, and Four-Way function configurations as required.

B. Specialty Device Types and Functions: Where indicated on the drawings, switches shall be provided with a combination of one or more of the following integral features:

1. Pilot-Light: Single-Pole, with LED-lighted handle, function as indicated on drawings.
2. Key-Operated: Single pole, with factory-supplied key in lieu of switch handle. Key all alike. Furnish two keys per switch location to the owner, not less than ten (10) keys.
3. Decorator Style: Smooth face configured for use with a single-opening wall plate.

2.7 WALL PLATES

A. Single and combination types shall match corresponding wiring devices and be obtained from the same manufacturer as the associated wiring device.

1. Plate-Securing Screws: Metal with head color to match plate finish.
2. Material for Finished Spaces: 0.035-inch (1-mm-) thick, satin finished, Type 302 stainless steel, unless directed by the Architect to be smooth, high-impact thermoplastic.
3. Material for Unfinished Spaces: Galvanized steel suitable for application.
4. Material for Damp Locations: Cast aluminum with spring-loaded lift cover, and listed and labeled for use in wet and damp locations.

B. Wet-Location, Weatherproof Cover Plates: NEMA 250, complying with UL 514D “Weatherproof While-In-Use Extra-Duty” Type 3R, weather-resistant, die-cast aluminum hood with gasket and lockable cover. Plastic or thermoplastic products are not acceptable.

2.8 SERVICE POLES

A. Description:

1. Factory-assembled and -wired units to extend power and voice and data communication from distribution wiring concealed in ceiling to devices or outlets in pole near floor.
2. Poles: Nominal 65-mm-square cross section, with height adequate to extend from floor to at least 150 mm above ceiling, and with separate channels for power wiring and voice and data communication cabling.
3. Mounting: Ceiling trim flange with concealed bracing arranged for positive connection to ceiling supports; with pole foot and carpet pad attachment.
4. Aluminum. Finish as selected by Architect.

5. Wiring: Sized for minimum of five No. 12 AWG power and ground conductors and a minimum of four, four-pair, Category 6A cables.
6. Power Receptacles: Two duplex, 125 V, 20 A, straight-blade convenience receptacles complying with requirements in this Section.
7. Voice and Data Communication Outlets: Blank insert with bushed cable opening.

2.9 FINISHES

A. Device Color:

1. Wiring Devices Connected to Normal Power System: 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. SPD Devices: Blue.
4. Isolated-Ground Receptacles: As specified above, with orange triangle on face.
5. Poke-through Assemblies Cover: As selected by Architect

B. Wall Plate Color: For thermoplastic covers, match device color.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with NECA 1, including mounting heights listed in that standard, unless otherwise indicated.

B. Coordination with Other Trades:

1. Protect installed devices and their boxes. 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 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 right 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. Pigtailing existing conductors is permitted, provided the outlet box is large enough.

D. Device Installation:

1. Replace devices that have been in temporary use during construction and that 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 152 mm in length.
5. When there is a choice, use side wiring with binding-head screw terminals. Wrap solid conductor tightly clockwise, two-thirds to three-fourths of the way around terminal screw.
6. Use a torque screwdriver when a torque is recommended or required by manufacturer.
7. When conductors larger than No. 10 AWG are installed, splice No. 10 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.

E. Receptacle Orientation:

1. Install ground pin of vertically mounted receptacles up, and on horizontally mounted receptacles to the right.
2. Install hospital-grade receptacles in patient-care areas with the ground pin or neutral blade at the top.

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. Coordinate with Architect. Install poke-through assemblies by core-drill after walls are framed. Do not cast in place. Provide access panel in ceiling below where ceiling does not provide access to the poke-through assembly.

3.2 GFCI RECEPTACLES

A. Install non-feed-through-type GFCI receptacles where protection of downstream receptacles is not required.

3.3 IDENTIFICATION

A. Comply with Section 26 05 53 "Identification for Electrical Systems."

B. Identify each receptacle with panelboard identification and circuit number. Use machine printed label with black-filled lettering on face of plate, and durable wire markers or tags inside outlet boxes.

3.4 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. In health care facilities, prepare reports that comply with NFPA 99.
2. Test Instruments: Use instruments that comply with UL 1436.
3. Test Instrument for Convenience Receptacles: Digital wiring analyzer with digital readout or illuminated digital-display 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 higher than 5 percent is unacceptable.
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. 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 hospital-grade receptacles for the retention force of the grounding blade according to NFPA 99.

D. Wiring device will be considered defective if it does not pass tests and inspections.

E. Prepare test and inspection reports.

END OF SECTION

SECTION 26 28 13 - FUSES

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. Cartridge fuses rated 600 V and less for use in switches.

1.3 SUBMITTALS

A. Product Data: Include the following for each fuse type indicated:

1. Dimensions and manufacturer's technical data on features, performance, electrical characteristics, and ratings.
2. Let-through current curves for fuses with current-limiting characteristics.
3. Time-current curves, coordination charts and tables, and related data.
4. Fuse size for elevator feeders and elevator disconnect switches.

B. Ambient Temperature Adjustment Information: If ratings of fuses have been adjusted to accommodate ambient temperatures, provide list of fuses with adjusted ratings.

1. For each fuse having adjusted ratings, include location of fuse, original fuse rating, local ambient temperature, and adjusted fuse rating.
2. Provide manufacturer's technical data on which ambient temperature adjustment calculations are based.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain fuses from a single manufacturer.

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 NEMA FU 1.

D. Comply with NFPA 70.

1.5 PROJECT CONDITIONS

A. Where ambient temperature to which fuses are directly exposed is less than 40 deg F or more than 100 deg F, apply manufacturer's ambient temperature adjustment factors to fuse ratings.

1.6 COORDINATION

A. Coordinate fuse ratings with utilization equipment nameplate limitations of maximum fuse size.

1.7 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Fuses: Quantity equal to 10 percent of each fuse type and size, but no fewer than three of each type and size.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Cooper Bussman, Inc.
2. Eagle Electric Mfg. Co., Inc.; Cooper Industries, Inc.
3. Ferraz Shawmut, Inc.
4. Tracor, Inc.; Littelfuse, Inc. Subsidiary.

2.2 CARTRIDGE FUSES

A. Characteristics: NEMA FU 1, nonrenewable cartridge fuse; class and current rating indicated; voltage rating consistent with circuit voltage.

2.3 SPARE-FUSE CABINET

A. Cabinet: Wall-mounted, 0.05-inch- thick steel unit with full-length, recessed piano-hinged door and key-coded cam lock and pull.

1. Size: Adequate for storage of spare fuses specified with 15 percent spare capacity minimum.
2. Finish: Gray, baked enamel.
3. Identification: "SPARE FUSES" in 1-1/2-inch- high letters on exterior of door.
4. Fuse Pullers: For each size of fuse.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine utilization equipment nameplates and installation instructions. Install fuses of sizes and with characteristics appropriate for each piece of equipment.

B. Evaluate ambient temperatures to determine if fuse rating adjustment factors must be applied to fuse ratings.

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

3.2 FUSE APPLICATIONS

A. Service Entrance: Class L, time delay RK1, time delay or J, time delay. Voltage rating consistent with circuit voltage.

B. Feeders: Class L, time delay RK1, time delay J, time delay or RK5, time delay. Voltage rating consistent with circuit voltage.

C. Motor Branch Circuits: Class RK1 or RK5, time delay. Voltage rating consistent with circuit voltage.

D. Other Branch Circuits: Class RK1, time delay, RK5, time delay or J, time delay. Voltage rating consistent with circuit voltage.

3.3 INSTALLATION

A. Install fuses in fusible devices. Arrange fuses so rating information is readable without removing fuse.

B. Install spare-fuse cabinet(s).

3.4 IDENTIFICATION

A. Install labels indicating fuse replacement information on inside door of each fused switch.

END OF SECTION

SECTION 26 28 16 - ENCLOSED SWITCHES AND CIRCUIT BREAKERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following individually mounted, enclosed switches and circuit breakers:

1. Fusible switches.
2. Nonfusible switches.
3. Enclosed molded case circuit breakers.
4. Enclosures.

1.3 DEFINITIONS

A. GFCI: Ground-fault circuit interrupter.

B. HD: Heavy duty.

C. RMS: Root mean square.

D. SPDT: Single pole, double throw.

1.4 SUBMITTALS

A. Product Data: For each type of enclosed switch, circuit breaker, accessory, and component indicated. Include dimensioned elevations, sections, weights, and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.

1. Enclosure types and details for types other than NEMA 250, Type 1.
2. Current and voltage ratings.
3. Short-circuit current rating.

B. Shop Drawings: Diagram power, signal, and control wiring.

C. Qualification Data: For testing agency.

D. Field quality-control test reports including the following:

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.

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.

C. Product Selection for Restricted Space: Drawings indicate maximum dimensions for enclosed switches and circuit breakers, including clearances between enclosures, and adjacent surfaces and other items. Comply with indicated maximum dimensions.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Rate equipment for continuous operation under the following conditions, unless otherwise indicated:

1. Ambient Temperature: Not less than minus 22 deg F and not exceeding 104 deg F.
2. Altitude: Not exceeding 6600 feet.

1.7 COORDINATION

A. Coordinate layout and installation of switches, circuit breakers, and components with other construction, including conduit, piping, equipment, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Available Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Eaton Corporation; Cutler-Hammer Products.
b. ABB/General Electric.
c. Siemens Energy & Automation, Inc.
d. Square D/Group Schneider.

2.2 FUSIBLE AND NONFUSIBLE SWITCHES

A. Fusible Switch, 1200 A and Smaller: NEMA KS 1, Type HD, with clips or bolt pads to accommodate specified fuses, lockable handle with capability to accept two padlocks, and interlocked with cover in closed position.

B. Accessories:

1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.

2. Neutral Kit: Internally mounted; insulated, capable of being grounded, and bonded; and labeled for copper and aluminum neutral conductors.
3. Auxiliary Contact Kit: Auxiliary set of contacts arranged to open before switch blades open.

2.3 MOLDED-CASE CIRCUIT BREAKERS AND SWITCHES

A. Molded-Case Circuit Breaker: NEMA AB 1, 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. GFCI Circuit Breakers: Single- and two-pole configurations with 5 or 30-mA trip sensitivity. 30-mA for heat trace, 5-mA for personnel protection.

B. Molded-Case Circuit-Breaker Features and Accessories:

1. Standard frame sizes, trip ratings, and number of poles.
2. Lugs: Mechanical style with compression lug kits suitable for number, size, trip ratings, and conductor material.
3. Application Listing: Type SWD for switching fluorescent lighting loads; Type HACR for heating, air-conditioning, and refrigerating equipment.
4. Shunt Trip: Trip coil energized from separate circuit, set to trip at 55 percent of rated voltage. Voltage and requirement as noted on drawings.
5. Auxiliary Switch: One SPDT switch with "a" and "b" contacts; "a" contacts mimic circuit-breaker contacts, "b" contacts operate in reverse of circuit-breaker contacts.

2.4 ENCLOSURES

A. NEMA AB 1 and NEMA KS 1 to meet environmental conditions of installed location.

1. Outdoor Locations: NEMA 250, Type 3R.
2. Kitchen Areas: NEMA 250, Type 4X, stainless steel.
3. Other Wet or Damp Indoor Locations: NEMA 250, Type 4.
4. Hazardous Areas Indicated on Drawings: NEMA 250, Type 7C.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine elements and surfaces to receive enclosed switches and circuit breakers for compliance with installation tolerances and other conditions affecting performance.

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

3.2 CONCRETE BASES

A. Coordinate size and location of concrete bases. Verify structural requirements with structural engineer.

B. Concrete base is specified in Division 26 Section "Hangers and Supports for Electrical Systems," and concrete materials and installation requirements are specified in Division 03.

3.3 INSTALLATION

A. Comply with applicable portions of NECA 1, NEMA PB 1.1, and NEMA PB 2.1 for installation of enclosed switches and circuit breakers.

B. Mount individual wall-mounting switches and circuit breakers with tops at uniform height, unless otherwise indicated. Anchor floor-mounting switches to concrete base.

C. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.

3.4 IDENTIFICATION

A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs as specified in Division 26 Section "Identification for Electrical Systems."

B. Enclosure Nameplates: Label each enclosure with engraved metal or laminated-plastic nameplate as specified in Division 26 Section "Identification for Electrical Systems."

3.5 FIELD QUALITY CONTROL

A. Prepare for acceptance testing as follows:

1. Inspect mechanical and electrical connections.
2. Verify switch and relay type and labeling verification.
3. Verify rating of installed fuses.

B. Perform the following field tests and inspections and prepare test reports:

1. Perform each electrical test and visual and mechanical inspection stated in NETA ATS, Section 7.5 for switches and Section 7.6 for molded-case circuit breakers. 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.

3.6 ADJUSTING

A. Set field-adjustable switches and circuit-breaker trip ranges.

3.7 CLEANING

A. On completion of installation, vacuum dirt and debris from interiors; do not use compressed air to assist in cleaning.

B. Inspect exposed surfaces and repair damaged finishes.

END OF SECTION

SECTION 26 43 13 - SURGE PROTECTION FOR LOW-VOLTAGE ELECTRICAL POWER CIRCUITS

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 field-mounted SPDs for low-voltage (120 to 600 V) power distribution and control equipment.

B. Related Requirements:

1. Section 26 24 13 "Switchboards" for factory-installed SPDs.
2. Section 26 24 16 "Panelboards" for factory-installed SPDs.

1.3 DEFINITIONS

A. I-nominals: Nominal discharge current.

B. MCOV: Maximum continuous operating voltage.

C. Mode(s), also Modes of Protection: The pair of electrical connections where the VPR applies.

D. MOV: Metal-oxide varistor; an electronic component with a significant non-ohmic current-voltage characteristic.

E. OCPD: Overcurrent protective device.

F. SCCR: Short-circuit current rating.

G. SPD: Surge protective device.

H. VPR: Voltage protection rating.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
2. Copy of UL Category Code VZCA certification, as a minimum, listing the tested values for VPRs, Inominal ratings, MCOVs, type designations, maximum OCPD requirements, model numbers, system voltages, and modes of protection.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For SPDs to include in maintenance manuals.

1.6 WARRANTY

A. Manufacturer's Warranty: Manufacturer agrees to replace or replace SPDs that fail in materials or workmanship within specified warranty period.

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

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers:

1. Manufacturers requesting product approval must meet or exceed the written specification contained herein.
2. The registered service mark (brand) must be owned by the Manufacturer. No private label accepted.
3. Manufacturer shall be ISO 9001 certified: Quality Systems – Model for Quality Assurance in Design, development, Production, Installation, and Servings.
4. The Manufacturer must be regularly engaged in the manufacture of surge protection device products of the specified categories for no less than ten (10) years.

2.2 GENERAL SPD REQUIREMENTS

A. SPD with Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application, provided with the following features and accessories:

1. Include LED indicator lights for power and protection status.
2. Internal thermal protection that disconnects the SPD before damaging internal suppressor components.
3. Surge Counter.

B. Comply with NFPA 70.

C. Comply with UL 1449 and UL 1283.

D. MCOV of the SPD shall be at least 125% the nominal system voltage.

E. Protection modes and UL 1449 VPR for grounded wye circuits with 480Y/277 V and 208Y/120 V, three-phase, four-wire circuits shall not exceed the following:

1. Line to Neutral: 1200 V for 480Y/277 V and 700 V for 208Y/120 V.
2. Line to Ground: 1200 V for 480Y/277 V and 700 V for 208Y/120 V.
3. Neutral to Ground: 1200 V for 480Y/277 V and 700 V for 208Y/120V.
4. Line to Line: 2000 V for 480Y/277 V and 1200V for 208Y/120 V.

F. Protection modes and UL 1449 VPR for 240/120 V, single-phase, three-wire circuits shall not exceed the following:

1. Line to Neutral: 700 V.
2. Line to Ground: 700V.
3. Neutral to Ground: 700V
4. Line to Line: 1200V.

G. SCCR: Equal or exceed 100 kA.

H. Nominal Discharge Current Rating: 20 kA

2.3 SERVICE ENTRANCE OR MAIN DISTRIBUTION EQUIPMENT

A. SPDs: Listed, and complying with UL 1449, Type 2.

B. Peak Surge Current Rating: The minimum single-pulse surge current withstand rating per phase shall not be less than 200kA. The peak surge current rating shall be the arithmetic sum of the ratings of the individual MOVs in a given mode.

2.4 PANEL SUPPRESSORS

A. SPDs: Listed and Complying with UL 1449, Type 2.

B. Peak Surge Current Rating: The minimum single-pulse surge current withstand rating per phase shall not be less than 100 kA. The peak surge current rating shall be the arithmetic sum of the ratings of the individual MOVs in a given mode.

2.5 ENCLOSURES

A. Shall be side-mounted, NEMA 250, Type 1, in the following conditions as noted on drawings:

1. At panelboards or transfer switches which are surface mounted indoors in a dry location, other than floor mounted.

B. Shall be mounted internal to the protected equipment enclosure in any of the following conditions:

1. At panelboards which are flush mounted.
2. At panelboards, transfer switches, or switchgear which are specified with enclosures other than NEMA 250, Type 1.
3. At switchgear or switchboards which is floor mounted.
4. Where noted on the drawings to be integral or internal to the equipment.

C. Shall be side mounted, NEMA 250, Type 3R, 4 or 4X in the following conditions:

1. At equipment which is located outdoors or in a damp or wet location and is not standardly available in the industry with internal SPDs.

2.6 CONDUCTORS AND CABLES

A. Power Wiring: Same size as SPD leads, complying with Section 26 05 19 "Low-Voltage Electrical Power Conductors and Cables."

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with NECA 1.

B. Install circuit breaker as required to comply with the UL listing of the SPD. All SPDs shall be connected through an OCPD and means of disconnect. Direct connection to the bus is not acceptable. Sized OCPD to match the maximum OCPD listed by the Manufacturer.

C. Install SPDs with conductors between suppressor and points of attachment as short and straight as possible and adjust circuit-breaker positions to achieve shortest and straightest leads. Do not splice and extend SPD leads unless specifically permitted by manufacturer. Do not exceed manufacturer's recommended lead length. Do not bond neutral and ground.

D. Use crimped connectors only. Wire nuts are unacceptable.

E. Wiring:

1. Power Wiring: Comply with wiring methods in Section 26 05 19 "Low-Voltage Electrical Power Conductors and Cables."

3.2 FIELD QUALITY CONTROL

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

1. Compare equipment nameplate data for compliance with Drawings and Specifications.
2. Inspect anchorage, alignment, grounding, and clearances.
3. Verify that electrical wiring installation complies with manufacturer's written installation requirements.

B. An SPD will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports.

3.3 STARTUP SERVICE

A. Complete startup checks according to manufacturer's written instructions.

B. Do not perform insulation-resistance tests of the distribution wiring equipment with SPDs installed. Disconnect SPDs before conducting insulation-resistance tests and reconnect them immediately after the testing is over.

C. Energize SPDs after power system has been energized, stabilized, and tested.

D. Reset surge counter after all electrical testing is complete.

3.4 DEMONSTRATION

A. Train Owner's maintenance personnel to operate and maintain SPDs.

END OF SECTION

SECTION 26 51 19 - LED INTERIOR 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. Interior solid-state luminaires that use LED technology.
2. Lighting fixture supports.

B. Related Requirements:

1. Section "Wiring Devices" for automatic control of lighting, including time switches, photoelectric relays, occupancy sensors, and multipole lighting relays and contactors.
2. Section "Wiring Devices" for line voltage controls and wall-box dimmers.

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. LED: Light-emitting diode.

F. Lumen: Measured output of lamp and luminaire, or both.

G. Luminaire: Complete, manufactured lighting unit, including lamp, reflector, and housing.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Arrange in order of luminaire designation.
2. Include data on features, accessories, and finishes.
3. Include physical description and dimensions of luminaires.
4. Include emergency lighting units, including batteries and chargers.
5. Include life, output (lumens, CCT, and CRI), and energy efficiency data.
6. Photometric data and adjustment factors based on laboratory tests, complying with IESNA Lighting Measurements Testing and Calculation Guides, of each lighting fixture type. The

adjustment factors shall be for lamps and accessories identical to those indicated for the lighting fixture as applied in this Project IES LM-79 and IES LM-80.

a. Manufacturers' Certified Data: Photometric data certified by manufacturer's laboratory with a current accreditation under the National Voluntary Laboratory Accreditation Program for Energy Efficient Lighting Products.

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. Qualification Data: For testing laboratory providing photometric data for luminaires.

D. Operation and Maintenance Data: For luminaires and lighting systems to include in operation and maintenance manuals.

1.5 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. Diffusers and Lenses: One for every 100 of each type and rating installed. Furnish at least one of each type.
2. Globes and Guards: One for every 20 of each type and rating installed. Furnish at least one of each type.
3. Any other components or accessories which are excluded from warranty coverage: One for every 20 of each type, finish and rating installed. Furnish at least one of each type.

1.6 QUALITY ASSURANCE

A. Luminaire Photometric Data Testing Laboratory Qualifications: Luminaire manufacturer's laboratory that is accredited under the NVLAP for Energy Efficient Lighting Products.

B. Provide luminaires from a single manufacturer for each luminaire type.

C. Each luminaire type shall be binned within a three-step MacAdam Ellipse to ensure color consistency among luminaires.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Protect finishes of exposed surfaces by applying a strippable, temporary protective covering before shipping.

1.8 WARRANTY

A. Warranty: Manufacturer and Installer agree to repair or replace components of luminaires that fail in materials or workmanship within specified warranty period.

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

PART 2 - PRODUCTS

2.1 LUMINAIRE REQUIREMENTS

A. Refer to architectural reflected ceiling plan for exact ceiling conditions planned. Fixture shall be designed for the ceiling intended, including ceiling material, presence of insulation or sound batting, and fire rating.

1. Where ceilings are fire rated, recessed luminaires shall be fire rated, or shall be provided with a UL Listed fire rated cover, or a field-constructed “hat” or “box,” which shall maintain the fire rating requirement and be acceptable to the AHJ.
2. Where ceilings are indicated to have thermal insulation or sound batting installed on top of the ceiling, within 6 inches of the luminaire location, recessed luminaire shall be rated for Insulation-Contact (IC-Rated).
3. Where ceilings are indicated to be of gyp construction, provide manufacturer’s modular flange kit for lay-in troffer type luminaires. Flange kits shall be separate from the luminaire for field installation. Integral flange adapters are not acceptable.

B. Comply with UL 8750.

C. 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.

D. NRTL Compliance: Luminaires for hazardous locations shall be listed and labeled for indicated class and division of hazard by an NRTL.

E. FM Global Compliance: Luminaires for hazardous locations shall be listed and labeled for indicated class and division of hazard by FM Global.

F. Recessed Fixtures: Comply with NEMA LE 4.

G. CRI of minimum 80. CCT as selected by the architect from 2700 K, 3000 K, 3500 K, or 4000 K.

H. Rated luminaire life of 50,000 hours, or as specified on the drawings.

I. Minimum efficacy of 80 lumens per watt, or as specified on the drawings.

J. Lamps dimmable from 100 percent to 10 percent of maximum light output, unless specified otherwise.

1. Where used on the drawings, “1 percent” or “0.1 percent” dimming shall indicate dimming ranges from 100 percent to 1 percent, or 100 percent to 0.1 percent. Provide dim-to-black where specified.

K. Internal driver.

L. Lens Thickness: At least 0.125 inch minimum unless otherwise indicated.

M. Housings: Powder-coat or painted finish, applied after fabrication.

2.2 DRIVER REQUIREMENTS

A. Comply with UL 8750.

B. Comply with NEMA 410.

C. Built-in surge protection (in accordance with IEEE /ANSIC82.77-5 Transient Surge Requirements). Additional surge protection as specified.

D. Dimming: Standard dimming shall utilize 0-10 volt, direct-current interface. Drivers shall be source-type, approximately 150 microamps.

1. 0-10 volt dimming shall be provided unless specified to be without dimming or to utilize a different dimming protocol.

2.3 EMERGENCY POWER UNIT

A. Internal Type: Self-contained, modular, battery unit, factory mounted within luminaire body and compatible with supplied driver and diode(s). Comply with UL 924.

1. Emergency Connection: Operate at least two diodes or diode strings in parallel at an output of 1000 lumens each. Connect unswitched circuit conductor to battery unit and switched circuit conductor to fixture driver.
2. Night-Light Connection: Wire to operate luminaire continuously and connect emergency battery unit.
3. Test Push Button and Indicator Light: Visible and accessible without entering ceiling space. Where test push button is located concealed behind a lens or diffuser, such lens or diffuser shall require no tools to remove and gain access to the test push button. Where indicator light is located concealed behind a lens or diffuser, it shall be located such that the glow is visible through the installed lens or diffuser.

    a. Test Push Button: Push-to-test type, simulates loss of normal power and demonstrates operability.
    b. Indicator Light: LED indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.
    c. Where specified, or where a luminaire meeting other specification requirements is not available with an integrated test push button and indicator light, such button and light may be remote mounted. Furnish and install a manufactured one-gang wall/ceiling plate in a one-gang junction box, flush mounted within 36 inches of fixture location. Such a device shall be located as directed by the architect.

4. Battery: Sealed, high-temperature, maintenance-free, nickel-cadmium type.
5. Charger: Fully automatic, solid-state, constant-current type with sealed power transfer relay. 24 hour maximum recharge time from full discharge.
6. Ambient Temperature rating of 32F to 131F. Where located outdoors or otherwise specified “low temp” rating shall be suitable for 0F locations without use of a heater.
7. Integral Self-Test: Factory-installed electronic device automatically initiates code-required test of emergency unit operation at code-specified intervals. Test failure is annunciated by an integral audible alarm and flashing red LED indicator light.

B. External Type: Self-contained, modular, battery unit, remote mounted and field-wired to the fixture. Shall be compatible with supplied driver and diode(s). Comply with UL 924.

1. Emergency Connection: Operate at least two diodes or diode strings in parallel at an output of 1000 lumens each. Connect unswitched circuit conductor to battery unit and switched circuit conductor to fixture driver.
2. Night-Light Connection: Wire to operate luminaire continuously and connect emergency battery unit.
3. Test Push Button and Indicator Light: Visible and accessible on the unit housing.

    a. Test Push Button: Push-to-test type, simulates loss of normal power and demonstrates operability.

b. Indicator Light: LED indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.

4. Housing: NEMA 250, Type 1 enclosure.
5. Battery: Sealed, high-temperature, maintenance-free, nickel-cadmium type.
6. Charger: Fully automatic, solid-state, constant-current type with sealed power transfer relay. 24 hour maximum recharge time from full discharge.
7. Ambient Temperature rating of 32F to 131F. Where located outdoors or otherwise specified “low temp” rating shall be suitable for 0F locations without use of a heater.
8. Integral Self-Test: Factory-installed electronic device automatically initiates code-required test of emergency unit operation at code-specified intervals. Test failure is annunciated by an integral audible alarm and flashing red LED indicator light.

2.4 MATERIALS

A. Metal Parts:

1. Free of burrs and sharp corners and edges.
2. Sheet metal components shall be steel unless otherwise indicated.
3. Form and support to prevent warping and sagging.

B. 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 servicing and when secured in operating position.

C. Exposed Metal Hardware: Where fixture is exposed to damp or wet environments. Grade 316 Stainless Steel.

D. Diffusers and Globes:

1. Acrylic Diffusers: One hundred 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.

2.5 LUMINAIRE FIXTURE SUPPORT COMPONENTS

A. Comply with requirements in Section 26 05 29 "Hangers and Supports for Electrical Systems" for channel and angle iron supports and nonmetallic channel and angle supports.

B. Single-Stem Hangers: 1/2-inch steel tubing with swivel ball fittings and ceiling canopy. Finish same as luminaire.

C. Wires: ASTM A 641/A 641 M, Class 3, soft temper, zinc-coated steel, 12 gauge.

D. Rod Hangers: 3/16-inch minimum diameter, cadmium-plated, threaded steel rod.

E. Hook Hangers: Integrated assembly matched to luminaire, line voltage, and equipment with threaded attachment, cord, and locking-type plug.

2.6 EXIT SIGNS

A. Description: Comply with UL 924; for sign colors, visibility, luminance, and lettering size, comply with authorities having jurisdiction.

B. Internally Lighted Signs:

1. Lamps for AC Operation: LEDs, 70,000 hours minimum rated lamp life.
2. Self-Powered Exit Signs (Battery Type): Integral automatic charger in a self-contained power pack.

a. Battery: Sealed, maintenance-free, nickel-cadmium type.
b. Charger: Fully automatic, solid-state type with sealed transfer relay.
c. Operation: Relay automatically energizes lamp from battery when circuit voltage drops to 80 percent of nominal voltage or below. When normal voltage is restored, relay disconnects lamps from battery, and battery is automatically recharged and floated on charger.
d. Test Push Button: Push-to-test type, in unit housing, simulates loss of normal power and demonstrates unit operability.
e. LED Indicator Light: Indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.
f. Remote Test: Switch in hand-held remote device aimed in direction of tested unit initiates coded infrared signal. Signal reception by factory-installed infrared receiver in tested unit triggers simulation of loss of its normal power supply, providing visual confirmation of either proper or failed emergency response.
g. Integral Self-Test: Factory-installed electronic device automatically initiates code-required test of unit emergency operation at required intervals. Test failure is annunciated by an integral audible alarm and flashing red LED.

2.7 EMERGENCY LIGHTING UNITS

A. Description: Self-contained units complying with UL 924.

1. Battery: Sealed, maintenance-free, lead-acid type.
2. Charger: Fully automatic, solid-state type with sealed transfer relay.
3. Operation: Relay automatically turns lamp on when power supply circuit voltage drops to 80 percent of nominal voltage or below. Lamp automatically disconnects from battery when voltage approaches deep-discharge level. When normal voltage is restored, relay disconnects lamps from battery, and battery is automatically recharged and floated on charger.
4. Test Push Button: Push-to-test type, in unit housing, simulates loss of normal power and demonstrates unit operability.
5. LED Indicator Light: Indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.
6. Wire Guard: Heavy-chrome-plated wire guard protects lamp heads or fixtures.
7. Integral Time-Delay Relay: Where specified, holds unit on for fixed interval of 15 minutes when power is restored after an outage.
8. Integral Self-Test: Factory-installed electronic device automatically initiates code-required test of unit emergency operation at required intervals. Test failure is annunciated by an integral audible alarm and flashing red LED.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with NECA 1.

B. Install luminaires level, plumb, and square with ceilings and walls unless otherwise indicated.

C. Refer to architectural reflected ceiling plan for exact location of lighting fixtures. Coordinate installation with ceiling rating. Provide fire rated cover for fixture where required. This may be a manufactured U.L. Listed cover, “hat” or box; or a site fabricated cover. The cover shall meet or exceed the fire rating requirement and meet requirements of Local AHJ. The cover shall be compatible with the IC or Non IC rating of the fixture.

D. Support for Lighting Fixtures in or on Grid-Type Suspended Ceilings: Use grid as a support element.

1. Install a minimum of four ceiling support system rods or wires for each fixture. Locate not more than 6 inches from lighting fixture corners.
2. Support Clips: Fasten to lighting fixtures and to ceiling grid members at or near each fixture corner with clips that are UL listed for the application.
3. Fixtures of Sizes Less Than Ceiling Grid: Install as indicated on reflected ceiling plans or center in acoustical panel, and support fixtures independently with at least two 3/4-inch metal channels spanning and secured to ceiling tees.
4. Provide support for luminaire without causing deflection of ceiling or wall.

E. Air-Handling Lighting Fixtures: Install with dampers closed and ready for adjustment.

F. Adjust aimable lighting fixtures to provide required light intensities.

G. Connect wiring according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

H. Provide additional conductors as required for dimming and control systems.

3.2 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Division 26 Section "Identification for Electrical Systems."

3.3 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Operational Test: After installing luminaires, switches, and accessories, and after electrical circuitry has been energized, test units to confirm proper operation including controls.
2. Test for Emergency Lighting: Interrupt power supply to demonstrate proper operation. Verify transfer from normal power to battery power and retransfer to normal. Test using both the test push button, and separately using the associated branch circuit breaker.

3.4 STARTUP SERVICE

A. Comply with requirements for startup specified in Section 26 09 43.16 "Addressable-Fixture Lighting Controls."

B. Comply with requirements for startup specified in Section 26 09 43.23 "Relay-Based Lighting Controls."

3.5 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.

END OF SECTION

SECTION 26 56 00 – 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. This Section includes the following:

1. Exterior luminaires with lamps and ballasts.
2. Luminaire-mounted photoelectric relays.
3. Poles and accessories.

B. Related Sections include the following:

1. Division 26 Section "Interior Lighting" for exterior luminaires normally mounted on exterior surfaces of buildings.

1.3 DEFINITIONS

A. CRI: Color-rendering index.

B. LED: Light-emitting diode

C. IP: International Protection or Ingress Protection Rating.

D. CCT: Correlated color temperature.

E. Lumen: Measured output of lamp and luminaire, or both.

F. Luminaire: Complete lighting fixture, including driver.

G. Pole: Luminaire support structure, including tower used for large area illumination.

H. Standard: Same definition as "Pole" above.

1.4 STRUCTURAL ANALYSIS CRITERIA FOR POLE SELECTION

A. Dead Load: Weight of luminaire and its horizontal and vertical supports, lowering devices, and supporting structure, applied as stated in AASHTO LTS-4.

B. Ice Load: Load of 3 lbf/sq. ft., applied as stated in AASHTO LTS-4.

C. Wind Load: Pressure of wind on pole and luminaire, calculated and applied as stated in AASHTO LTS-4.

1. Wind speed for calculating wind load for poles exceeding 50 feet in height is 110 mph.

2. Wind speed for calculating wind load for poles 50 feet or less in height is 110 mph.

D. Seismic: Shall withstand the effects of earthquake motions determined according to ASCE/SEI 7. “Withstand” means that “the luminaire will remain in place without separation of any parts when subjected to the seismic forces specified.”

1.5 SUBMITTALS

A. Product Data: For each luminaire, pole, and support component:

1. Arranged in order of lighting unit designation.
2. Include data on features, accessories, finishes.
3. Physical description of luminaire, including materials, dimensions, effective projected area, and verification of indicated parameters.
4. Details of attaching luminaires and accessories.
5. Details of installation and construction.
6. Photometric data and adjustment factors based on laboratory tests, complying with IESNA Lighting Measurements Testing and Calculation Guides, of each lighting fixture type. The adjustment factors shall be for lamps and accessories identical to those indicated for the lighting fixture as applied in this Project IES LM-79 and IES LM-80.

    a. Manufacturers' Certified Data: Photometric data certified by manufacturer's laboratory with a current accreditation under the National Voluntary Laboratory Accreditation Program for Energy Efficient Lighting Products.

7. Photoelectric relays.
8. Include life, output (lumens, CCT, and CRI), and energy efficiency data.
9. Means of attaching luminaires to supports, and indication that attachment is suitable for components involved.
10. Anchor bolts for poles.

B. Shop Drawings:

1. Anchor-bolt templates keyed to specific poles and certified by manufacturer.
2. Wiring Diagrams: Power and control wiring.

C. Pole and Support Component Certificates: Signed by manufacturers of poles, certifying that products are designed for indicated load requirements in AASHTO LTS-4 and that load imposed by luminaire has been included in design.

D. Qualification Data: For agencies providing photometric data for lighting fixtures.

E. Field quality-control test reports.

F. Warranty: Special warranty specified in this Section.

1.6 QUALITY ASSURANCE

A. Luminaire Photometric Data Testing Laboratory Qualifications: Provided by manufacturers' laboratories that are accredited under the National Volunteer Laboratory Accreditation Program for Energy Efficient Lighting Products.

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 IEEE C2, "National Electrical Safety Code."

D. Comply with NFPA 70.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Package aluminum poles for shipping according to ASTM B 660.

B. Store poles on decay-resistant-treated skids at least 12 inches above grade and vegetation. Support poles to prevent distortion and arrange to provide free air circulation and positive drainage.

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 ground line.

D. Retain factory-applied pole wrappings on fiberglass and laminated wood poles until right before pole installation. Handle poles with web fabric straps.

E. Remove factory-applied pole wrappings on metal poles immediately upon delivery to the site. Handle poles with web fabric straps.

1.8 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace products 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 specified warranty period. Manufacturer may exclude lightning damage, hail damage, vandalism, abuse, or unauthorized repairs or alterations from special warranty coverage.

1. Warranty Period for Luminaires: Five years from date of Substantial Completion.
2. Warranty Period for Metal Corrosion: Five years from date of Substantial Completion.
3. Warranty Period for Color Retention: Five years from date of Substantial Completion.
4. Warranty Period for Poles: Repair or replace lighting poles and standards that fail in finish, materials, and workmanship within manufacturer's standard warranty period, but not less than three years from date of Substantial Completion.

1.9 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Glass and Plastic Lenses, Covers, and Other Optical Parts: 10 for every 100 of each type and rating installed. Furnish at least one of each type.
2. Drivers: 10 for every 100 of each type and rating installed. Furnish at least one of each type.
3. Globes and Guards: 10 for every 20 of each type and rating installed. Furnish at least one of each type.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In the Lighting Fixture Schedule where titles below are column or row headings that introduce lists, the following requirements apply to product selection:

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

2.2 LUMINAIRES, GENERAL REQUIREMENTS

A. Luminaires shall comply with UL 1598 and be listed and labeled for installation in wet locations by an NRTL acceptable to authorities having jurisdiction.

B. Comply with IESNA RP-8 for parameters of lateral light distribution patterns indicated for luminaires.

C. Metal Parts: Free of burrs and sharp corners and edges.

D. Sheet Metal Components: Corrosion-resistant aluminum, unless otherwise indicated. Form and support to prevent warping and sagging.

E. Housings: Rigidly formed, weather- and light-tight enclosures that will not warp, sag, or deform in use. Provide filter/breather for enclosed luminaires.

F. 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. Designed to disconnect ballast when door opens.

G. Exposed Hardware Material: Grade 316 Stainless steel.

H. Plastic Parts: High resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.

I. Light Shields: Metal baffles, factory installed and field adjustable, arranged to block light distribution to indicated portion of normally illuminated area or field.

J. 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.

K. Lenses and Refractors Gaskets: Use heat- and aging-resistant resilient gaskets to seal and cushion lenses and refractors in luminaire doors.

L. 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.

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 NEMA C136.10.
2. Adjustable window slide for adjusting on-off set points.
3. Relay shall be suitable for LED sources, including consideration for inrush.

2.4 DRIVER REQUIREMENTS

A. Comply with UL 8750.

B. Comply with NEMA 410.

C. Built-in surge protection (in accordance with IEEE /ANSIC82.77-5 Transient Surge Requirements). Additional surge protection as specified.

PART 3 - EXECUTION

3.1 LUMINAIRE INSTALLATION

A. Install lamps in each luminaire.

B. Fasten luminaire to indicated structural supports.

1. Use fastening methods and materials selected to resist seismic forces defined for the application and approved by manufacturer.

C. Adjust luminaires that require field adjustment or aiming. Include adjustment of photoelectric device to prevent false operation of relay by artificial light sources.

3.2 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 Division 26 Section "Raceway 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.

3.3 GROUNDING

A. Ground metal poles and support structures according to Division 26 Section "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 according to Division 26 Section "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 foundations.

3.4 FIELD QUALITY CONTROL

A. Inspect each installed fixture for damage. Replace damaged fixtures and components.

B. Illumination Observations: Verify normal operation of lighting units after installing luminaires and energizing circuits with normal power source.

1. 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 IESNA testing guide(s):

a. IESNA LM-5, "Photometric Measurements of Area and Sports Lighting."
b. IESNA LM-50, "Photometric Measurements of Roadway Lighting Installations."
c. IESNA LM-52, "Photometric Measurements of Roadway Sign Installations."
d. IESNA LM-64, "Photometric Measurements of Parking Areas."
e. IESNA LM-72, "Directional Positioning of Photometric Data."

D. 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.

3.5 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain luminaire lowering devices. Refer to Division 01 Section "Demonstration and Training."

END OF SECTION

SECTION 26 56 68 – EXTERIOR ATHLETIC LIGHTING

Lighting System with LED Light Source

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 lighting system performance and design standards for Oak Ridge Softball using an LED Lighting source. 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 following venues:

1. Softball

D. The primary goals of this sports lighting project are:

1. Guaranteed Light Levels: Selection of appropriate light levels impacts the safety of players and the enjoyment of spectators. Therefore, light levels are guaranteed to not drop below specified target values for a period of 25 years.
2. Environmental Light Control: It is the primary goal of this project to minimize spill light to adjoining properties and glare to players, spectators, and neighbors.
3. Cost of Ownership: To reduce the operating budget, the preferred lighting system shall be energy efficient and cost effective to operate. All maintenance costs shall be eliminated for the duration of the warranty.
4. 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. Fields should be proactively monitored to detect luminaire outages over a 25-year life cycle. All communication and monitoring costs for 25-year period shall be included in the bid.

    a. Control and monitoring system shall provide contactor control of all existing circuits. Key switches shall be provided to provide field-level control of existing circuit groups.

1.2 ONFIELD LIGHTING PERFORMANCE

A. Illumination Levels and Design Factors: Playing surfaces shall be lit to an average target illumination level and uniformity as specified in the chart below. Lighting manufacturers will provide a guarantee that light levels will be sustained over the life of the warranty period. Lighting calculations shall be developed, and field measurements taken on the grid spacing with the minimum number of grid points specified below.

Manufacturers will provide lumen maintenance data of the LED luminaires used per TM-21-11 and will Incorporate the lumen maintenance projections into the lighting designs to ensure target light levels are achieved throughout the guaranteed period of the system. Per IES guidelines, lumen maintenance hours should be reported based on the 6x multiplier of testing hours.

Area of Lighting	Average Target Illumination Levels	Maximum to Minimum Uniformity Ratio	Grid Points	Grid Spacing
Softball	50 Footcandles (Infield) 30 Footcandles(Outfield)	2.0:1.0 (Infield) 2.5:1.0 (Outfield)	25 (Infield) 73 (Outfield)	20’ X 20’

B. Color Temperature: The lighting system shall have a minimum color temperature of 5700K and a CRI of 75.

C. Playability: Lighting design and luminaire selection should be optimized for playability by reducing glare onfield and providing sufficient uplight.

1. Aiming Angles: To reduce glare, luminaire aiming should ensure the top of the luminaire field angle (based on sample photometric reports) is a minimum of 10 degrees below horizontal.
2. Glare Control Technology – Luminaires selected should have glare control technology including, but not limited to: external visors, internal shields and louvres. No symmetrical beam patterns are acceptable.
3. Aerial lighting – Adequate illumination must be provided above the field to see the ball in flight. It is recommended that a lighting analysis be performed above the field of play to evaluate the visibility of the ball over its typical trajectory to ensure the participants will adequately see the ball. Calculation planes should be evaluated up to the maximum anticipated height for the level of play.
4. Mounting Heights: To ensure proper aiming angles, minimum mountings heights shall be as described below. Higher mounting heights may be necessary for luminaire with lesser glare control to meet field angle requirements of section 1.2.C.1.

# of Poles	Pole Designation	Pole Height
2	A1-2	60’
2	B1-2	70’

1.3 ENVIRONMENTAL LIGHT CONTROL

A. Light Control Luminaires: All luminaires shall utilize spill light and glare control devices including, but not limited to, internal shields, louvers, and external shields. No symmetrical beam patterns are accepted.

B. Spill Light and Glare Control: To minimize impact on adjacent properties, spill light and candela values must not exceed the following levels taken at 3 feet above grade.

	Average	Maximum
150’ Specified Spill Line Horizontal Footcandles	.05 FC	.15 FC
150’ Specified Spill Line Max Vertical Footcandles	.1 FC	.4 FC
150’ Specified Spill Line Max Candela (taken at 5 ft above grade)		8800 cd

C. Spill Scans: Spill scans must be submitted indicating the amount of horizontal and vertical footcandles along the specified lines. Light levels shall be provided in 30-foot intervals along the boundary line at 3 ft above grade.

D. Sample Photometry: The first page of a photometric report for all luminaire types proposed showing

horizontal and vertical axial candle power shall be provided to demonstrate the capability of achieving the specified performance. Reports shall be certified by a qualified testing laboratory with a minimum of five years experience or by a manufacturer's laboratory with a current accreditation under the National Voluntary Laboratory Accreditation Program for Energy Efficient Lighting Products. A summary of the horizontal and vertical aiming angles for each luminaire shall be included with the photometric report.

E. Field Verification: Lighting manufacturer shall supply field verification of environmental light control using a meter calibrated within the last 12 months:

1. Spill verification: Illumination levels shall be taken in accordance with IESNA RP-6-22. The light sensing surface of the light meter should be held 36 inches above the playing surface with the sensing surface horizontal (for horizontal readings) or vertically pointed at the brightest light bank (for max vertical readings)

1.4 COST OF OWNERSHIP

A. Manufacturer shall submit a 25 year Cost of Ownership summary that includes energy consumption, anticipated maintenance costs, and control costs. All costs associated with faulty luminaire replacement - equipment rentals, removal and installation labor, and shipping - are to be included in the maintenance costs.

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, drivers 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, 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 cross-arms, pole, or electrical components enclosure.

C. System Description: Lighting system shall consist of the following:

1. Galvanized steel poles and cross-arm assembly.
2. Non-approved pole technology:

   a. Square static cast concrete poles will not be accepted.
   b. 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. Lighting systems shall use concrete foundations. See Section 2.4 for details.

   a. For a foundation using a pre-stressed concrete base embedded in concrete backfill the

concrete shall be air-entrained and have a minimum compressive design strength at 28 days of 3,000 PSI. 3,000 PSI concrete specified for early pole erection, actual required minimum allowable concrete strength is 1,000 PSI. All piers and concrete backfill must bear on and against firm undisturbed soil.

b. For anchor bolt foundations or foundations using a pre-stressed concrete base in a suspended pier or re-enforced pier design pole erection may occur after 7 days. Or after a concrete sample from the same batch achieves a certain strength.

4. Manufacturer will supply all drivers and supporting electrical equipment.

    a. Remote drivers and supporting electrical equipment shall be mounted approximately 10 feet above grade in aluminum enclosures. The enclosures shall be touch-safe and include drivers and fusing with indicator lights on fuses to notify when a fuse is to be replaced for each luminaire. Disconnect per circuit for each pole structure will be located in the enclosure. Integral drivers are not allowed.
    b. Manufacturer shall provide surge protection at the pole equal to or greater than 40 kA for each line to ground (Common Mode) as recommended by IEEE C62.41.2_2002.

5. Wire harness complete with an abrasion protection sleeve, strain relief and plug-in connections for fast, trouble-free installation.
6. All luminaires, visors, and cross-arm assemblies shall withstand 150 mi/h winds and maintain luminaire aiming alignment.
7. Control cabinet to provide remote on-off control, monitoring, and entertainment features of the lighting system. See Section 2.3 for further details.
8. Manufacturer shall provide lightning grounding as defined by NFPA 780 and be UL Listed per UL 96 and UL 96A.

    a. Integrated grounding via concrete encased electrode grounding system.
    b. 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 minimum size of 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: 480 Volt, 3 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.

B. Energy Consumption: The kW consumption for the field lighting system shall be 20 kW.

2.3 CONTROL

A. Instant On/Off Capabilities: System shall provide for instant on/off of luminaires.

B. Lighting contactor cabinet(s) constructed of NEMA Type 4 aluminum, designed for easy installation with contactors, labeled to match field diagrams and electrical design. Manual off-on-auto selector switches shall be provided.

C. Contactor control of lights: To minimize wear on drivers and other electrical components and prevent lights from turning on due to communication loss, circuits must be controlled via contactor switching, not dimming driver output to zero.

D. Dimming: System shall provide for 3-stage dimming (high-medium-low). Dimming will be set via scheduling options (Website, app, phone, email).

E. 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, 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. Scheduling tool shall be capable of setting curfew limits.

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.

F. 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 controller shall determine switch position (manual or auto) and contactor status (open or closed).

G. 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 luminaire outages, control operation and service. Mobile application will be provided suitable for IOS and Android devices.

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. Report hours saved by using early off and push buttons by users.

H. Communication Costs: Manufacturer shall include communication costs for operating the control and monitoring system for a period of 25 years.

I. Communication with luminaire drivers: Control system shall interface with drivers in electrical components enclosures by means of powerline communication.

2.4 STRUCTURAL PARAMETERS

A. Wind Loads: Wind loads shall be based on the 2015 International Building Code. Wind loads to be calculated using ASCE 7-10, an ultimate design wind speed of 115 mph and exposure category C.

B. Pole Structural Design: The stress analysis and safety factor of the poles shall conform to 2013 AASHTO Standard Specification for Structural Supports for Highway Signs, Luminaires, and Traffic Signals (LTS-6).

C. Foundation Design: The foundation design shall be based on soils that meet or exceed those of a Class 5 material as defined by 2015 IBC Table 1806.2.

PART 3 – EXECUTION

3.1 SOIL QUALITY CONTROL

A. 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 registered engineer in the State of Tennessee for soils other than specified soil conditions;
2. Additional materials required to achieve alternate foundation;
3. Excavation and removal of materials other than normal soils, such as rock, caliche, etc.

3.2 DELIVERY TIMING

A. Delivery Timing Equipment On-Site: The equipment must be on-site 10 – 12 weeks from receipt of approved submittals and receipt of complete order information.

3.3 FIELD QUALITY CONTROL

A. 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 RP-6-22.

B. Field Light Level Accountability

1. Light levels are guaranteed not to fall below the target maintained light levels for the entire warranty period of 25 years. These levels will be specifically stated as “guaranteed” on the illumination summary provided by the manufacturer.
2. The contractor/manufacturer shall be responsible for conducting initial light level testing and an additional inspection of the system, in the presence of the owner, one year from the date of commissioning of the lighting.
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.

C. Correcting Non-Conformance: If, in the opinion of the Owner or his appointed Representative, the actual performance levels including footcandles, uniformity ratios, uplight for aerial visibility, and offsite candela readings are not in conformance with the requirements of the performance specifications and submitted information, the Manufacturer shall be required to make adjustments to meet specifications and satisfy Owner.

3.4 WARRANTY AND GUARANTEE

A. 25-Year Warranty: Each manufacturer shall supply a signed warranty covering the entire system for 25 years from the date of shipment. Warranty shall guarantee specified light levels. Manufacturer shall maintain specifically funded financial reserves to assure fulfillment of the warranty for the full term. Warranty does not cover weather conditions events such as lightning or hail damage, improper installation, vandalism or abuse, unauthorized repairs or alterations, or product made by other manufacturers.

B. Maintenance: Manufacturer shall monitor the performance of the lighting system, including on/off status, hours of usage and luminaire outage for 25 years from the date of equipment shipment. Parts and labor shall be covered such that individual luminaire outages will be repaired when the usage of any field is materially impacted. Manufacturer is responsible for removal and replacement of failed luminaires, including all parts, labor, shipping, and equipment rental associated with maintenance. Owner agrees to check fuses in the event of a luminaire outage.

PART 4 – DESIGN APPROVAL

4.1 PRE-BID SUBMITTAL REQUIREMENTS (Non-Musco)

A. Design Approval: The owner / engineer will review pre-bid submittals per section 4.1.B from all the manufacturers to ensure compliance to the specification 10 days prior to bid. 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.

B. Approved Product: Musco's Light-Structure System™ with TLC for LED® is the approved product. All substitutions must provide a complete submittal package for approval as outlined in Submittal Information at the end of this section at least 10 days prior to bid. Special manufacturing to meet the standards of this specification may be required. An addendum will be issued prior to bid listing any other approved lighting manufacturers and designs.

C. All listed manufacturers not pre-approved shall submit the information at the end of this section at least 10 days prior to bid. An addendum will be issued prior to bid; listing approved lighting manufacturers and the design method to be used.

D. 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 FOR ALL MANUFACTURERS (NOT PRE-APPROVED) 10 DAYS PRIOR TO BID

All items listed below are mandatory, shall comply with the specification and be submitted according to pre-bid submittal requirements. Complete the Yes/No column to indicate compliance (Y) or noncompliance (N) for each item. Submit checklist below with submittal.

Yes / No	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(s) showing field layouts with pole locations
	C	On Field Lighting Design	Lighting design drawing(s) showing: a. Field Name, date, file number, prepared by b. Outline of field(s) 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, horizontal and vertical aiming angles, 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.
	D	Off Field Lighting Design	Lighting design drawing showing initial spill light levels along the boundary line (defined on bid drawings) in footcandles. Lighting design showing glare along the boundary line in candela. Light levels shall be taken at 30-foot intervals along the boundary line. Readings shall be taken with the meter orientation at both horizontal and aimed towards the most intense bank of lights.
	E	Photometric Report	Provide first page of photometric report for all luminaire types being proposed showing candela tabulations as defined by IESNA Publication LM-35-02. Photometric data shall be certified by laboratory with current National Voluntary Laboratory Accreditation Program or an independent testing facility with over 5 years experience.
	F	Performance Guarantee	Provide performance guarantee including a written commitment to undertake all corrections required to meet the performance requirements noted in these specifications at no expense to the owner. Light levels must be guaranteed to not fall below target levels for warranty period.
	G	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 Tennessee, if required by owner. (May be supplied upon award).
	H	Control & Monitoring System	Manufacturer of the control and monitoring system shall provide written definition and schematics for automated control system. They will also provide ten (10) references of customers currently using proposed system in the state of Tennessee.
	I	Electrical Distribution Plans	Manufacturer bidding an alternate product must include a revised electrical distribution plan including changes to service entrance, panels and wire sizing, signed by a licensed Electrical Engineer in the state of Tennessee.
	J	Warranty	Provide written warranty information including all terms and conditions. Provide ten (10) references of customers currently under specified warranty in the state of Tennessee.
	K	Project References	Manufacturer to provide a list of ten (10) projects where the technology and specific fixture proposed for this project has been installed in the state of Tennessee. Reference list will include project name, project city, installation date, and if requested, contact name and contact phone number.

	L	Product Information	Complete bill of material and current brochures/cut sheets for all products being provided.
	M	Delivery	Manufacturer shall supply an expected delivery timeframe from receipt of approved submittals and complete order information.
	N	Non-Compliance	Manufacturer shall list all items that do not comply with the specifications. If in full compliance, tab may be omitted.
	O	Cost of Ownership	Document cost of ownership as defined in the specification. Identify energy costs for operating the luminaires. Maintenance cost for the system must be included. All costs should be based on 25 Years

The information supplied herein shall be used for the purpose of complying with the specifications for <Enter Project Name, F11>. 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.

Manufacturer: _____ Signature: _____

Contact Name: _____ Date: _____/_____/_____

Contractor: _____ _ Signature: _____

SECTION 27 05 00 - COMMON WORK RESULTS FOR COMMUNICATIONS

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. Communications equipment coordination and installation.
2. Sleeves for pathways and cables.
3. Sleeve seals.
4. Grout.
5. Common communications 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 communications 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 pathways, 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 communications 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 PATHWAYS AND CABLES

A. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends.

B. 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

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 COMMON REQUIREMENTS FOR COMMUNICATIONS 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 communications 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.

3.2 SLEEVE INSTALLATION FOR COMMUNICATIONS PENETRATIONS

A. Communications penetrations occur when pathways, cables, wireways, or cable trays 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 1/4-inch annular clear space between sleeve and pathway 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 pathway 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 pathway and cable penetrations. Install sleeves and seal pathway and cable penetration sleeves with firestop materials. Comply with requirements in Division 07 Section "Penetration Firestopping."

K. Protection of Roof:

1. Coordinate electrical work with roofing work in regard to any electrical items which may pierce or otherwise affect the roof.
2. Arrange for any cutting or repairing to roofing which might already be installed when an electrical installation is made.
3. Roof penetrations shall not void roofing warranty. Penetrations shall be coordinated with roofing supplier holding the warranty. Electrical contractor shall coordinate with roofing supplier for installation of pre-molded pipe seal or field fabricated pipe penetration as applicable. Electrical contractor to include all costs and coordination with and for roofing penetrations, new or existing.
4. Routing of electrical wiring thru ductwork, and penetrations of ductwork or roof curbs is not allowed.

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 pathway or cable and sleeve for installing mechanical sleeve seals.

3.3 SLEEVE-SEAL INSTALLATION

A. Install to seal exterior wall penetrations.

B. Use type and number of sealing elements recommended by manufacturer for pathway or cable material and size. Position pathway or cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pathway 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 communications installations to restore original fire-resistance rating of assembly. Firestopping materials and installation requirements are specified in Division 07 Section "Penetration Firestopping."

END OF SECTION

SECTION 27 05 28 - PATHWAYS FOR COMMUNICATIONS 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. Metal conduits and fittings.
2. Nonmetallic conduits and fittings.
3. Metallic surface pathways.
4. Tele-power poles.
5. Hooks.
6. Boxes, enclosures, and cabinets.

1.3 DEFINITIONS

A. GRS: Galvanized rigid steel conduit.

B. IMC: Intermediate metal conduit.

1.4 ACTION SUBMITTALS

A. Product data for the following:

1. Surface pathways
2. Wireways and fittings.
3. Tele-power poles.

PART 2 - PRODUCTS

2.1 METAL CONDUITS AND FITTINGS

A. Description: Metal raceway of circular cross section with manufacturer-fabricated fittings.

B. General Requirements for Metal Conduits and Fittings:

1. Listed and labeled as defined in NFPA 70, by a nationally recognized testing laboratory, and marked for intended location and application.
2. Comply with TIA-569-E.

C. GRS: Comply with ANSI C80.1 and UL 6.

D. IMC: Comply with ANSI C80.6 and UL 1242.

E. EMT: Comply with ANSI C80.3 and UL 797. Steel.

F. Fittings for Metal Conduit: Comply with NEMA FB 1 and UL 514B. Fittings for EMT shall be steel, set screw type.

2.2 NONMETALLIC CONDUITS AND FITTINGS

A. Description: Nonmetallic raceway of circular section with manufacturer-fabricated fittings.

B. General Requirements for Nonmetallic Conduits and Fittings:

1. Listed and labeled as defined in NFPA 70, by an NRTL, and marked for intended location and application.
2. Comply with TIA-569-E.

C. RNC: Type EPC-40-PVC except where noted to be Schedule 80. Then Type EPC-80-PVC, complying with NEMA TC 2 and UL 651 unless otherwise indicated.

D. Rigid HDPE: Comply with UL 651A.

E. Continuous HDPE: Comply with UL 651A.

F. RTRC: Comply with UL 2515A and NEMA TC 14.

G. Fittings: Comply with NEMA TC 3; match to conduit or tubing type and material.

H. Solvents and Adhesives: As recommended by conduit manufacturer.

2.3 SURFACE METAL PATHWAYS

A. Description: Galvanized steel with snap-on covers, complying with UL 5.

B. Finish: Manufacturer's standard enamel finish in color selected by Architect.

C. Listed and labeled as defined in NFPA 70, by an NRTL, and marked for intended location and application.

D. Fittings and Accessories: Dividers, end caps, covers, cutouts, wiring harnesses, devices, mounting materials, and other fittings shall match and mate with tele-power pole as required for complete system.

E. Comply with TIA-569-E.

2.4 HOOKS

A. Description: Prefabricated sheet metal cable supports for telecommunications cable.

B. Listed and labeled as defined in NFPA 70, by an NRTL, and marked for intended location and application.

C. Comply with TIA-569-E.

D. Galvanized steel.

E. J shape.

2.5 BOXES, ENCLOSURES, AND CABINETS

A. Description: Enclosures for communications.

B. General Requirements for Boxes, Enclosures, and Cabinets:

1. Comply with TIA-569-E.
2. Boxes, enclosures, and cabinets installed in wet locations shall be listed and labeled as defined in NFPA 70, by an NRTL, and marked for use in wet locations.
3. Box extensions used to accommodate new building finishes shall be of same material as recessed box.
4. Device Box Dimensions: 4-11/16 inches square by 2-1/8 inches deep with at least two 1 inch knock-out openings on each of two opposite sides.

C. Sheet Metal Outlet and Device Boxes: Comply with NEMA OS 1 and UL 514A.

D. Cast-Metal Outlet and Device Boxes: Comply with NEMA FB 1, aluminum, Type FD, with gasketed cover.

E. Dual Service Floor Boxes: Refer to Division 26 Section “Wiring Devices” for requirements.

F. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.

G. Hinged-Cover Enclosures: Comply with UL 50 and NEMA 250, with continuous-hinge cover with flush latch unless otherwise indicated.

1. Enclosures: Steel, finished inside and out with manufacturer's standard enamel.

2. Interior Panels: Steel; all sides finished with manufacturer's standard enamel.

H. Cabinets:

1. NEMA 250 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.
6. Nonmetallic cabinets shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

PART 3 - EXECUTION

3.1 PATHWAY APPLICATION

A. Outdoors: Apply pathway products as specified below unless otherwise indicated:

1. Exposed Conduit: GRS or IMC.
2. Concealed Conduit, Aboveground: EMT with compression type fittings.
3. Underground Conduit: RNC, Type EPC-40-PVC, direct buried.
4. Boxes and Enclosures, Aboveground: NEMA 250. Type 3R.

B. Indoors: Apply pathway products as specified below unless otherwise indicated:

1. Exposed, Not Subject to Severe Physical Damage: EMT.
2. Exposed and Subject to Severe Physical Damage: IMC. Pathway locations include the following:

    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.
4. Damp or Wet Locations: GRS or IMC.
5. Pathways for Optical-Fiber or Communications Cable in Spaces Used for Environmental Air: EMT.
6. Pathways for Optical-Fiber or Communications-Cable Risers in Vertical Shafts: EMT.
7. Pathways for Concealed General-Purpose Distribution of Optical-Fiber or Communications Cable: EMT.
8. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4 stainless steel units in institutional and commercial kitchens and damp or wet locations.

C. Minimum Pathway Size: 3/4-inch trade size.

D. Pathway Fittings: Compatible with pathways and suitable for use and location.

1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.
2. PVC Externally Coated, Rigid Steel Conduits: Use only fittings listed for use with this type of conduit. Patch and seal all joints, nicks, and scrapes in PVC coating after installing conduits and fittings. Use sealant recommended by fitting manufacturer and apply in thickness and number of coats recommended by manufacturer.
3. EMT: Use set-screw, steel fittings. Use compression fittings where Type EMT is permitted outdoors. Comply with NEMA FB 2.10.

E. Do not install aluminum conduits, boxes, or fittings in contact with concrete or earth.

F. Install surface pathways only where indicated on Drawings.

G. Do not install nonmetallic conduit where ambient temperature exceeds 120 deg F.

3.2 INSTALLATION

A. Comply with the following standards for installation requirements except where requirements on Drawings or in this Section are stricter:

1. NECA 1.
2. NECA/BICSI 568.
3. TIA-569-E.
4. NECA 101
5. NECA 102.
6. NECA 105.

7. NECA 111.

B. Comply with NFPA 70 limitations for types of pathways allowed in specific occupancies and number of floors.

C. Comply with requirements in Division 07 Section "Penetration Firestopping" for firestopping materials and installation for penetrations through fire-rated walls, ceilings, and assemblies.

D. Comply with requirements in Division 26 Section "Hangers and Supports for Electrical Systems" for hangers and supports.

E. Comply with requirements in Division 27 Section 27 05 44 "Common Work Results for Communications" for sleeves and sleeve seals for communications.

F. Keep pathways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal pathway runs above water and steam piping.

G. Complete pathway installation before starting conductor installation.

H. Arrange stub-ups so curved portions of bends are not visible above finished slab.

I. Install no more than the equivalent of two 90-degree bends in any pathway run. Support within 12 inches of changes in direction. Utilize long radius ells for all optical-fiber cables.

J. Conceal rigid conduit within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.

K. Support conduit within 12 inches of enclosures to which attached.

L. Pathways Embedded in Slabs:

1. Run conduit larger than 1-inch trade size, parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support. Secure pathways to reinforcement at maximum 10-foot intervals.
2. Arrange pathways to cross building expansion joints at right angles with expansion fittings. Comply with requirements for expansion joints specified in this article.
3. Arrange pathways to keep a minimum of 2 inches of concrete cover in all directions.
4. Do not embed threadless fittings in concrete unless specifically approved by Architect for each specific location.
5. Change from nonmetallic conduit and fittings to metal conduit and fittings before rising above floor.

M. Stub-ups to Above Recessed Ceilings:

1. Use EMT, IMC, or RMC for pathways.
2. Use a conduit bushing or insulated fitting to terminate stub-ups not terminated in hubs or in an enclosure.

N. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of pathway and fittings before making up joints. Follow compound manufacturer's written instructions.

O. Coat field-cut threads on PVC-coated pathway with a corrosion-preventing conductive compound prior to assembly.

P. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install insulated bushings on conduits terminated with locknuts.

Q. Install pathways square to the enclosure and terminate at enclosures with locknuts. Install locknuts hand tight plus one additional quarter-turn.

R. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure, to assure a continuous ground path.

S. Cut conduit perpendicular to the length. For conduits of 2-inch trade size and larger, use roll cutter or a guide to ensure cut is straight and perpendicular to the length.

T. Install pull wires in empty pathways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of pull wire. Secure pull wire, so it cannot fall into conduit. Cap pathways designated as spare alongside pathways in use.

U. Surface Pathways:

1. Install surface pathway for surface telecommunications outlet boxes only where indicated on Drawings.
2. Install surface pathway with a minimum 2-inch radius control at bend points.
3. Secure surface pathway with screws or other anchor-type devices at intervals not exceeding 48 inches and with no less than two supports per straight pathway section. Support surface pathway according to manufacturer's written instructions. Tape and glue are not acceptable support methods.

V. Pathways for Optical-Fiber and Communications Cable: Install pathways, metal and nonmetallic, rigid and flexible, as follows:

1. 3/4-Inch Trade Size and Smaller: Install pathways in maximum lengths of 50 feet.
2. 1-Inch Trade Size and Larger: Install pathways in maximum lengths of 75 feet.
3. Install with a maximum of two 90-degree bends or equivalent for each length of pathway 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.

W. Install pathway-sealing fittings at accessible locations according to NFPA 70 and fill them with listed sealing compound. For concealed pathways, 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 pathway-sealing fittings according to NFPA 70.

X. Install devices to seal pathway interiors at accessible locations. Locate seals, so no fittings or boxes are between the seal and the following changes of environments. Seal the interior of all pathways at the following points:

1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
2. Where an underground service pathway enters a building or structure.
3. Where otherwise required by NFPA 70.

Y. Comply with manufacturer's written instructions for solvent welding PVC conduit and fittings.

Z. Expansion-Joint Fittings:

1. Install in each run of aboveground RMC and EMT that is located where environmental temperature change may exceed 100 deg F, and that has straight-run length that exceeds 100 feet.

2. Install expansion fittings at all locations where conduits cross building or structure expansion joints.
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 time of installation. Install conduit supports to allow for expansion movement.

AA. Hooks:

1. Size to allow a minimum of 25 percent future capacity without exceeding design capacity limits.
2. Shall be supported by dedicated support wires. Do not use ceiling grid support wire or support rods.
3. Hook spacing shall allow no more than 6 inches of slack. The lowest point of the cables shall be no less than 6 inches adjacent to ceilings, mechanical ductwork and fittings, luminaires, power conduits, power and telecommunications outlets, and other electrical and communications equipment.
4. Space hooks no more than 5 feet o.c.
5. Provide a hook at each change in direction.

BB. Mount boxes at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements. Install boxes with height measured to center of box unless otherwise indicated.

CC. 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 and plumb. Prepare block surface to provide a flat surface for a raintight connection between box and cover plate or supported equipment and box.

DD. Horizontally separate boxes mounted on opposite sides of walls, so they are not in the same vertical channel.

EE. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for the purpose.

FF. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.

GG. Set metal floor boxes level and flush with finished floor surface.

HH. 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. Install manufactured duct elbows for stub-ups at poles and equipment and at building entrances through floor unless otherwise indicated.
2. Underground Warning Tape: Comply with requirements in Division 26 Section "Identification for Electrical Systems."

3.4 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR COMMUNICATIONS PENETRATIONS

A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Division 27 Section "Common Work Results for Communication."

3.5 FIRESTOPPING

A. Install firestopping at penetrations of fire-rated floor and wall assemblies. Comply with requirements in Division 07 Section "Penetration Firestopping."

3.6 PROTECTION

A. Protect coatings, finishes, and cabinets from damage or deterioration.

1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
2. Repair damage to PVC coatings or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION

SECTION 28 05 00 - COMMON WORK RESULTS FOR ELECTRONIC SAFETY AND SECURITY

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. Electronic safety and security equipment coordination and installation.
2. Sleeves for raceways and cables.
3. Sleeve seals.
4. Grout.
5. Common electronic safety and security 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 electronic safety and security 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 electronic safety and security 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. 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, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Advance Products & Systems, Inc.
b. Calpico, Inc.
c. Metraflex Co.
d. Pipeline Seal and Insulator, Inc.

2. 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.
3. Pressure Plates: Stainless steel. Include two for each sealing element.
4. Connecting Bolts and Nuts: 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 COMMON REQUIREMENTS FOR ELECTRONIC SAFETY AND SECURITY 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 electronic safety and security 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.

3.2 SLEEVE INSTALLATION FOR ELECTRONIC SAFETY AND SECURITY PENETRATIONS

A. Electronic safety and security penetrations occur when raceways, pathways, cables, wireways, or cable trays 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 1/4-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. Protection of Roof:

1. Coordinate electrical work with roofing work in regard to any electrical items which may pierce or otherwise affect the roof.
2. Arrange for any cutting or repairing to roofing which might already be installed when an electrical installation is made.
3. Roof penetrations shall not void roofing warranty. Penetrations shall be coordinated with roofing supplier holding the warranty. Electrical contractor shall coordinate with roofing supplier for installation of pre-molded pipe seal or field fabricated pipe penetration as applicable. Electrical contractor to include all costs and coordination with and for roofing penetrations, new or existing.

4. Routing of electrical wiring thru ductwork, and penetrations of ductwork or roof curbs is not allowed.

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.

3.3 SLEEVE-SEAL INSTALLATION

A. Install to seal exterior wall penetrations.

B. 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 electronic safety and security installations to restore original fire-resistance rating of assembly. Firestopping materials and installation requirements are specified in Division 07 Section "Penetration Firestopping."

END OF SECTION

SECTION 31 11 00 – CLEARING AND GRUBBING

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Clearing, grubbing, removal, and proper disposal of trees, shrubs, bushes, etc. within the limits of construction as indicated on the drawings or otherwise necessary to perform construction activities. Failure to show all trees, woods lines, etc. on the drawings does not relieve Contractor of responsibility to remove them.

B. Comply with all Federal, State, and Local laws, codes, and ordinances pertaining to the proper disposal of clearing and grubbing debris off site.

1.2 RELATED WORK

A. Section 31 25 00 – Erosion and Sedimentation Controls

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 GRUBBING

A. Completely remove trees, shrubs, stumps including their main root ball and entire root system.

B. Below subgrade elevation, refill all voids created by removal of root ball with approved soils (in grass areas) or stone (in pavement areas). Properly compact to avoid soft spots and excessive settlement.

3.2 DISPOSAL

A. All debris and waste resulting from clearing and grubbing operations shall be disposed of off site at approved locations. Contractor shall pay all applicable tipping fees, etc.

B. Perform all work in compliance with requirements of erosion control as required by applicable permits, noted on the drawings and/or described in the specifications.

END OF SECTION 31 11 00

SECTION 31 20 00 – EARTH MOVING

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Remove topsoil and stockpile a sufficient amount for final placement in all areas to receive sod or seeding. Final placement and spreading of topsoil to a minimum depth of 6 inches in all areas affected by construction where impervious surfaces (buildings or pavements) are not constructed. Import topsoil as required at no additional cost to the Owner.

B. All excavation (cut) and embankment (fill) work necessary to construct subgrades to contours, elevations and grades shown on the drawings.

C. All excavation above subgrade elevations shall be considered as unclassified. No additional payment shall be made for rock excavation or unsuitable soil excavation lying between the existing subgrade (elevation of natural ground after topsoil has been removed) and the proposed subgrade. Proposed subgrade elevations in cut areas are defined as follows:

1. Areas to be seeded – Finish grade minus 6 inches minimum topsoil
2. Areas to receive sod – Finish grade minus thickness of sod minus 6 inches minimum topsoil
3. Areas to receive athletic surfacing – Finish grade minus depth of infield mix / top dressing minus 6 inches of compacted soil.
4. Sidewalks – Finish grade minus 4 inches concrete minus 4 inches stone
5. Thickened foundation slab under athletic field bleachers – Finish grade minus required thickness of concrete minus required thickness of stone (refer to structural).
6. Storm Drainage Trenches – Bottom of pipe minus thickness of bedding
7. Storm Drainage Structures – Bottom of structure minus thickness of bedding
8. Utility Trenches (water & sanitary sewer) – Bottom of pipe minus thickness of bedding
9. Building Areas – Refer to Architectural Drawings
10. Building Foundations – Refer to Structural & Architectural Drawings.
11. In fill areas subgrade is defined as existing grade minus depth of topsoil.

D. Any unsuitable soils shall be disposed of offsite.

E. Additional payments will be received by the Contractor for undercutting and engineered refill of unsuitable soils lying below the proposed subgrade elevation in cut areas, and the existing subgrade elevation in fill areas. Locations and depths of undercut will be as directed by the Owner's Geotechnical Consultant or his representative. Contractor is responsible for securing the services of a Tennessee Licensed Surveyor to accurately define the limits of all undercut areas and their associated quantities. Payments will be determined on the basis of unit prices established in the Owner-Contractor Agreement.

F. Contractor shall coordinate all work with the Owner's Geotechnical Consultant so that his representative will be on site to perform all testing required by the specifications or otherwise directed by the Engineer. Full documentation of all testing will be kept on file by the Contractor and presented to the Engineer in a timely fashion for periodic review. Such information will likewise be presented to the Owner upon request, and/or upon completion of the work for his project files.

G. Provide all equipment, personnel, etc. necessary to successfully complete the work in accordance with the drawings and specifications within the contract time allotted.

1.2 RELATED WORK

A. Section 31 25 00 – Erosion and Sedimentation Controls

B. Section 31 11 00 – Clearing and Grubbing

1.3 EXISTING CONDITIONS

A. An attempt has been made to show utilities known to exist in their approximate location. All utility information has been provided by either the Surveyor or the City of Oak Ridge. The Contractor is responsible for contacting utility providers and the City of Oak Ridge in order to determine the exact location, nature and status of all utility lines (whether shown on the drawings or not) before removing, adjusting, altering, extending or relocating any such utilities. Contractor shall make all necessary caps, plugs, terminations, etc. as required by the utility provider and / or governing authorities to return said utility to complete operation at no additional cost to the Owner. Any utility which is damaged shall be repaired and / or replaced by the Contractor at no additional cost to the Owner.

B. Existing data shown on the drawings has been obtained from field surveys, along with other general information provided by the City of Oak Ridge. The Contractor is expected to personally examine the site, make investigations, and decide for themselves the character of the materials to be encountered, existing conditions, and work to be performed.

C. The Contractor shall verify the existence or nonexistence of septic tanks, wells, cisterns, basements or cellars on the site. The existence of any of the above items not shown on the drawings shall be brought to the attention of the Engineer immediately. The above shall be properly demolished, capped or removed as required by the Engineer, and the area filled and compacted as specified at no additional cost to the Owner.

1.4 GRADES, LINES, AND LEVELS

A. Grades, lines, levels and benchmarks shall be established and maintained by the Contractor. The Surveyor's control points are shown on the drawings. Contractor shall verify the location and elevation of all control points with the Owner's surveyor who performed the boundary / topographical survey for the project. Notify the Engineer of any discrepancies.

B. Contractor to verify all grades, lines, levels and dimensions shown on the drawings. If existing grades are at variance with the drawings, notify the Engineer immediately and receive instruction prior to commencing work.

C. Contractor shall be responsible for complete and accurate field layout (dimensions, elevations, etc.) of all work to be performed under this contract.

1.5 PROTECTION

A. If benchmarks or monuments are disturbed or destroyed, secure the services of a licensed surveyor, and replace as directed by the Engineer at no additional cost to the Owner.

B. Protect adjacent property from construction damage.

C. Erect barricades, fences, signs and other protective devices in accordance with the requirements of the Project Manual, and/or otherwise required by governing codes / regulations.

D. Provide and maintain protection for persons and property throughout the entire construction period.

E. Restore to original grades and conditions, all properties damaged by any activity related to the work, and take adequate precautions to avoid settlements or cave-in of properties higher than the site; and silting, eroding, or other damage to properties lower than the site. Protect existing culverts, storm sewers and adjacent properties from sediment, construction materials, trash, etc. both public and private at no additional cost to the Owner.

1.6 TESTING

A. Owner's Geotechnical Consultant will perform all testing described herein or otherwise requested by the Engineer. Cost of lab work and field testing will be paid for by the Owner. Contractor shall coordinate all testing with Owner's Geotechnical Consultant. Depth and frequency of testing may be modified by Owner's Geotechnical Consultant.

B. Compaction tests will be performed in accordance with ASTM D-698 (standard proctor)

C. Compaction tests shall be made for each soil of varying characteristics at a depth of 6 inches to 1 foot below the surface of each one foot of compacted lift.

D. Perform a minimum of one compaction test for each lift for each five thousand (5,000) square feet of fill under structures with a minimum of two tests regardless of the square footage. Area calculated shall include 10'- 0" beyond the building line.

E. Perform a minimum of one test for each lift per five thousand (5,000) square feet for all other areas other than structural fill area.

F. Perform one test for each 100 linear feet per two feet of fill thickness placed in confined trenches.

G. Provide representative samples of soil proposed for fill to the laboratory for testing. Samples shall weigh not less than 50 pounds each.

1.7 PROTECTION OF EXISTING WORK REMAINING

A. Existing pavements opened or damaged in performance of this work shall be restored at no additional cost to the Owner. Restoration shall be performed in a manner prescribed by authorities having jurisdiction and as approved by the Engineer.

B. Clean existing areas outside of grading limits (which are disturbed as a result of these operations) of debris and restore to original grades and condition, including seeding.

1.8 DISPOSITION OF UTILITIES

A. Follow rules and regulations of authorities having jurisdiction in executing the work under this article.

B. Protect active utilities shown on the drawings from damage resulting from Contractor's operations. Remove, relocate or coordinate such work with the utility provider as necessary to install improvements as designed. If active utilities, not shown on the drawings, are encountered, notify the Engineer immediately. All utility work required to remove, adjust or relocate said utility (whether shown on the drawings or not), shall be performed at no additional cost to the Owner. If the utility provider elects to perform such work with their own forces or sub-contractor, Contractor shall pay all costs, fees, etc. associated with the work.

C. Inactive and abandoned utilities encountered in excavation and grading operations shall be removed, plugged, or capped as directed by the Engineer in consultation with the utility owner. In absence of specified requirements, plug or cap such utility lines at least five (5') feet outside of building walls or as required by governing authorities and / or utility providers.

PART 2 - PRODUCTS

2.1 MATERIALS

A. All soil fill material shall be clean subsoil, free from trash, debris, roots, organics, topsoil, other deleterious and/or frozen material. Suitable fill materials for structural fills should consist of a cohesive soil with a Standard Proctor maximum dry density of 90 pcf or greater; a Plasticity Index of 35% or less; and a maximum particle size of 6 inches.

B. All material shall be capable of compaction to required densities as specified and should be tested by the Geotechnical Consultant to confirm that it meets the project requirements before being placed.

C. Dense graded aggregate (DGA) fill may be used as backfill in undercut excavations and in utility trench excavations. The DGA used for this sections should be Type A and Grading D or E in accordance with Section 903.05 of the Tennessee Department of Transportation (TDOT) Specifications.

D. Unsuitable fill material shall be defined as that which fails to conform to the requirements of the preceding paragraphs and / or is rejected by the Owner's Geotechnical Consultant. Unsuitable fill shall be removed from the site and properly disposed of.

PART 3 - EXECUTION

3.1 PREPARATION

A. Establish and identify required lines, levels, contours, and datum.

B. Maintain benchmarks, monuments, and other reference points. Re-establish if disturbed or destroyed, at no additional cost to the Owner.

C. Before start of grading, establish the location and extent of utilities in the work area.

D. Maintain, protect, re-route or extend, as required, existing utilities to remain which pass through the work area at no additional cost to the Owner.

3.2 REMOVAL OF TOPSOIL

A. Prior to starting general excavation, strip topsoil from within the limits of the project site. Do not strip topsoil in a muddy condition and avoid mixing with subsoil. Remove all topsoil, to whatever depth found, from areas over which any construction is to be placed, such as buildings, embankments (fills), etc. Also strip topsoil from all excavation (cut) areas. Stockpile the stripped topsoil within the site at locations designated on the Erosion Control Plan / SWPPP (Storm Water Pollution Prevention Plan) or at other approved locations where it will not hinder construction operations. Topsoil stockpiles shall be free from trash, brush, tree stumps, large roots, stones over 2 inches in diameter, and other objectionable material. Protect the stockpiled topsoil against loss and the admixture of debris. Place silt fences around all stockpile areas. Divert concentrated storm water flow away from stockpiles.

B. Do not drive heavy equipment over stockpiled topsoil. Dress stockpile.

3.3 GRADING

A. Grade the entire site to required subgrade elevations. Refer to drawings for finish grade contours and spot elevations to be used in conjunction with details and specifications in determining subgrade elevations. Replace and spread topsoil to a minimum depth of 6 inches. Fine grade to ensure drainage away from all buildings and in the vicinity of area drains. Grading shall slope uniformly from spot elevations / high points to area drains. Accurate fine grading in close proximity to buildings is critical. Do not sump area drains (i.e. improperly grade just in the vicinity of the area drain). No ponding will be allowed. Exterior grades must not slope toward buildings or be higher than finish floor.

B. Fill shall be placed only on a stable subgrade. If required, undercutting and refill as directed by the Owner's Geotechnical Consultant shall be performed to establish a suitable subgrade. Once any required undercutting is completed and prior to the placement of any fill material, the exposed surface shall be proof-rolled and properly compacted. All pavement and building areas shall bear on subgrade soils compacted to a minimum of 98 percent of the soil's Standard Proctor Maximum Dry Density (ASTM D-698) to within 2% of the optimum moisture content.

C. Fill shall be placed in loose, horizontal lifts not exceeding 8 inches in thickness. Each lift should be tested by Owner's Geotechnical Consultant to confirm that the Contractor's method is capable of achieving the project requirements before placing any subsequent lifts. Any areas, which have become soft or frozen, shall be removed at no additional cost to the Owner, before additional fill is placed.

D. Dense Graded Aggregate (DGA) fill should be placed in loose, horizontal lifts not exceeding 8 inches in loose thickness. Each lift should be compacted to at least 98 percent of maximum dry density per the Standard Proctor Method (ASTM D698). Each lift should be compacted, tested by the Owner's Geotechnical Consultant and approved before placing subsequent lifts.

E. Building and pavement structural fill shall extend a minimum of ten (10') feet outside of building / pavement (or future building / pavement) lines. Slope of fill shall not exceed 3H:1V or flatter if shown on the drawings.

F. In cut areas, any soft areas encountered at proposed subgrade elevation shall be undercut and refilled as directed by the Owner's Geotechnical Consultant.

3.4 REMOVAL OF WATER

A. Keep excavated areas and/or areas prone to ponding, free of water throughout the construction period in order to prevent softening / deterioration of the subgrade. Do not allow water to remain ponded after a rainfall.

B. Pump all water from ponded areas and/or install temporary drainage piping as necessary to alleviate ponding. All discharges of construction storm water must comply with erosion control methods (i.e. filter bag, etc.)

3.5 UNSUITABLE MATERIAL

A. Unsuitable soils shall be disposed of offsite.

3.6 PROOF-ROLLING

A. Entire site shall be proof-rolled with heavy, approved construction equipment. Any soft areas thus determined, shall be undercut and replaced with suitable material properly compacted. Once an area of soft yielding soils has been undercut and refilled, if it becomes soft again due to moisture, traffic, etc., then Contractor shall remove and replace it as needed at no additional cost to the Owner.

B. Proof-roll subgrade prior to commencement of filling operations. Proof-rolling should be performed after stripping of topsoil and after a suitable period of dry weather to avoid degrading the subgrade.

C. Proof-roll all cut areas after subgrade elevations have been attained. Scarify and recompact subgrade to 98 percent of the soils maximum dry density per the Standard Proctor Method (ASTM D-698) and within 2% of the optimum moisture content.

D. All proof-rolling and / or undercutting and refill operations shall be performed in the presence of a representative of the Owner's Geotechnical Consultant.

E. If existing subgrade soils in either cut or fill areas are suitable for construction operations with the exception of excessive moisture, they shall not be undercut. Instead, the Contractor shall scarify, aerate or otherwise manipulate the soils until they have dried sufficiently to be incorporated into the project. This work shall be performed at no additional cost to the Owner.

3.7 PLACING FILL AND COMPACTION

A. Place all horizontal layers not to exceed eight (8") inches in loose thickness. Compact each layer to the required density.

B. Water content of material to receive compaction shall be uniform throughout each layer of the material. Allowable ranges of moisture content shall be determined by the Geotechnical Consultant. Contractor may be directed to add necessary moisture to material or manipulate and aerate to reduce excessive moisture. No additional payment shall be made to the Contractor for adjusting moisture content of the soils.

C. Where the fill consists of sand or gravel materials, compacting equipment shall consist of pneumatic-tired or steel wheel rollers, either of the vibratory of static loaded type. The effective load shall not be less than 4,000 pounds per foot of drum lengths for compaction of a layer (8") inches in thickness.

D. Pneumatic rollers shall consist of two axles, on which there are mounted not less than nine pneumatic tires, in a manner such that the rear wheels will not follow in the track of the forward group. The roller should have a rigid frame, provided with a platform for carrying the vibratory equipment or ballast.

E. Where cohesive soils are used as fill, each layer shall be compacted with a sheepsfoot roller. The rollers shall have a staggered row of feet and shall be loaded to produce a pressure of at least 200 pounds per square inch of contact with the soil.

F. Fill materials placed shall be protected from freezing. No materials shall be placed on top of frozen materials.

3.8 ROCK EXCAVATION

A. All excavation work shall be considered unclassified regardless of materials encountered. No additional payment shall be made to the Contractor for removal of rock.

B. Should rock be encountered in the cut areas or in the trenches, use a backhoe or ripper until the use of such equipment is not practical.

C. Remove rock below slabs, footings, and pavements as directed by the Owner's Geotechnical Consultant.

D. Perform blasting only after receiving written approval from the Engineer and / or upon notifying the Owner's Insurance Company and local authorities of the intent. Also, refer to requirements for insurance as specified in the Project Manual. Engage skilled mechanics to perform blasting. Provide heavy mats to minimize concussion. Handle, store and use explosives in accordance with the "Manual of Accident Prevention in Construction" of the Associated General Contractors of America, Inc. copyright 1958 with amendments. Pre-blast surveys should be performed on adjacent properties which could potentially incur damage as a result of blasting operations. Contractor to pay all costs of pre-blast surveys, monitoring, etc.

E. No blasting shall be allowed while adjacent ballfields are being utilized or persons other than those working for / with the Contractor are present.

F. Blasted rock of a size or type that can not be used in fill areas shall be removed from the site at no additional cost to the Owner.

3.9 CLASSIFICATION OF FILLS AND COMPACTION DENSITY

A. Structural Fill: Buildings, future building expansion areas, parking areas, access drives, sidewalks, and concrete pavements. The subgrade in structural fill areas shall be compacted to 98 percent of the maximum dry density as determined by the Standard Proctor Method (ASTM D-698) to within 2% of optimum moisture content.

B. Non-structural Fill: Grass areas, athletic fields and other areas where the types of improvements listed in paragraph "A" above are not proposed currently. The subgrade shall be compacted to 95 percent of the maximum dry density as determined by the Standard Proctor Method.

3.10 GRADING TOLERANCES

A. Grade all areas to subgrade elevations as indicated on the drawings. Grade the surface of all work to within specified tolerances shown below, free of voids and compacted as specified herein. Provide a smooth, uniform transition between points where elevations are shown. Tie all newly graded work to existing elevations in a uniform manner.

B. The softball field shall be laser graded. Refer to the drawings for additional information.

C. Graded surfaces shall be free from irregular surface changes, and as follows: Surfaces under building slabs, sidewalks and pavements shall be shaped to lines, grades and cross-sections with surface not more than ½ inch above or below the required subgrade elevation. Grassed areas shall be shaped to receive topsoil to within 0.10 foot above or below required subgrade elevations.

D. Grade areas adjacent to building lines to drain away from building. Minor adjustments can be made to subgrades upon prior approval of the Engineer in order to avoid ponding.

E. Install drainage swales as necessary to prevent ponding of grading areas and convey runoff to catch basins / area drains.

F. Protect all newly graded surfaces from traffic and erosion. Keep free of debris. Where graded or compacted surfaces are damaged by subsequent operations, return to indicated grade and state of compaction at no additional cost to the Owner.

END OF SECTION 31 20 00

SECTION 31 23 33 – TRENCHING AND BACKFILLING

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Excavate for storm drainage piping, sanitary sewerage piping, water piping & structures. Preparation of trench bottom with appropriate materials. De-water excavation as required. Place and compact granular bedding & backfill. Provide necessary sheeting, shoring, and bracing.

1.2 RELATED WORK

A. Section 31 25 00 – Erosion and Sedimentation Controls

B. Section 31 20 00 – Earth Moving

C. Section 33 10 00 – Water Utilities

D. Section 33 30 00 – Sanitary Sewerage

E. Section 33 40 00 – Storm Water Utilities

1.3 PRECAUTIONS

A. Notify utility providers when necessary to disturb existing facilities and abide by their requirements for repairing, replacing or relocating. Should utility provider elect to perform the work themselves or with their own subcontractor, Contractor shall pay all associated costs.

B. Protect all buildings, pavements, and other features which are to remain.

C. Protect all vegetation (trees, shrubs, etc.) which is to remain.

D. Protect all benchmarks and other survey points.

PART 2 - PRODUCTS & MATERIALS

2.1 BEDDING AND BACKFILL MATEIALS (ASTM D 2487)

A. Class I Material: Angular, ¼ to 1-1/2 inch graded stone including a number of fill materials that have regional significance such as crushed stone, cinders, slag and crushed shells.

B. Class II Material: Coarse sands and gravels with a maximum particle dimension of 1-1/2 inch including variously graded sands and gravels containing small percentages of fines, generally granular and non-cohesive, either wet or dry.

C. Class III Material: Fine sand and clayey gravels, including fine sands, sand-clay mixtures, and gravel-clay mixtures.

D. Class IV Material: Silt, silty clays, and clays, including inorganic clays and silts of medium to high plasticity and liquid limits.

E. In areas of elevated karst risk, or as noted on the drawings or directed by the Engineer or Owner's Geotechnical Consultant, Dense Graded Aggregate (DGA) should be used exclusively for bedding and backfill. The DGA used should be Type A and Grading D or E in accordance with Section 903.05 of the Tennessee Department of Transportation (TDOT) Specifications.

PART 3 - EXECUTION

3.1 PREPARATION

A. Install barriers and other devices to protect areas adjacent to construction.

3.2 EXCAVATION

A. Perform in such a manner as to form a suitable trench in which to place the pipe and cause the least inconvenience to the public and / or Owner's daily business. Excavate trenches as required to allow proper placement of all piping, structures, fittings, and accessories. Refer to drawings and manufacturer's recommendations for details.

B. Excavation shall be by open cut unless otherwise noted. The top portion of the trenches may be excavated as required by the Contractor to any width which will not cause damage to any adjacent structure. The maximum width at the crown of the pipe shall be two feet plus the nominal diameter of the pipe, unless approved specifically by the Engineer due to unusual bracing and shoring requirements. The minimum width at the crown of the pipe shall be one foot plus the nominal pipe diameter unless otherwise detailed.

C. Where storm piping and/or other utilities cross public streets, excavations must be performed in accordance with State and/or local requirements for work to be performed within the right-of-way. Contractor shall be responsible for obtaining any approvals necessary for such work to be performed.

D. Where required, cut pavement along neat, straight lines with either a pavement breaker or pavement saw.

E. Trench depth shall be as shown on the drawings for storm drainage and sanitary sewer piping. For water lines, trench depth shall be sufficient to provide a minimum cover of 36 inches over the top of the pipe unless otherwise noted. Trench depth may be increased at no additional cost to the Owner to avoid conflicts with other utilities.

F. Align trench as shown on the drawings unless a change is necessary to miss an unforeseen obstruction. Contractor shall obtain the Engineer's prior approval for any changes in alignment.

G. For PVC water & sanitary sewer, and HDPE storm drainage piping: envelop in stone in accordance with details, specifications and manufacturer's recommendations. Should discrepancies exist between the manufacturer's recommendations and these specifications and / or details found on the drawings, Contractor shall advise the Engineer who will make the final determination regarding the installation and materials to be used. No additional payment will be made to the Contractor for stone envelope (full height under pavements) and bedding.

H. For reinforced concrete storm drainage piping and ductile iron water piping (when applicable), install in stone within pipe bedding and haunching zone. Make sure that pipe is supported for its full length. Carefully fill the area along each side of the pipe. Pipe shall be bedded and backfilled with stone for full height under pavement areas. In other areas, initial and final backfill can be approved material other than stone.

I. When unstable soil is encountered at the trench bottom (subgrade), remove it to a depth required to assure support of the pipeline and refill to the proper grade with approved stone. Removal of unsuitable soils below subgrade and refill with stone as directed by the Owner's Geotechnical Consultant shall be performed in accordance with unit prices established in the Owner-Contractor Agreement. Contractor's surveyor shall accurately measure quantities of undercut and stone refill.

J. Remove rock encountered in trench excavation to a depth of six (6) inches below the bottom of the pipe barrel, backfill with an approved aggregate, and compact to uniformly support the pipe. In no case shall solid rock exist within six (6) inches of the finished pipeline. Rock removal within the 6 inch envelope shall be performed by Contractor at no additional cost to the Owner.

K. When soils borings (Geotechnical Report) are provided, they are for information only and do not guarantee existing conditions. Contractor shall make such investigations as he deems necessary to determine existing conditions.

3.3 SHEETING, SHORING, AND BRACING

A. Slope sides of trench as required to assure stability. Comply with all Federal, State, and Local requirements for safety. Furnish and install sheeting, shoring, and bracing as required to maintain safety for those workers in the vicinity of the trench.

B. Unless adjacent facilities will be damaged, remove all sheeting, shoring, and bracing after backfill has been placed to a depth of 18 inches over the pipeline.

C. Cut shoring off at the top of the pipe and leave the lower section in the trench unless directed otherwise by the Engineer, Owner's Geotechnical Consultant or Authorities Having Jurisdiction.

3.4 USE OF EXPLOSIVES

A. Conduct all blasting operations in accordance with prevailing Municipal, State or other governing agency regulations, codes, ordinances or laws.

B. Exercise due caution when blasting adjacent to existing structures and pipelines. A pre-blast survey of all structures on adjacent property should be performed where damage could be incurred as a result of blasting operations. Cost of pre-blast survey, monitoring, etc. shall be the responsibility of the Contractor.

C. If structures or pipelines are damaged, promptly replace or repair them at no additional cost to the Owner.

D. Do not conduct blasting operations within 25 feet of water, sewer, gas or other utility lines, unless otherwise approved by the utility provider. Notify all utility providers in advance of any blasting. Distances may be increased above the 25 foot minimum if required by utility providers.

E. Cover all shots with blasting mats to prevent flying material.

F. Do not perform blasting operations when adjacent athletic fields are being utilized.

G. Coordinate timing for blasting operations with AHJ, local municipalities, and the Owner.

3.5 DISPOSAL OF UNSUITABLE MATERIAL

A. Unsuitable soils shall be disposed of offsite.

3.6 UNAUTHORIZED EXCAVATION

A. All excavation outside or below the proposed lines and grades shown on the drawings, otherwise specified, or directed by the Engineer is considered as unauthorized.

B. Backfill areas of unauthorized excavation with the type material necessary (earth, stone or concrete) to assure the stability of the structure or construction involved.

3.7 REMOVAL OF WATER

A. Keep excavated areas free of water while work is in progress. Do not allow water to remain in trenches after a rainfall. Pump all water from trenches to avoid softening of subgrade.

B. Take particular precautions to prevent the displacement of structures or pipelines as a result of accumulated water.

3.8 OBSTRUCTIONS

A. Obstructions shown on the drawings are for information only and do not guarantee their exact locations nor that other obstructions are not present.

B. When utilities or obstructions are not shown on the drawings but are present at the proposed location of the pipeline or structure, the Contractor may request to relocate the pipeline to avoid disturbing the utility or obstructions. It the Engineer denies his request, then the Contractor must relocate the existing utility or obstruction at no additional cost to the Owner.

C. Exercise due care in excavating adjacent to existing obstructions and do not disturb same unless absolutely necessary.

D. In the event obstructions are disturbed, repair or replace as quickly as possible to the condition existing prior to their disturbance. This repair or replacement will be at the Contractor's expense.

E. If required by the utility provider, Contractor shall pay for the repair or replacement work performed by the forces of the utility provider or other appropriate party.

F. If replacement or repair of disturbed obstructions is not performed by the Contractor in a timely fashion, the Owner after giving written notice to the Contractor, may have the necessary work done by others and deduct the cost of same from payments to the Contractor.

3.9 STORM SEWER BEDDING & INITIAL BACKFILL

A. Bed and backfill pipe in accordance with details on the drawings and these specifications. Bed pipe on Class I or II material and sufficient additional Class II material accurately shaped by a template to fit the lower part of the pipe exterior. Backfill pipe to subgrade with stone under all pavement areas. Other areas can be backfilled with approved material other than stone.

B. Bedding and initial backfill for HDPE piping (supersedes other paragraphs within this section). Completely encapsulate each pipe section with a minimum of six (6") inches of granular material (stone) on the bottom, nine (9") inches on the sides and twelve (12") inches on the top. Refer to the manufacturer's recommendations for additional information. Advise the Engineer of any conflicts between this specification and the Manufacturer's recommendations. The Engineer will then make the final determination regarding any conflict. Please note that the Manufacturer's recommendations do not take precedence over these specifications.

C. In areas of elevated karst risk, or as noted on the drawings or directed by the Engineer or Owner's Geotechnical Consultant, Dense Graded Aggregate (DGA) should be used exclusively for bedding and backfill. The DGA used should be Type A and Grading D or E in accordance with Section 903.05 of the Tennessee Department of Transportation (TDOT) specifications. This paragraph supersedes other requirements within this specification.

D. Do not begin backfilling before the Owner's Designated Representative has viewed the installation (i.e. bedding, general alignment, and joints of the pipe). Contractor shall give the responsible party at least 48 hours notice in order for a site visit to be made. Please note that the prescribed viewing does not relieve Contractor of the full responsibility of installing storm piping in accordance with the drawings and specifications.

E. Perform backfilling by hand, together with tamping, until fill has progressed to twelve (12") inches above the top of the pipe (or more if detailed on the drawings or recommended by the Manufacturer). Deposit Class I granular material (where required) or loose soil free from lumps, clods, frozen material or stones in layers approximately six (6") inches deep. Compact by hand, or with manually operated machine tampers actuated by compressed air or other suitable means. Use tamps and machines of a suitable type which do not crush or otherwise damage the pipe.

3.10 GRAVITY SANITARY SEWER BEDDING & INITIAL BACKFILL

A. Always maintain proper grade and alignment during the bedding and tamping process. Any pipe dislodged during this process shall be replaced by the Contractor at his expense. All bedding and initial backfill to be properly compacted.

B. Bedding and initial backfill for polyvinylchloride PVC piping (supersedes other paragraphs within this section). Completely encapsulate each pipe section with a minimum of six (6") inches of granular material (stone) on the bottom, six (6") inches on the sides and twelve (12") inches on the top. Refer to the manufacturer's recommendations for additional information. Advise the Engineer of any conflicts between this specification and the Manufacturer's recommendations. The Engineer will then make the final determination regarding any conflict. Please note that the Manufacturer's recommendations do not take precedence over these specifications.

C. In areas of elevated karst risk, or as noted on the drawings or directed by the Engineer or Owner's Geotechnical Consultant, Dense Graded Aggregate (DGA) should be used exclusively for bedding and backfill. The DGA used should be Type A and Grading D or E in accordance with Section 903.05 of the Tennessee Department of Transportation (TDOT) specifications. This paragraph supersedes other requirements within this specification.

D. Do not begin backfilling before the Owner's Designated Representative has viewed the installation (i.e. bedding, general alignment, and joints of the pipe). Contractor shall give the responsible party at least 48 hours notice in order for a site visit to be made. Please note that the prescribed viewing does not relieve Contractor of the full responsibility of installing sanitary sewer piping in accordance with the drawings and specifications.

E. Perform backfilling by hand, together with tamping, until fill has progressed to twelve (12") inches above the top of the pipe (or more if detailed on the drawings or recommended by the Manufacturer). Deposit Class I granular material in layers approximately six (6") inches deep. Compact by hand, or with manually operated machine tampers actuated by compressed air or other suitable means. Use tamps and machines of a suitable type which do not crush or otherwise damage the pipe

3.11 WATER PIPING BEDDING & INITIAL BACKFILL

A. For PVC waterlines, completely encapsulate each pipe section with a minimum of six (6") inches of granular material (stone) on the bottom, six (6") inches on the sides and twelve (12") inches on the top. Refer to the manufacturer's recommendations for additional information. Advise the Engineer of any conflicts between this specification, the drawings, and the Manufacturer's recommendations. The Engineer will then make the final determination regarding any conflict. Please note that the Manufacturer's recommendations do not take precedence over these specifications. All bedding and initial backfill to be properly compacted.

B. In areas of elevated karst risk, or as noted on the drawings or directed by the Engineer or Owner's Geotechnical Consultant, Dense Graded Aggregate (DGA) should be used exclusively for bedding and backfill. The DGA used should be Type A and Grading D or E in accordance with Section 903.05 of the Tennessee Department of Transportation (TDOT) specifications. This paragraph supersedes other requirements within this specification.

C. Do not begin backfilling before the Owner's Designated Representative has viewed the installation (i.e. bedding and joints of the pipe). Contractor shall give at least 48 hours notice in order for a site visit to be made. Please note that the prescribed viewing does not relieve Contractor of the full responsibility of installing water piping in accordance with the drawings and specifications.

D. Perform backfilling by hand, together with tamping, until fill has progressed to twelve (12") inches above the top of the pipe (or more if detailed on the drawings or recommended by the Manufacturer). Deposit Class I granular material in layers approximately six (6") inches deep. Compact by hand, or with manually operated machine tampers actuated by compressed air or other suitable means. Use tamps and machines of a suitable type which do not crush or otherwise damage the pipe

3.12 FINAL BACKFILLING

A. After the backfill has reached a point twelve (12") inches or more above the top of the pipe, perform final backfilling depending upon the location of the work and danger from subsequent settlement.

B. Backfill beneath driveways, streets, parking lots, and other non-grassed areas shall extend all the way to the pavement subgrade. Use Class I granular material of either crushed limestone or crushed gravel of high weight and density. Carefully deposit in uniform layers not to exceed six (6") inches thick. Compact each layer thoroughly by rolling, ramming and tamping with tools suitable for that purpose in such a manner so as to not disturb the pipe.

C. In areas of elevated karst risk, or as noted on the drawings or directed by the Engineer or Owner's Geotechnical Consultant, Dense Graded Aggregate (DGA) should be used exclusively for bedding and backfill. The DGA used should be Type A and Grading D or E in accordance with Section 903.05 of the Tennessee Department of Transportation (TDOT) specifications. This paragraph supersedes other requirements within this specification.

D. Refer to the drawings for any "special locations" such as french drains, where stone backfill extends to subgrade.

END OF SECTION 31 23 33

SECTION 31 25 00 – EROSION AND SEDIMENTATION CONTROLS

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Erosion control as shown on the drawings and otherwise required to comply with applicable permitting by the Tennessee Department of Environment and Conservation. More specifically, the State's General NPDES Permit for Discharge of Storm Water associated with Construction Activities. In accordance with permit guidelines, the following items are being submitted to TDEC for review and approval on behalf of the Owner.
   1. Notice of Intent (NOI)
   2. Site Location Map
   3. Storm Water Pollution Prevention Plan (SWPPP)
   4. Erosion Control Drawings and Details

B. Once a Notice of Coverage (NOC) has been received from TDEC, the Contractor will be required to review the above information and sign the NOI and SWPPP as required. If TDEC requires, or if Contractor feels that additional measures beyond those shown on the erosion control drawings are required to adhere to the permit conditions, he shall provide such measures at no additional cost to the Owner. Contractor shall be responsible to the Owner and TDEC for any noncompliance with permit requirements during the entire construction period. If fines or penalties are imposed on the Owner by the State due to Contractor's noncompliance with permit conditions, such fines and costs associated with additional services performed by members of Owner's Project Design Team will be deducted from monies owed the Contractor.

C. Material Certifications will be required for all erosion control products.

1.2 RELATED WORK

A. Section 31 11 00 – Clearing and Grubbing

PART 2 - PRODUCTS

2.1 SILT FENCE (TYPE "A")

A. Tensile Strength per ASTM D-4632 shall be 120 lbs. minimum (Warp) and 100 lbs. minimum (Fill).

B. Elongation per ASTM D-4632 shall be 40 % maximum

C. AOS (Apparent Opening Size) per ASTM D-4751 shall be #30 maximum sieve size.

D. Flow Rate shall be 25 gallons per square foot minimum (GDT-87)

E. Ultraviolet Stability shall be 80 per ASTM D-4632 after 300 hours weathering in accordance with ASTM D-4355.

F. Bursting Strength shall be a minimum of 175 psi per ASTM D-3786 Diaphragm Bursting Strength Tester.

G. Minimum Fabric Width shall be 36 inches.

2.2 SILT FENCE (TYPE "C")

A. Tensile Strength per ASTM D-4632 shall be 260 lbs. minimum (Warp) and 180 lbs. minimum (Fill).

B. Elongation per ASTM D-4632 shall be 40 % maximum

C. AOS (Apparent Opening Size) per ASTM D-4751 shall be #30 maximum sieve size.

D. Flow Rate shall be 70 gallons per minute per square foot minimum (GDT-87)

E. Ultraviolet Stability shall be 80 per ASTM D-4632 after 300 hours weathering in accordance with ASTM D-4355.

F. Bursting Strength shall be a minimum of 175 psi per ASTM D-3786 Diaphragm Bursting Strength Tester.

G. Minimum Fabric Width shall be 36 inches.

2.3 STONE CHECK DAM

A. Stone check dams are constructed from large aggregate (clean of fines) such as TDOT #1 or #2 with a minimum stone size of 1.5 inch.

2.4 ROCK CHECK DAM

A. Rock check dams are constructed from small riprap such as TDOT Class A-1 (clean of fines) with stone sizes from 2 to 15 inches.

2.5 SANDBAG CHECK DAM

A. Sandbags filled with either aggregate or sand may also be used as a check dam.

2.6 STONE FILTER RING

A. When utilized at inlets / outlets with diameters less than 12 inches, the filter ring should be constructed of small riprap such as TDOT Class A-3 (clean from fines) with stone sizes from 2 to 6 inches.

B. When utilized at inlets with diameters greater than 12 inches, the filter ring should be constructed of small riprap such as TDOT Class A-1 (clean from fines) with stone sizes from 2 to 15 inches.

C. For added sediment filtering capabilities, the upstream side of the riprap can be faced with smaller coarse aggregate, such as TDOT #57 (clean of fines) with a minimum stone size of ¾ inch.

D. A geotextile should be used as a separator between the graded stone and the soil base and abutments. The geotextile will prevent the migration of soil particles from the subgrade into the graded stone. Geotextile should be non-toxic to vegetation, be inert to common chemicals, and be mildew and rot resistant. Materials should meet or exceed the strength, elongation, permittivity, apparent opening size, and ultraviolet stability properties of the requirements outlined in AASHTO M288 for the respective use.

2.7 MACHINED RIPRAP

A. Class A-1 riprap shall be 2 to 15 inches in diameter with 20% by weight at least 4 inch size. Typical thickness is 18 inches with a surface tolerance of 3 inches.

B. Class A-3 riprap shall be 2 to 6 inches in diameter with 20% by weight at least 4 inch size. Typical thickness is 12 inches with a surface tolerance of 2 inches.

2.8 SEDIMENT TRAP

A. The outlet for the sediment trap should consist of a stone section of the embankment located at the low point in the basin. A combination of coarse aggregate and riprap should be used to provide for filtering / detention as well as outlet stability. The smaller stone should be TDOT #3, #357, or #5 Coarse Aggregate (smaller stone sizes will enhance filter efficiency) and riprap should be Class A-1.

B. A geotextile should be used as a separator between the graded stone and the soil base and abutments. The geotextile will prevent the migration of soil particles from the subgrade into the graded stone. Geotextile should be non-toxic to vegetation, be inert to common chemicals, and be mildew and rot resistant. Materials should meet or exceed the strength, elongation, permittivity, apparent opening size, and ultraviolet stability properties of the requirements outlined in AASHTO M288 for the respective use.

2.9 STORM DRAIN INLET PROTECTION

A. Silt Fence Inlet Protection shall utilize Type C silt fence supported by 2x4 inch wood or equivalent steel posts with a minimum length of three feet spaced a maximum of 3 feet apart and driven into ground approximately 18 inches deep.

B. Block and Gravel Inlet Protection shall utilize concrete blocks (CMU's), 2x4 inch wood studs for lateral support (if needed), hardware cloth or comparable wire mesh with ½ inch openings, and clean coarse aggregate (TDOT #3, #357, or #5).

C. Gravel Inlet Protection shall utilize wire mesh with ½ inch openings and clean coarse aggregate (TDOT #3, #357, or #5).

D. Refer to drawings and / or Tennessee Erosion and Sediment Control Handbook for additional details.

2.10 STORM DRAIN OUTLET PROTECTION

A. Outlet protection at storm drainage pipe discharge points shall consist of Class A-1 riprap unless otherwise shown on the drawings. Riprap used in this fashion is considered as both temporary erosion control and a long-term stabilization measure.

2.11 MULCH WITHOUT SEEDING

A. As a temporary erosion control measure, mulch may be used without seeding during times when seed may not be expected to germinate due to temporary conditions.

B. Dry straw or hay may be utilized to achieve a 95% or greater soil coverage.

2.12 TEMPORARY VEGETATION

A. As a temporary erosion control measure, seeding with the following grass mixtures may be used: (1) January 1 to May 1 - Italian Rye 33%, Korean Lespedeza 33%, Summer Oats 34% (2) May 1 to July 15 – Sudan Sorghum 100% or Starr Millet 100% (3) July 15 to January 1 – Balboa Rye 67%, Italian Rye 33%.

2.13 EROSION CONTROL BLANKETS

A. Machine produced temporary blankets should have a consistent thickness with the organic material evenly distributed over the entire blanket area. All blankets should have a minimum width of 48 inches. Straw blankets, excelsior blankets, coconut fiber blankets, wood fiber blankets, and jute mesh blankets are acceptable.

B. Straw Blankets are temporary blankets that consist of weed-free straw from agricultural crops formed into a blanket. Blankets with a top side of photodegradable plastic mesh size of 5/16 x 5/16 inch and sewn to the straw with biodegradable thread are appropriate for slopes. The blanket should have a minimum dry weight of 0.5 pounds per square yard.

C. Excelsior blankets are temporary blankets that consist of curled wood excelsior (80% of fibers are six inches or longer) formed into a blanket. The blanket should have clear markings indicating the top side of the blanket and be smolder resistant. Blankets should have photodegradable plastic mesh having a maximum mesh size of 1-1/2 x 3 inches. The blanket should have a minimum thickness of ¼ of an inch and a minimum dry weight of 0.8 pounds per square yard. Slopes require excelsior matting with the top side of the blanket covered in the plastic mesh, and for waterways, both sides of the blanket require plastic mesh.

D. Coconut fiber blankets are temporary blankets that consist of 100% coconut fiber formed into a blanket. The minimum thickness of the blanket should be ¼ of an inch with a minimum dry weight of 0.5 pounds per square yard. Blankets should have photodegradable plastic mesh, with a maximum mesh size of 5/8 x 5/8 inch and be sewn to the fiber with a breakdown resistant synthetic yarn. Plastic mesh is required on both sides of the blanket if used in waterways. A maximum of two inches is allowable for the stitch pattern and row spacing.

E. Wood fiber blankets are temporary blankets that consist of reprocessed wood fibers that do not possess or contain any growth or germination inhibiting factors. The blanket should have a photodegradable plastic mesh with a maximum mesh size of 5/8 x ¾ inch, securely bonded to the top of the mat. The blanket should have a minimum dry weight of 0.35 pounds per square yard. A maximum of two inches is allowable for the stitch pattern and row spacing. This practice should be applied only to slopes.

F. Jute mesh consists of woven root fiber or yarn with regularly spaced openings between strands. A typical jute mesh will weigh approximately 1.0 pounds per square yard for basic slope applications.

2.14 EQUIVALENT MEASURES

A. Where TDEC required vegetative buffer strips can not be maintained during construction, or where otherwise deemed appropriate by the Engineer, “equivalent measures” as described herein and detailed on the drawings shall be utilized. Equivalent measures for erosion control shall include two parallel rows of Type C silt fencing. In some cases, if required by TDEC, a fiber roll shall be included between the Type C rows. If required by TDEC, the fiber roll shall be provided at no additional cost to the Owner.

B. Fiber rolls (also called fiber logs or straw wattles) are tube-shaped erosion control devices filled with straw, flax, rice, coconut fiber material, or composted material. Each roll is wrapped with UV-degradable polypropylene netting for longevity or with 100% biodegradable materials like burlap, jute, or coir.

2.15 SEDIMENT FILTER BAGS

A. During de-watering of trenches and ponded areas, pumps may be utilized to facilitate the process. If so, all contaminated (sediment laden) water shall be pumped either into sediment traps or filter bags / socks to block the flow of sediment off site.

B. Size of receiving bags and type / strength of geotextile fabric shall be determined by Contractor in compliance with applicable permitting by TDEC and other Authorities Having Jurisdiction.

PART 3 - EXECUTION

3.1 COMPLIANCE

A. Contractor shall comply with all Federal, State, and Local laws, codes, and ordinances pertaining to erosion control and the protection of the waters of the State including, but not limited to those permits and approvals listed in section 1.1 above.

B. Erosion control measures as shown on the drawings are considered by the Engineer as a minimum and in no way limits the responsibility of the Contractor to fully comply with applicable permits.

C. It is the intention and goal of the TNCGP and the SWPPP that any discharge from the property have no objectionable color contrast to the water body that receives it. The demolition and / or grading activity will be carried out in such a manner as will prevent any discharge that would cause a condition in which visible solids, bottom deposits, or turbidity impairs the usefulness of the waters on the property or downstream of the property for fish and aquatic life, livestock watering and wildlife, recreation, irrigation, navigation, or industrial or domestic water supply.

3.2 EXECUTION

A. Install erosion control measures in accordance with approved drawings, Tennessee Erosion and Sediment Control Handbook, and permit conditions prior to beginning any other work on the site (i.e. clearing, demolition, etc.)

B. Refer to TDEC Erosion & Sediment Control Handbook for additional information pertaining to the proper installation and maintenance of erosion control measures.

C. Inspect, maintain, and repair erosion and sedimentation control measures throughout the construction period until permanent vegetation has been established and the entire site has been stabilized.

D. Contractor to protect all storm water inlets (pipes, area drains, etc.) from sediment laden runoff by installing sufficient erosion control measures.

E. All erosion control measures shall be checked within 24 hours after any rainfall of 1/2 inches or more within a 24 hour period. During prolonged rainfall, daily checking and repairing is necessary.

F. A specific individual designated by the Contractor shall be responsible for installation, maintenance, and inspection of erosion and sediment control measures at the project site. In compliance with Part 5.5.3.10 of the TNCGP, the Contractor's EPSC Inspector will be required to have completed the TN EPSC Level One Certification Class.

G. Inspection reports shall be prepared as required by governing permits, and submitted to the Engineer in a timely manner.

H. Contractor shall notify the Engineer immediately of any erosion and sedimentation control issues which may arise during the construction period.

I. After permanent vegetation has been successfully established, remove and dispose of all erosion and sedimentation controls, and restore / stabilize any areas disturbed during removal.

J. Should sediment escape off site, Contractor shall be responsible for removing such sediment from all streets, downstream public and private properties, storm drainage piping, ditches, swales, etc. to the satisfaction of the Engineer in consultation with the property owner and/or local authority having jurisdiction. All affected properties shall be restored to their pre-construction condition. No work shall be performed on private properties without the consent of the property owner. Should sediment reach streams and/or wetland areas, an ARAP will be required before proceeding with restoration. Contractor shall bear the cost of all repairs, restoration measures, additional permitting, etc. required to satisfy the intent of this paragraph.

END OF SECTION 31 25 00

SECTION 31 31 16 - TERMITE CONTROL

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. Soil treatment.

1.3 REFERENCE STANDARDS

A. Comply with requirements of U.S. Environmental Protection Agency (EPA) and applicable State and local codes.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.
1. Include the EPA-Registered Label for termiticide products.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: A specialist who is licensed according to regulations of authorities having jurisdiction to apply termite control treatment and products in jurisdiction where Project is located and who employs workers trained and approved by manufacturer to install manufacturer's products .

1.6 FIELD CONDITIONS

A. Soil Treatment:
1. Environmental Limitations: To ensure penetration, do not treat soil that is water saturated or frozen. Do not treat soil while precipitation is occurring. Comply with requirements of the EPA-Registered Label and requirements of authorities having jurisdiction.
2. Related Work: Coordinate soil treatment application with excavating, filling, grading, and concreting operations. Treat soil under footings, grade beams, and ground-supported slabs before construction.

1.7 WARRANTY

A. Soil Treatment Special Warranty: Manufacturer's standard form, signed by Applicator and Contractor, certifying that termite control work consisting of applied soil termiticide treatment will prevent infestation of subterranean termites , including Formosan termites (Coptotermes formosanus) . If subterranean termite activity or damage is discovered during warranty period, re-treat soil and repair or replace damage caused by termite infestation.
1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain termite control products from single source.

2.2 SOIL TREATMENT

A. Termiticide: EPA-Registered termiticide acceptable to authorities having jurisdiction, in an aqueous solution formulated to prevent termite infestation.
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. BASF Corporation; Termidor
      b. Envu (formerly known as Bayer Environmental Science); Premise Pre-Construction
   2. Service Life of Treatment: Soil treatment termiticide that is effective for not less than five years against infestation of subterranean termites.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements for moisture content of soil per termiticide label,interfaces with earthwork, slab and foundation work, landscaping, utility installation, and other conditions affecting performance of termite control. Verify that soil surfaces are unfrozen, sufficiently dry to absorb treatment, final graded, and ready to receive treatment.

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

3.2 PREPARATION

A. General: Prepare work areas according to the requirements of authorities having jurisdiction and according to manufacturer's written instructions before beginning application and installation of termite control treatment(s). Remove extraneous sources of wood cellulose and other edible materials, such as wood debris, tree stumps and roots, stakes, formwork, and construction waste wood from soil within and around foundations.

B. Soil Treatment Preparation: Remove foreign matter and impermeable soil materials that could decrease treatment effectiveness on areas to be treated. Loosen, rake, and level soil to be treated, except previously compacted areas under slabs and footings. Termiticides may be applied before placing compacted fill under slabs if recommended in writing by termiticide manufacturer.
   1. Fit filling hose connected to water source at the site with a backflow preventer, according to requirements of authorities having jurisdiction.

3.3 APPLYING SOIL TREATMENT

A. Application: Mix soil treatment termiticide solution to a uniform consistency per the manufacturer's requirements. Distribute treatment uniformly. Apply treatment at the product's EPA-Registered Label volume and rate for maximum specified concentration of termiticide to the following so that a continuous horizontal and vertical termiticidal barrier or treated zone is established around and under building construction.
   1. Slabs-on-Grade and Basement Slabs: Under ground-supported slab construction, including footings, building slabs, and attached slabs as an overall treatment. Treat soil materials before concrete footings and slabs are placed.
   2. Foundations: Soil adjacent to and along the entire inside perimeter of foundation walls; along both sides of interior partition walls; around plumbing pipes and electric conduit penetrating the slab; around interior column footers, piers, and chimney bases; and along the entire outside perimeter, from grade to bottom of footing.
   3. Penetrations: At expansion joints, control joints, and areas where slabs and below-grade walls will be penetrated by piping, ducts, grounding rods, columns, posts, etc.

B. Post warning signs in areas of application.

C. Reapply soil treatment solution to areas disturbed by subsequent excavation, grading, landscaping, or other construction activities following application.

3.4 PROTECTION

A. Avoid disturbance of treated soil and additional soil grading over treated areas after application. Keep off treated areas until completely dry.

B. Protect termiticide solution dispersed in treated soils and fills from being diluted by exposure to water spillage or weather until foundations and ground-supported slabs are installed. Use waterproof barrier according to EPA-Registered Label instructions.

3.5 MAINTENANCE SERVICE

A. Maintenance Service: Beginning at Substantial Completion, maintenance service shall include 12 months' full maintenance by skilled employees of termite-control-treatment Installer . Include a minimum quarterly maintenance as required for proper performance according to the product's EPA-Registered Label and manufacturer's written instructions. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.

END OF SECTION 31 31 16

SECTION 32 13 13 – CONCRETE PAVING

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Fine grading of subgrade such that final elevations conform to those shown on the drawings.

B. Furnishing and installation of aggregate base, wire or steel bar reinforcement, and concrete for sidewalks and pavements.

1.2 RELATED WORK

A. Section 31 20 00 – Earth Moving

B. Section 03 30 00 – Cast-In-Place Concrete

1.3 SUBMITTALS

A. Material certifications shall be submitted to the Engineer for all materials specified within this section.

B. Mix design complying with ACI 318 shall be submitted to the Engineer for approval.

C. Refer to the Architectural drawings for any specific joint layout patterns in sidewalks. If Architect / Engineer has not prepared specific joint layout drawings, then Contractor shall prepare joint layout shop drawings to be submitted to the Architect / Engineer for approval prior to beginning work. All joint types (construction, expansion, contraction, etc) shall be clearly indicated and detailed on shop drawings. Refer to the drawings and these specifications for desired concrete finish and details referencing joint locations.

1.4 REFERENCE STANDARDS

A. References to (TDOT) shall be construed to mean Tennessee Department of Transportation's Standard Specifications for Road & Bridge Construction (Latest Edition). All concrete paving subject to traffic loadings shall be performed in accordance with TDOT Specs. Any conflicts between TDOT Specs and other items listed in this section shall be resolved in favor of the more stringent of the two. The "Basis for Payment section of TDOT Specs does not apply to this contract.

B. Perform cast-in-place concrete work in accordance with ACI 301, 318, 304, 305 and 306 as applicable.

C. Refer to Section 03 30 00 Cast-In-Place Concrete for additional information.

PART 2 - MATERIALS

2.1 CONCRETE

A. Concrete shall be Class A mixture achieving a minimum of 4,000 psi compressive strength at 28 days. All concrete exposed to freezing and thawing shall have a maximum water-cement ratio of 0.50. All concrete subjected to de-icers shall have a maximum water-cement ratio of 0.45. Maximum slump of 3 inches.

B. Cement shall be ASTM C150, Type I Portland Cement.

C. Fine and coarse aggregates shall conform to ASTM C33.

D. Water shall be clean and not detrimental to concrete.

E. Air Entrainment Admixture shall conform to ASTM C260. Provide in accordance with ACI 302. Concrete subject to freezing and thawing and / or de-icers shall be categorized as “severe exposure”.

F. Expansion joint filler shall comply with ASTM D1751.

2.2 REINFORCEMENT

A. Welded steel wire fabric shall conform to ASTM A185.

B. Reinforcing steel shall be ASTM A615, Grade 60.

PART 3 - EXECUTION

3.1 PREPARATION FOR PAVING

A. Concrete work shall be done in dry weather when subgrade is sufficiently stable to be properly compacted. Ground moisture shall be in accordance with applicable Sections of the Reference Standards.

B. All areas receiving concrete paving shall be proof-rolled with a fully loaded tandem dump truck (or other approved equipment) prior to placement of base coursing. Any areas which pump will require undercutting and removal of spongy soils and refill to subgrade with stone. Area shall then be proof-rolled again prior to placing stone base.

C. Prior to installing base stone, check the subgrade to assure that elevation and compaction requirements have been met. Fine grade and re-compact as necessary. Make sure that subgrade is free draining at all times.

D. The subgrade shall be thoroughly compacted with approved equipment. The subgrade shall be compacted as outlined in Section 31 20 00 – Earth Moving.

3.2 BASE STONE

A. Mineral aggregate base shall be constructed in conformance with TDOT Specs. Apply base course in one layer to give a total compacted thickness as indicated on the drawings. Spread base course over area evenly, roll lightly, check grades and level as required. Roll base course with a 10 to 12 ton rubber tired power roller until thoroughly compacted. Subgrade base shall be fine graded and proof-rolled to insure against pumping. All depressions shall be filled and compacted. High areas to be cut down to correct subgrade. Final contours shall conform to those shown for subgrade base on the drawings.

3.3 CAST-IN-PLACE CONCRETE

A. Mix and deliver concrete in accordance with ASTM C94.

B. Provide concrete of the following strength unless otherwise noted on the drawings. 28 day compressive strength of 4000 psi.

C. Place reinforcement supported and secured against displacement.

D. Ensure reinforcing is clean, free of loose scale, dirt, or other foreign coatings.

E. Separate walks from vertical surfaces with ½ inch thick joint filler, extended from bottom of slab to within ½ inch of finished slab surface.

F. Place concrete continuously between predetermined expansion, construction, and control joints. Do not break or interrupt successive pours such that cold joints occur. Screed walks maintaining minimum cross slope to assure drainage of surface water.

G. Place construction joints at locations where placement operations are stopped for a period of more than ½ hour, except where such placements terminate at expansion joints. Engineer / Architect must approve locations of all construction joints and expansion joints.

H. Construct contraction joints to a depth equal to 1/3 of the total thickness of the concrete. Joints shall be either saw cut or troweled. Contact the Engineer / Architect for a decision on the type to joint to be used on this project. If saw cut contraction joints are used, they should be cut as soon as possible without tearing or otherwise damaging the concrete surface. Generally, contraction joints shall be located at all re-entrant corners and at uniform longitudinal spacings of approximately the width of the walk. Location and spacing of contraction joints shall be prior approved by Engineer / Architect. Refer to paragraph 1.3C Submittals.

I. Place expansion joint filler between abutting concrete walks, pavements, etc. unless otherwise noted or directed by the Engineer.

J. Finish concrete surfaces in accordance with ACI 301 and ACI 302. Uniformly spread, screed, and float concrete. Exterior concrete to receive a “broom finish” unless otherwise noted.

K. Apply cure and sealer as appropriate in accordance with manufacturer’s instructions.

L. Immediately after placement, protect concrete from premature drying.

M. Maintain concrete with minimal moisture loss at relatively constant temperature for time necessary for hydration of cement and hardening of concrete.

3.4 CLEAN-UP

A. At the completion of the work, the Contractor shall clean up all scraps, rubbish and surplus material caused by this work and haul them away from the site. Leave job in neat, clean and orderly condition.

3.5 FIELD QUALITY CONTROL

A. Quality control testing (i.e. slump, air entrainment, temperature, compressive strength tests, etc.) shall be provided for all concrete pours by an ACI Certified Technician employed by the Contractor who will also make compressive test cylinders and deliver them to Owner's Geotechnical Consultant's lab. Test reports shall be provided to the Engineer in a prompt manner.

B. Modify or replace concrete not conforming to required lines, details and elevations as directed by the Engineer.

C. Concrete which achieves less than the specified compressive strength at 28 days shall be considered as defective and shall be removed and replaced by the Contractor at no additional cost to the Owner.

END OF SECTION 32 13 13

SECTION 32 18 13 - SYNTHETIC GRASS SURFACING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Synthetic grass surfacing.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site .

1.3 DEFINITIONS

A. NFHS: National Federation of State High School Associations

B. TSSAA: Tennessee Secondary School Athletic Association

1.4 ACTION SUBMITTALS

A. Product Data:
   1. Synthetic grass surfacing.

B. Shop Drawings: For synthetic grass surfacing.
   1. Include sections and details for the following: Edge detail, perimeter storm drain, other inserts, covers, etc.
   2. Show locations of seams and method of seaming.

C. Samples: For each type of synthetic grass surfacing indicated.
   1. Turf Fabric: 12 inches square.
   2. Infill Material: 4 oz. of each type.
   3. Seam Sample: 24 inches square with seam centered in sample.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer .

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For synthetic grass surfacing, including instructions for proper care, preventative maintenance, and cleaning instructions to include in maintenance manuals.

B. Warranty: Executed warranty documents.

1.7 QUALITY ASSURANCE

A. Manufacturer Qualification: An entity specializing in the design and manufacturing of synthetic grass surfacing with not less than 10 years documented experience and must have been in business under the same ownership for not less than 10 years installing similar surface systems for that entire period.
   1. Manufacturer shall have an experienced technical services and sales professional who is available during the course of the Work to meet personally with the Owner, Contractor, and Architect.
   2. Manufacturer shall be a certified member of the Synthetic Turf Council in good standing.

B. Installer Qualifications: An entity that has installed a minimum of 10 synthetic grass surfaced fields and employs installers and supervisors who are trained and approved by manufacturer.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Store materials in location and manner to allow installation of synthetic grass surfacing without excess disturbance of granular base.

1.9 WARRANTY

A. Special Warranty: Guarantees the usability and playability of the synthetic grass surface system for its intended use. Manufacturer agrees to repair or replace synthetic grass surfacing that fails in materials or workmanship within specified warranty period.
   1. The warranty shall have the following provisions:
      a. Must be a Manufacturer's warranty from a single source covering workmanship and all self-manufactured or procured materials.
      b. Must provide full turf coverage for the entire warranty period.
      c. Materials and workmanship.
      d. Materials installed meet or exceed the product specifications within the manufacturing tolerances.
      e. A provision to either repair or replace such portion of the installed materials that are no longer serviceable to maintain a serviceable and playable surface.
      f. Must not be limited to the amount of annual usage.
   2. Failures include, but are not limited to, the following:
      a. Deterioration and excessive wear.
      b. Deterioration from UV light.
      c. Excessive loss of shock attenuation.
      d. Seam separation, including game lines and markings.
   3. Warranty Period: Five (5) years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS, GENERAL

A. Source Limitations: Obtain all products and accessories for the complete system from a single source / manufacturer unless noted otherwise below.

2.2 PERFORMANCE REQUIREMENTS

A. Turf Fabric: Turf fabric tested in accordance with the following methods, with additional test method conditions for each method in accordance with ASTM F1551.
   1. Tuft Bind: Not less than 10 lbf in accordance with ASTM D1335.
   2. Breaking Strength: Minimum 200 lbf in warp direction and minimum 200 lbf perpendicular to warp direction, in accordance with ASTM D5034.

B. Synthetic Turf Playing Surfaces: Assembly tested in accordance with the following methods, with additional test method conditions for each method in accordance with ASTM F1551.

C. Permeability: 68 inches/hour of rainfall capacity in accordance with ASTM F2898 or EN 15330-1.

2.3 SYNTHETIC GRASS SURFACING

A. Synthetic Grass Surfacing for Field Sports: Complete surfacing system, consisting of synthetic yarns bound to water-permeable backing and infill indicated, suitable for baseball and softball playing fields.
   1. All components and their installation method shall be designed and manufactured for use on outdoor athletic fields. The materials as specified shall be able to withstand exposure in all climates, be resistant to insect infestation, rot, fungus, mildew, ultraviolet light and heat

degradation, and shall have the basic characteristics of flow-through drainage, allowing free movement of surface runoff through the synthetic turf fabric where such water may flow to the base and into the field drainage system.

2. Manufacturers: Subject to compliance with requirements, provide products by the following:
   a. Shaw Sports Turf Division of Berkshire Hathaway.
   b. Basis-of-Design Product: Subject to compliance with the requirements, provide the product, accessories, and a complete system based on the basis of design listed below.
      1) Shaw Sports Turf: Elevate 48.

B. Turf Fabric: Woven turf fabric with multicolored fiber and UV resistance, complying with the following:
   1. Yarn Fiber: Slit-film polyethylene .
      a. Pile yarn shall be proven athletic caliber yard designed specifically for outdoor use and stabilized to resist the effect of ultraviolet degradation, heat, foot traffic, water, and airborne pollutants.
      b. Provide stone base material, sizes, and thicknesses in accordance with the manufacturer's requirements.
         1) Stone base shall be comprised of on layer of #57 stone 4" in thickness and one layer of #8 stone 2" in thickness.
      c. Provide sub-surface drainage system as indicated on the Drawings.
   2. Linear Density (Denier) Tape / Nylon: 8,000 / 4,400 in accordance with ASTM D1577.
   3. Yarn Thickness Tape / Nylon: 100/100 microns in accordance with ASTM D3218.
   4. Pile Weight: 48 oz./sq. yd. in accordance with ASTM D5848.
   5. Product Weight (Total): 76 oz./sq. yd. in accordance with ASTM D5848.
   6. Primary Backing Weight: 8 oz./sq. yd. in accordance with ASTM D5848.
   7. Secondary Coating Weight: 20 oz/sq. yd in accordance with ASTM D5848.
   8. Finished Pile Height: 0.75 inch in accordance with ASTM D5823.
   9. Colors: As selected by the Owner.
   10. Fabric Width: 15 ft. in accordance with ASTM D5793.
   11. Tuft Gauge: 1/4 inch in accordance with ASTM D5793.
   12. Infilltrometer: Greater than 14 in accordance with ASTM D3885.

C. Backing: Manufacturer's standard woven or nonwoven polypropylene primary backing with urethane-coated secondary backing; provide perforations or drainage channels sufficient to meet permeability indicated.
   1. Primary Backing: Multi-layer backing containing UV stabilizers and must pass 3,000 hours of QUV A testing.
   2. Secondary Backing: High-grade polyurethane shall be applied to the primary backing adding resistance to water degradation and strengthening grip on fibers.
   3. The entire backing shall be coated with holes perforated throughout the backing at the manufacturer's recommended interval to allow for drainage.

D. Game Lines and Markings: Provide game lines and markers in widths and colors in accordance with requirements indicated on Drawings.
   1. All game lines and markings shall meet TSSAA and NFHS standards.
   2. Application Method: Tufted in to the maximum extent practicable, with remaining lines inlaid.
   3. Team Logo/Graphic: Provide inlaid team logo/graphic in colors and design indicated.

E. Seaming Method: Sewn .

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify all measurements and existing conditions prior to commencing with the work.

B. Examine base and other conditions, with Installer present, for compliance with requirements for installation tolerances, permeability, and other conditions affecting performance of the Work.

1. Verify that the subgrade and base have been uniformly compacted to a minimum of 95% of maximum dry density and that care has been taken to minimize segregation.
2. Verify the elevations of the base material for planarity, as well as the elevations of the perimeter curb / nailer using a minimum 10-foot grid. Surface planarity shall be within 1/4 inch in 10-feet. Provide written confirmation that compaction / planarity and drainage / permeability specifications, and cleanliness have been achieved.
3. Inspect all synthetic grass surfacing materials delivered to the site for both mixing and quantity to assure that the entire installation has sufficient material to maintain proper mixing ratios.

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

3.2 INSTALLATION OF SYNTHETIC GRASS SURFACING

A. Avoid disturbance of base during installation of turf fabric.

B. Roll out turf fabric and allow to relax at least four hours prior to seaming.

C. Provide seams flat, tight, and snug, with no gaps or fraying. No head or cross seams are allowed except as needed for inlaid fabric striping or to accommodate programmed cut-outs. Selvedge edges of all panels must be cut and discarded prior to being sewn together. A butt-stitch method of seaming must be implemented and a double-lock stitch with cord shall be utilized. Bagger stitching is prohibited. Remove yarns that are trapped within seams. Attach turf fabric to perimeter restraint system as recommended by the manufacturer.
1. Seaming tape is to be constructed of high tenacity, coated non-woven fabric. Inlaid markings shall be adhered to seaming tape with a high strength polyurethane adhesive applied per the manufacturer's standard procedures for outdoor applications. All main fabric seams shall be transverse to the field directly (run perpendicularly across the field).

D. Install inlaid game lines, markings, and logo / graphics by cutting through turf fabric and installing snugly fitting game line turf fabric. Provide seaming tape that extends minimum 6 inches beyond seam.

E. Repair loose seams and bubbles formed due to expansion of turf fabric prior to installation of infill.

3.3 CLEANING

A. Provide labor, supplies, and equipment, as necessary, for final cleaning of surfaces. Clean per manufacturer's instructions.

B. Keep the area clean and clear of debris throughout the duration of the project.

C. All surfaces shall be cleaned as necessary to leave the work area in a clean, immaculate condition ready for immediate occupancy and use by the Owner.

3.4 DEMONSTRATION

A. Train Owner's maintenance personnel in proper maintenance procedures for synthetic grass surfacing.

END OF SECTION 32 18 13

SECTION 32 18 23 – ATHLETIC SURFACING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
1. Infield Mix.
2. Infield Conditioner.
3. Infield Topdressing.
4. Warning Track Mix.

B. Description of Work:
1. The installation of all materials shall be performed in accordance with the manufacturer's written installation instructions, and in compliance with all approved Drawings. Furnish all materials, equipment, tools, labor, transportation, and services to install, grade, and place field subgrade and infield mix as specified and shown on the Drawings, including but not limited to:
a. Placement or preparation of base grade (including raking, leveling, and compaction), in addition to the placement and compaction of the infield mix.
b. Incorporation of infield conditioner, fine grading, dragging, top dressing with vitrified shale or calcined clay product, moisture management, and other maintenance of skinned infield surface until the point of Substantial Completion.

C. Related Requirements:
1. Section 11 68 33 "Athletic Field Equipment" for installation requirements for specified equipment.
2. Section 31 20 00 "Earth Moving" for associated requirements.
3. Section 32 31 13 "Chain Link Fences and Gates" for associated requirements.
4. Section 32 92 00 "Turfs and Grasses" for associated requirements.

1.3 DEFINITIONS

A. NCAA: The National Collegiate Athletic Association.

B. NFHS: National Federation of State High School Associations.

C. TSSAA: Tennessee Secondary School Athletic Association.

1.4 REFERENCES

A. ASTM F-1632: Standard Test Method for Particle Size Analysis.

B. ASTM D-422: Standard Test Method for Fine Particle Size Analysis.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Manufacturer's product data sheet and installation instructions for each product to be used.
2. Manufacturer's maintenance and cleaning instructions for each product to be used.

B. Samples: Submit three (3) 1-quart labeled samples for each product specified along with a private lab test indicating the particle size analysis of the material. All tests shall be performed in accordance with ASTM F-1632.
1. Submit samples of all standard colors for Architect and Owner selection.

1.6 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Include site plan diagram indicating locations of each product to be installed.

B. Product Certificates: For each type of product.

1.7 CLOSEOUT SUBMITTALS

A. Maintenance Data: For each product used to include in maintenance manuals.

1.8 FIELD CONDITIONS

A. All earthwork shall be performed in accordance with the preceding Sections.

B. Complete construction of dugouts, adjacent sidewalks and installation of all fence posts, underground utilities, and field irrigation system prior to installation of infield mix products.

C. Field Measurements: Verify layout of field prior to preparation and installation of infield mix.

D. Sub-base material shall be uniformly graded and compacted, and shall mirror finish grade contours to ensure an even depth of material.

E. Construct skin surfaces with a finish grade that provides adequate surface drainage sloping away from the center of the infield. Refer to Grading Plan provided in Civil Drawings.

1.9 COORDINATION

A. Coordinate installation of infield mix products with trades of work adjacent and affected by the scope of work of this Section.

1.10 WARRANTY

A. Warranty Period: Contractor shall provide warranty that product was installed per specifications and manufacturer's instructions upon date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS, GENERAL

A. Source Limitations: Obtain material from single source from single manufacturer.

2.2 MIX PRODUCTS, GENERAL

A. Mix products shall be free of any particles greater than 3mm in any dimension, unless noted otherwise below.

B. Mix products shall contain no organic matter and meet the requirements listed below.

2.3 INFIELD MIX

A. General Requirements: Infield mix for skinned areas shall be manufactured under controlled conditions via Pugmill mechanical mixer until uniformly mixed into a homogenous mixture.

B. Basis-of-Design Product: Subject to compliance with requirements, provide Turface Athletics “Turface SAF Diamond Select Mix” or comparable product by one of the following:
1. Turface Athletics as supplied by American Sports Fields.
2. Or Architect approved equal.
   a. Unless noted, equal product to that specified will be accepted. The Owner and Architect shall have sole judgment concerning equivalency of substitution.

C. Infield mix shall be free of organic matter and weed seeds. Infield mix shall have a bulk density of around 1.35 ton per cubic yard in a loose state and a bulk density of around 1.5 tons per cubic yard when properly compacted to between 85% and 90% on a standard proctor test (ASTM D 689-07). Infield mix shall be screened with a 1/4” wire screen with no retention of rocks or debris. The infield material shall meet the following parameters:
1. Sieve Analysis (+/- 2%):

U.S. Standard Sieve	% Passing by Weight
#5	99.9
#10	99
#18	98
#35	90
#60	47
#100	34
#270	29

2. Particle Size Analysis (+/- 2%):
   a. Gradation: A minimum of 98% of particles shall pass the 2.00mm sieve with the highest portion of sand particles in the medium to very fine range.
      1) Sand (2.00mm – 0.05mm): 70%
      2) Silt (0.05mm – 0.002mm): 12%
      3) Clay (< 0.002mm): 18%

D. Color: As selected by the Architect from the manufacturer’s standard color selections.

2.4 INFIELD CONDITIONER

A. Basis-of-Design Product: Subject to compliance with requirements, provide Turface Athletics “Turface MVP” or “Turface Pro League Natural” or comparable product by one of the following:
1. Turface Athletics as supplied by American Sports Fields.
2. Or Architect approved equal.
   a. Unless noted, equal product to that specified will be accepted. The Owner and Architect shall have sole judgment concerning equivalency of substitution.

B. Infield conditioner shall be blended into the infield mix at a rate of 15% by volume or as otherwise recommended by the manufacturer. Infield conditioner shall be incorporated into the infield mix before

infield installation. Follow manufacturer's recommendations if the infield mix will be amended after the initial installation.

C. Color: As selected by the Architect from the manufacturer's standard color selections.

2.5 INFIELD TOPDRESSING

A. Basis-of-Design Product: Subject to compliance with requirements, provide Turface Athletics – "Turface MVP", "Turface Pro League", "Turface Pro League Elite", "Turface SlideMaster", or comparable product by one of the following:
   1. Turface Athletics as supplied by American Sports Fields.
   2. Or Architect approved equal.
      a. Unless noted, equal product to that specified will be accepted. The Owner and Architect shall have sole judgment concerning equivalency of substitution.

B. Color: As selected by the Architect from the manufacturer's standard color selections.

2.6 WARNING TRACK MIX

A. General Requirements: Warning track mix shall be engineered, mechanically crushed, and screened offsite under controlled conditions until uniformly mixed into a homogenous mixture.
   1. All tests shall be in accordance with ASTM F-1632.

B. Basis-of-Design Product: Subject to compliance with requirements, provide Turface Athletics "Turface SAF Trac Select" or comparable product by one of the following:
   1. Turface Athletics as supplied by American Sports Fields.
   2. Or Architect approved equal.
      a. Unless noted, equal product to that specified will be accepted. The Owner and Architect shall have sole judgment concerning equivalency of substitution.

C. Warning track shall be clean, crushed material resulting in a mix that is uniform and possessing the following requirements:
   1. Particle Size: No larger than 1/4" refined particles.
   2. Color: As selected by the Architect from the manufacturer's standard color selections.

D. Excess Materials: Provide Owner with a 1-ton pallet of material for future use.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine subgrade and conditions with Installer present, for compliance with requirements for infield mix and other conditions affecting performance of the Work.
   1. Verify critical dimensions.

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

3.2 INSTALLATION, GENERAL

A. General: Comply with manufacturer's written installation instructions.

B. Unless otherwise indicated, install mix products after other finishing operations of adjacent work has been completed.

3.3 SUBGRADE FOR INFIELD

A. Subgrade tolerance shall be +0.00’ and -0.10’ relative to the grading plan. Subgrade should parallel and reflect the finished grade of the infield mix.

B. Subgrade material shall be compacted in order to achieve 95% compaction. If the subgrade cannot be compacted to this level, an imported granular fill shall be installed.

C. Stake the subgrade on a 25’ grid throughout the infield.

D. Obtain Architect’s and Owner’s approval of prepared subgrade prior to the delivery and installation of infield mix.

3.4 INSTALLATION – GENERAL

A. Protect all adjacent completed work from damage, soil staining, etc. Damage to adjacent work shall be the responsibility of the Contractor to address to the satisfaction of the Architect.

B. Infield surfacing shall be installed in strict conformance with the manufacturer’s specifications to the lines and grades as shown on Drawings.

C. New Fields: Place material to a final minimum depth of 4 inches when finished and compacted over a minimum of 6” of compacted non-organic soil. The final grade should be leveled and sloped according to standard infield construction specifications indicated on the Drawings.

D. The “lip” area (the edge between the dirt and the grass) shall have a smooth transition between the infield and outfield.

3.5 INFIELD MIX PLACEMENT

A. Determine finish grade contours on the 25’ grid. Provide a stake every 25’.

B. Material shall be placed in lifts of 1 inch to 2 inches and compacted to between 85% and 90% of standard proctor (ASTM D 689-07). Rough surface before placing next lift and ensure material is spread and finished utilizing equipment with an appropriate blade length. Utilize external water source to maintain proper moisture of infield mix during installation. Do not install as a powder product, this can create settling and effect the final grade after installation.
   1. Watering: After leveling the infield skin, water the surface as required and per the manufacturer’s instructions to achieve the optimum compaction. Compact with a minimum 2,000 pound static drum roller. If low areas are present, scarify and level low areas with additional infield mix. Adjust the grading of all areas that show signs of ponding.

C. Compact and drag smooth installation. Infield mix shall be free of dips, divots, humps, bumps, or other obstructions or blemishes that would interfere with ball travel, the movement of water, or would hinder the removal of water through positive surface drainage. Correct irregularities to the satisfaction of the Architect. Surface slope shall be maintained with no ponding evident during rain event.

3.6 INFIELD GRADE INSPECTION

A. The finish grade tolerance shall be +0.05’ and -0.00’ relative to the Civil Drawings. The depth of infield mix installation shall be 4 inches. Ensure all adjacent and meeting edges are flush and well aligned. Infield finish grade should be at a slope of at least 1/2 percent leading away from the infield surface to provide for drainage and allow rain to run off of infield skin. Final infield grade shall be checked by laser transit, surveyed by a third party, and approved by Architect.

3.7 INFIELD TOPDRESSING

A. After final grading is completed and successful inspection, the field shall be top dressed by application of a calcined clay or shale product to assist in managing moisture under the infield skin.

B. Application rate shall be 375 lbs per 1,000 square feet of infield area to achieve an approximate coverage thickness of 1/8” to 1/4” of the infield surface and then shall be rolled again.

3.8 MAINTENANCE UTILIZING INFIELD CONDITIONER

A. For additional moisture management, infield conditioner can be pre-blended into the infield mix at a rate of 15% by volume or as otherwise recommended by the manufacturer. To amend an existing infield mix with infield conditioner, follow manufacturer’s recommendations for the incorporation of infield conditioner.

3.9 WARNING TRACK PLACEMENT

A. Excavate material from the warning track area to a depth of 2 inches below the final finished grade.
   1. Refer to Drawings for extent of excavation and warning track area. Extend warning track 6 inches beyond the fenceline on the outside of the playing field area.

B. Compact the subgrade until a minimum or 95 percent compaction is achieved.

C. Install geotextile filter fabric to prevent future weed migration through the warning track area.

D. Place warning track material over geotextile filter fabric to a depth of 2” at completion and after compaction.
   1. Compact with a minimum 1-ton vibratory roller until an optimum compaction between 90 percent and 95 percent is achieved.
   2. Provide a minimum 1% slope toward fenceline.

E. Inspection: The finished surface of the warning track shall be smooth and free from any visible dips, humps, bumps, or other blemishes which would hinder the removal of water through positive surface drainage.

3.10 CLEANING

A. After completing installation, clean adjacent completed work.

B. Replace damaged work that cannot be cleaned and repaired, in a manner approved by Architect, before time of Substantial Completion.

END OF SECTION 32 18 23

SECTION 32 31 13 - CHAIN LINK FENCES AND GATES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
   1. Chain-link fences.
   2. Swing gates.

B. Related Requirements:
   1. Section 03 30 00 "Cast-in-Place Concrete" for cast-in-place concrete and post footings.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site .
   1. Review layout of fencing, gauges, heights, gates, hardware, openings, etc.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.
   1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for the following:
      a. Fence and gate posts, rails, and fittings.
      b. Chain-link fabric, reinforcements, and attachments.
      c. Gate and hardware.

B. Delegated-Design Submittal: For structural performance of chain-link fence and gate frameworks, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation. Engineer to be professionally licensed in State where Project is located.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For professional engineer .

B. Product Certificates: For each type of chain-link fenceand gate.

C. Field quality-control reports.

D. Sample Warranty: For special warranty.

1.6 FIELD CONDITIONS

A. Field Measurements: Verify layout information for chain-link fence and gates shown on Drawings in relation to property survey and existing structures. Verify dimensions by field measurements.

1.7 WARRANTY

A. Special Warranty: Manufacturer andInstaller agree to repair or replace components of chain-link fences and gates that fail in materials or workmanship within specified warranty period.
   1. Failures include, but are not limited to, the following:

a. Failure to comply with performance requirements.
b. Deterioration of metals, metal finishes, and other materials beyond normal weathering.

2. Warranty Period: Five (5) 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 01 40 00 "Quality Requirements," to design chain-link fence frameworks.

B. Structural Performance: Chain-link fence and gate framework shall withstand the design wind loads and stresses for fence height(s), span, and under exposure conditions indicated according to ASCE/SEI 7 .
1. Design Wind Load: As indicated on Drawings .
a. Minimum Post Size and Maximum Spacing: Determine according to CLFMI WLG 2445, based on mesh size and pattern specified.

C. Lightning Protection System: Maximum resistance-to-ground value of 25 ohms at each grounding location along fence under normal dry conditions.

2.2 CHAIN-LINK FENCE FABRIC

A. General: Provide fabric in one-piece heights measured between top and bottom of outer edge of selvage knuckle or twist according to "CLFMI Product Manual" and requirements indicated below:
1. Fabric Height: As indicated on Drawings.
2. Steel Wire for Fabric:
a. Non-Athletic Field Fence Fabric: Wire diameter of 9-gauge (0.148 inch).
b. Athletic Field Fence Fabric:
1) Infield Fabric: Wire diameter of 6-gauge (0.192 inch) below 15' height above finished grade, 9-gauge (0.148 inch) above 15' height above finished grade.
2) Outfield Fabric: Wire diameter of 9-gauge (0.148 inch).
c. Mesh Size: 2 inches .
3. Selvage: Knuckled at both selvages .

2.3 FENCE FRAMEWORK

A. Posts and Rails : ASTM F 1043 for framework, including rails, braces, and line; terminal; and corner posts. Provide members with minimum dimensions and wall thickness according to ASTM F 1043 or ASTM F 1083 based on the following:
1. Fence Height: As indicated on Drawings .
2. Horizontal Framework Members: Intermediate, top, and bottom rails according to ASTM F 1043.
a. Top Rail: 1.66 inches in diameter .
b. Intermediate Rail: 1.66 inches in diameter.
c. Bottom Rail: 1.66 inches in diameter.
3. Metallic Coating for Steel Framework:
a. Type A: Not less than minimum 2.0-oz./sq. ft. average zinc coating according to ASTM A 123/A 123M or 4.0-oz./sq. ft. zinc coating according to ASTM A 653/A 653M.
b. Type B: Zinc with organic overcoat, consisting of a minimum of 0.9 oz./sq. ft. of zinc after welding, a chromate conversion coating, and a clear, verifiable polymer film.
c. External, Type B: Zinc with organic overcoat, consisting of a minimum of 0.9 oz./sq. ft. of zinc after welding, a chromate conversion coating, and a clear, verifiable polymer film. Internal, Type D, consisting of 81 percent, not less than 0.3-mil- thick, zinc-pigmented coating.
d. Type C: Zn-5-Al-MM alloy, consisting of not less than 1.8-oz./sq. ft. coating.
e. Coatings: Any coating above.

2.4 SWING GATES

A. General: ASTM F 900 for gate posts and single and/or double swing gate types.
1. Gate Leaf Width: As indicated on Drawings.
2. Framework Member Sizes and Strength: Based on gate fabric height as indicated on Drawings.

B. Pipe and Tubing:
1. Zinc-Coated Steel: ASTM F 1043 and ASTM F 1083; protective coating and finish to match fence framework .
2. Gate Posts: Round tubular steel
3. Gate Frames and Bracing: Round tubular steel .

C. Frame Corner Construction: Welded .

D. Hardware:
1. Hinges: 180-Degree with swings as indicated on Drawings.
2. Latch: Permitting operation from both sides of gate with provision for padlocking accessible from both sides of gate.
3. Finish: All components of hardware shall match finish of fence framework and fence fabric.

E. Large Gate Leaf Support Wheels:
1. Provide integral heavy duty support wheels on bottom of end post of large gate leafs where indicated on the Drawings.

2.5 FITTINGS

A. Provide fittings according to ASTM F 626.

B. Post Caps: Provide for each post.
1. Provide line post caps with loop to receive tension wire or top rail.

C. Rail and Brace Ends: For each gate, corner, pull, and end post.

D. Rail Fittings: Provide the following:
1. Top Rail Sleeves: Pressed-steel or round-steel tubing not less than 6-inches long.
2. Rail Clamps: Line and corner boulevard clamps for connecting top, intermediate, and bottom rails to posts.

E. Tension and Brace Bands: Pressed steel .

F. Tension Bars: Steel , length not less than 2 inches shorter than full height of chain-link fabric. Provide one bar for each gate and end post, and two for each corner and pull post, unless fabric is integrally woven into post.

G. Truss Rod Assemblies: Steel, hot-dip galvanized after threading rod and turnbuckle or other means of adjustment coated to match color of fencing.

H. Tie Wires, Clips, and Fasteners: According to ASTM F 626.
1. Standard Round Wire Ties: For attaching chain-link fabric to posts, rails, and frames, according to the following:
a. Hot-Dip Galvanized Steel: 0.148-inch- diameter wire ; galvanized coating thickness matching coating thickness of chain-link fence fabric.

I. Finish:
1. Metallic Coating for Pressed Steel or Cast Iron: Not less than 1.2 oz./sq. ft.of zinc.

2.6 GROUT AND ANCHORING CEMENT

A. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107/C 1107M. Provide grout, recommended in writing by manufacturer, for exterior applications.

B. Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound. Provide formulation that is resistant to erosion from water exposure without needing protection by a sealer or waterproof coating, and that is recommended in writing by manufacturer for exterior applications.

2.7 GROUNDING MATERIALS

A. Connectors and Grounding Rods: Listed and labeled for complying with UL 467.
1. Connectors for Below-Grade Use: Exothermic welded type.
2. Grounding Rods: Copper-clad steel, 5/8 by 96 inches.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for site clearing, earthwork, pavement work, and other conditions affecting performance of the Work.
1. Do not begin installation before final grading is completed unless otherwise permitted by Architect.

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

3.2 PREPARATION

A. Stake locations of fence lines, gates, and terminal posts. Do not exceed intervals of 500 feet or line of sight between stakes. Indicate locations of utilities, lawn sprinkler system, underground structures, benchmarks, and property monuments.

3.3 CHAIN-LINK FENCE INSTALLATION

A. Install chain-link fencing according to ASTM F 567 and more stringent requirements specified.

B. Post Excavation: Drill or hand-excavate holes for posts to diameters and spacings indicated, in firm, undisturbed soil.

C. Post Setting: Set posts in concrete at indicated spacing into firm, undisturbed soil.
1. Coordinate layout and installation of posts with layout and installation of concrete sidewalks.
2. Verify that posts are set plumb, aligned, and at correct height and spacing, and hold in position during setting with concrete.
3. Concrete Fill: Place concrete around posts to dimensions indicated and vibrate or tamp for consolidation. Protect above ground portion of posts from concrete splatter.
a. Concealed Concrete: Place top of concrete 6-inches below grade to allow covering with surface material.

D. Terminal Posts: Install terminal end, corner, and gate posts according to ASTM F 567 and terminal pull posts at changes in horizontal or vertical alignment of 15 degrees or more . For runs exceeding 500 feet, space pull posts an equal distance between corner or end posts.

E. Line Posts: Space line posts uniformly at 96 inches o.c.

F. Post Bracing and Intermediate Rails: Install according to ASTM F 567, maintaining plumb position and alignment of fence posts. Diagonally brace terminal posts to adjacent line posts with truss rods and turnbuckles. Install braces at end and gate posts and at both sides of corner and pull posts.
   1. Locate horizontal braces at midheight of fabric 72 inches or higher, on fences with top rail, and at two-third fabric height on fences without top rail. Install so posts are plumb when diagonal rod is under proper tension.

G. Top Rail: Install according to ASTM F 567, maintaining plumb position and alignment of fence posts. Run rail continuously through line post caps, bending to radius for curved runs and terminating into rail end attached to posts or post caps fabricated to receive rail at terminal posts. Provide expansion couplings as recommended in writing by fencing manufacturer.

H. Intermediate and Bottom Rails: Secure to posts with fittings.

I. Chain-Link Fabric: Apply fabric to inside(playing field side) of enclosing framework. Apply fabric to outside of all non-playing field fencing. Leave 2-inchbottom clearance between finish grade or surface and bottom selvage unless otherwise indicated. Pull fabric taut and tie to posts and rails. Anchor to framework so fabric remains under tension after pulling force is released.

J. Tension or Stretcher Bars: Thread through fabric and secure to end, corner, pull, and gate posts, with tension bands spaced not more than 15 inches o.c.

K. Tie Wires: Use wire of proper length to firmly secure fabric to line posts and rails. Attach wire at one end to chain-link fabric, wrap wire around post a minimum of 180 degrees, and attach other end to chain-link fabric according to ASTM F 626. Bend ends of wire to minimize hazard to individuals and clothing.
   1. Maximum Spacing: Tie fabric to line posts at 12 inches o.c. and to braces at 24 inches o.c.

L. Fasteners: Install nuts for tension bands and carriage bolts on the side of fence opposite the fabric side. Peen ends of bolts or score threads to prevent removal of nuts.

3.4 GATE INSTALLATION

A. Install gates according to manufacturer's written instructions, level, plumb, and secure for full opening without interference. Attach fabric as for fencing. Attach hardware using tamper-resistant or concealed means. Install ground-set items in concrete for anchorage. Adjust hardware for smooth operation.

3.5 GROUNDING AND BONDING

A. Fence and Gate Grounding:
   1. Ground for fence and fence posts shall be a separate system from ground for gate and gate posts.
   2. Install ground rods and connections at maximum intervals of 1500 feet .
   3. Fences within 100 Feet of Buildings, Structures, Walkways, and Roadways: Ground at maximum intervals of 750 feet .
   4. Ground fence on each side of gates and other fence openings.
      a. Bond metal gates to gate posts.
      b. Bond across openings, with and without gates, except openings indicated as intentional fence discontinuities. Use No. 2 AWG wire and bury it at least 18 inches below finished grade.

B. Grounding Method: At each grounding location, drive a grounding rod vertically until the top is 6 inches below finished grade. Connect rod to fence with No. 6 AWG conductor. Connect conductor to each fence component at grounding location.

C. Connections:
   1. Make connections with clean, bare metal at points of contact.
   2. Make aluminum-to-steel connections with stainless-steel separators and mechanical clamps.

3. Make aluminum-to-galvanized-steel connections with tin-plated copper jumpers and mechanical clamps.
4. Make above-grade ground connections with mechanical fasteners.
5. Make below-grade ground connections with exothermic welds.
6. Coat and seal connections having dissimilar metals with inert material to prevent future penetration of moisture to contact surfaces.

D. Bonding to Lightning Protection System: Ground fence and bond fence grounding conductor to lightning protection down conductor or lightning protection grounding conductor according to NFPA 780.

3.6 ADJUSTING

A. Gates: Adjust gates to operate smoothly, easily, and quietly, free of binding, warp, excessive deflection, distortion, nonalignment, misplacement, disruption, or malfunction, throughout entire operational range. Confirm that latches and locks engage accurately and securely without forcing or binding.

B. Lubricate hardware and other moving parts.

END OF SECTION 32 31 13

SECTION 32 92 00 – TURF AND GRASSES

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Finish grading of topsoil so that final grades, contours, and elevations are consistent with those shown on the drawings.

B. Furnish and installing sod at all locations shown on the drawings as permanent stabilization. Seeding and mulching all disturbed areas that do not receive sod.

C. Applying fertilizer, water, etc. as necessary to obtain a stand of grass (uniform coverage of healthy grass without any bare spots) and establish healthy sod through one growing season (i.e. fall seeding / sod with spring overseeding as necessary).

D. Seeding should be performed in the fall with spring aerating / overseeding as necessary.

E. Maintain new vegetation until Owner's acceptance of all lawn work. Re-seed grass areas, treat for weeds, and replace sod as necessary until the one year warranty period has expired. Owner shall be responsible for providing an adequate supply of water during the one year warranty period.

F. Work is not considered complete and ready for Owner's acceptance until all disturbed areas have a uniform coverage of healthy grass / sod in accordance with TDEC requirements for release of permitting.

1.2 RELATED WORK

A. Section 31 20 00 – Earth Moving

1.3 QUALITY ASSURANCE

A. Make analysis and material tests for topsoil, fertilizers, insecticides and other materials of similar character per current methods of the Association of Official Agricultural Chemists when required by Engineer.

B. Grass seed shall conform to tolerances for germination and purity per applicable standards of U.S. Department of Agriculture.

C. Sod shall be of a type compatible with grass seed mixture, disease free with healthy root system and dense vegetation.

D. All sod shall be in place with established roots into the subsoil at least 30 days prior to Grand Opening. All remaining areas are to have a healthy stand of grass (no bare spots).

PART 2 - PRODUCTS

2.1 TOPSOIL MATERIAL

A. Topsoil material (previously stockpiled) has been spread across the site (refer to Section 31 20 00 – Earth Moving). Examine the surface of the topsoil layer and sift out all plant growth, rubbish, stones, etc. Topsoil depths should be a minimum of six (6") inches at all locations. Contractor to verify in the field that a minimum of six (6") inches exists everywhere. If not, thicknesses shall be adjusted to provide the minimum.

B. Acceptable topsoil material shall be defined as natural, fertile, agricultural soil, capable of sustaining vigorous plant growth, uniform composition throughout, without admixture of subsoil, free of stones, lumps, plants and their roots, sticks or other extraneous matter. Do not attempt to install while in a frozen or muddy condition.

2.2 FERTILIZER

A. Provide a commercial balanced fertilizer delivered to site in bags labeled with manufacturer's guaranteed analysis. Store in weather-proof storage, place in such a manner that it's effectiveness will not be impaired.

B. Fertilizer shall be a grade containing the percentages of plant food elements as recommended to obtain a healthy stand of grass.

C. Availability of various elements shall be per standards of the Association of Official Agriculture Chemists.

2.3 GRASS SEED

A. Grass seed shall be of the previous season's crop and the date of analysis shown on each bag shall be within nine (9) months of the time of delivery to the project. When requested by the Engineer, the Contractor shall furnish a sample of seed from each bag for testing. Grass seed shall be Kentucky 31 Fescue.

B. The seed shall comply with all provisions of the U.S. Department of Agriculture as to labeling, purity and germination.

2.4 MULCH

A. Dry straw or hay of good quality, free of seeds of competing plants and at the rate of 1-1/2 to 2 tons per acre.

B. A combination of good quality dry straw or hay, free of seeds of competing plants at a rate of 2-1/2 tons per acre and wood cellulose or cane fiber much at a rate of 500 pounds per acre.

C. Sericea lespedeza seed bearing hay at a rate of 3 tons per acre. This mulch may be applied green or air dried, but must contain mature seed.

D. Manufactured mulch materials, such as soil retention blankets, erosion control blankets / netting, or others that may be required on special areas of high water concentration or unstable soils. When these materials are used, follow the manufacturer's recommendations for installation.

2.5 HYDRO MULCHING

A. Wood cellulose fiber or cane fiber mulch shall be applied with hydraulic seeding and fertilizing equipment. All slurry ingredients shall be mixed to form a homogeneous slurry and spray-applied within one hour after the mixture is made.

B. When wood cellulose or cane fiber mulch is used at the 500 pound per acre rate, straw or hay mulch with asphalt emulsion is applied over this to complete the mulch.

C. Wood cellulose or cane fiber mulch at 1,000 pounds per acre rate is used alone where other mulch material will not stick.

D. Wood cellulose or cane fiber mulch is self anchoring.

2.6 SOD FOR SOFTBALL FIELD

A. Sod for softball field shall be HGT Bluegrass Sod as approved by the Owner. Sod must be certified for purity.

B. Sod should be machine cut and contain ¾ inch (+ or – ¼ inch) of soil, not including shoots or thatch. Sod should be certified and where possible grown in the general area of the project.

C. Sod should be cut to the desired size. Torn or uneven pads should be rejected.

D. Sod should be cut and installed within 36 hours of digging.

E. Apply fertilizer and water as necessary to establish and maintain healthy sod.

PART 3 - EXECUTION

3.1 RESPONSIBILITY

A. The Contractor will be responsible to fine grade acceptable topsoil which has been uniformly spread across the site to thicknesses required to bring finish grades to elevations, lines and contours shown on the drawings. Thickness of topsoil shall be a minimum of (6”) inches everywhere.

B. Accurately shape topsoil, remove all stones, roots and other foreign matter. Utilize rock hound or other similar equipment as necessary. Rake topsoil areas, provide fertilizer, grass seed, mulch, sod, and water as needed.

3.2 GRASS SEEDING (applies to disturbed areas outside the limits of sod shown on the drawings)

A. Remove stones, roots, rubbish and other deleterious materials from areas that are to be seeded.

B. Immediately prior to sowing seed, scarify ground as necessary; rake until surface is smooth and friable. Sow seed evenly, lightly rake into ground, then roll ground with suitable roller; water thoroughly with fine spray. Keep lawns watered with sprinklers or other approved methods. Re-seed any areas not doing well or damaged. At intervals, as may be required according to seasonal conditions, mow and water grass and execute necessary weeding until acceptable and full stand of grass has been obtained.

C. Provide permanent grass seeding for lawn areas where sod is not to be installed. Seed in accordance with the following schedule unless otherwise approved by Engineer. Sow areas ready for seeding between April 1st and September 1st with Kentucky 31 Fescue at a minimum rate of 75 pounds per acre. Sow areas ready for seeding between September 1st and April 1st with Kentucky 31 Fescue at a minimum rate of 45 pounds per acre, and Annual Rye Grass at a minimum rate of 50 pounds per acre.

D. Apply fertilizer at a minimum rate of 20 to 25 pounds per 1,000 square feet.

E. Apply ground limestone at a rate of 30 pounds per 1,000 square feet.

3.3 MULCH

A. All areas which are seeded shall be mulched.

B. Mulch materials shall be applied uniformly over the seeded area in accordance with paragraphs 2.4 & 2.5 above.

C. Unless self anchoring, mulch shall be anchored with an emulsified asphalt binder at the rate of 10 gallons per 1,000 square feet.

3.4 SOD FOR SOFTBALL FIELD

A. Bring topsoil surface to grade. Clear the field of any trash, woody debris, stones and clods larger than 1/16 inch diameter. Apply sod to soil surfaces only and not to frozen surfaces or gravel type soils.

B. Sample the soil and send to a certified laboratory for analysis.

C. Add any nutrients noted in the laboratory analysis to promote growth of vegetation per manufacturer's directions. Mix fertilizer and lime into soil surface as needed.

D. Verify compaction of all irrigation trenches (as applicable) and re-compact as necessary.

E. Apply a pre-emergent herbicide over the entire area to be sodded. Apply in strict accordance with the label recommended guidelines.

F. Install sod with tight joints and in straight lines. Don't overlay joints. Stagger joints and do not stretch sod.

G. Roll with a drum roller to consolidate edges of seams and insure firm contact with underlying topsoil.

H. Irrigate sod and the top 4 inches of soil immediately after installation.

I. Sod should not be cut or installed in extremely wet or dry weather. Irrigation should be used to supplement rainfall for a minimum of 2 to 3 weeks. Thereafter, Contractor shall monitor moisture levels and water as required to maintain healthy growth.

J. Identify any low area within the field and add soil mix and sod blend as necessary.

K. Top dress all sod areas with sand (2 applications minimum).

L. Apply a second round of pre-emergent and three rounds of fertilizer prior to requesting Owner's acceptance of fields.

M. Maintain fields (mowing, trimming, edging, etc) until formal acceptance by the Owner.

N. Spray and remove all weeds and grass encroaching in infield (for softball).

O. Fields shall be deemed “Ready for Play” by Owner prior to formal acceptance.

P. Coordinate with Owner regarding mowing and any water supply needs.

3.5 PROTECTION

A. Provide, at no additional cost to the Owner, protection for seeded and sod areas against trespassing and damage. If lawns are damaged prior to Owner’s acceptance or Grand Opening (whichever is later), Contractor shall repair them as directed. Remove protection when directed by the Engineer.

3.6 MAINTENANCE

A. Provide maintenance from start of work until Owner’s acceptance or Grand Opening (whichever is later). Maintenance includes watering of lawns, weeding, mowing, cleaning-up and edging; repairs of minor washouts and gullies; repairs to protection, and other necessary work of maintenance. Maintain all slopes and areas of concentrated flow against erosion.

B. Maintenance of sod should include re-sodding areas where an adequate stand of sod is not obtained. New sod should be mowed sparingly.

C. Grass height should not be cut to less than 2 to 3 inches.

3.7 FINAL CLEAN-UP

A. At time of final inspection of work, and before final acceptance by Owner, Contractor shall clean all paved areas, curbs, etc. that are soiled or stained by work performed in this section. Clean by sweeping or washing and remove all defacements or stains.

B. Remove all excess material, trash and other debris from the site and properly dispose of them.

END OF SECTION 32 92 00

SECTION 33 10 00 – WATER UTILITIES

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Water utilities to be governed by these specifications includes, but is not limited to furnishing and installation of the ¾ inch domestic water line from the tie point at the existing waterline to within 5 feet of the building where it ties to plumbing. Work shall include all trenching, stone bedding, backfill, thrust blocking, tees, bends, fittings and other items incidental to the proper installation of water line.

B. All work (including products and materials) shall be installed in strict accordance with these specifications and any requirements of Oak Ridge Schools.

1.2 RELATED WORK

A. Section 31 20 00 – Earth Moving

B. Section 31 23 33 – Trenching and Backfilling

1.3 QUALITY ASSURANCE

A. Water piping and appurtenances may be inspected at the manufacturing source, as well as, the job site by the Engineer.

B. The Contractor shall notify the Owner's Designated Representative at least 48 hours prior to backfilling pipe. Pipe shall not be backfilled prior to the responsible party viewing the installation.

C. All water line installation shall be pressure and leakage tested by the Contractor in the presence of the Owner's Designated Representative.

1.4 SHOP DRAWINGS

A. Submit shop drawings and material certifications for all products furnished under this section.

PART 2 - PRODUCTS & MATERIALS

2.1 WATER DISTRIBUTION SYSTEM

A. Concrete for miscellaneous use shall be of a mix using Portland Cement and shall meet 3,000 psi minimum strength requirements unless it is to be exposed to freezing and thawing. Then it shall have a minimum 28 day compressive strength of 4,000 psi.

B. Bedding and backfill shall be as specified in Section 31 25 00 – Trenching and Backfilling.

C. The ¾ inch waterline to the softball field and baseball field score booth / concessions building shall be schedule 40 PVC pipe. All pipe and fittings shall be of a type and manufacturer that is approved by the Engineer.

D. Valve types and locations, where not shown, shall be as directed by Oak Ridge Schools. All valve boxes shall be suitable for the type of vehicular loads anticipated by Oak Ridge Schools.

PART 3 - EXECUTION

3.1 GENERAL

A. All excavation work shall be considered unclassified. Excavate all rock, if encountered, at no additional cost to the Owner.

B. Should rock be encountered in the trenches use a backhoe or ripper until the use of such equipment is not practical. Notify the Engineer and receive written instructions prior to further rock excavation.

3.2 NOTIFICATION

A. The Contractor shall notify the Owner's Designated Representative at least 48 hours prior to beginning any work associated with the ¾ inch domestic water lines.

3.3 WATER DISTRIBUTION SYSTEM

A. The Contractor will deliver all pipe and fittings to the construction site. Care must be exercised in the handling of all materials. Pipe and appurtenances shall in no case be thrown from vehicles to the ground, but instead, it shall be lowered gently and not allowed to roll against or strike other objects violently.

B. Excavation for pipe laying must be made of sufficient depth and width to allow the proper jointing and alignment of the pipe. The depth shall be as required to provide a minimum of thirty-six (36") inches of cover measured below the finished grade shown on the drawings.

C. Uneven surfaces or humps in the ground encountered shall be dug through to such depth that pipe may be laid to a reasonable even grade and have sufficient cover at low places.

D. In excavating for pipe lines in rock, the excavation shall be carried to a depth of six (6") inches below the bottom of the pipe. All excavation shall be unclassified. No additional payment will be received for excavating rock to the depth specified above.

E. If unsuitable material is encountered in the trench bottom, the Owner's Geotechnical Consultant may require additional excavation to ensure a firm foundation for the pipe. In such cases the trench bottom shall be brought back up to proper grade with bedding material as provide in Section 31 23 33 Trenching and Backfilling. Undercutting of unsuitable material and refilling with stone (DGA) shall be paid for at the unit prices established in the Owner-Contractor Agreement.

F. Pipes must be swabbed before lowering into trench. The points insisted upon in the laying of pipe will be proper alignment, evenness of width and depth of joints, perfection of jointing, and care in handling pipe. Whenever pipe laying is stopped, the end of the pipe shall be securely plugged.

G. Separate trenches shall be provided for water lines and sanitary sewer lines.

H. No pipes shall be laid resting on a rock, brick, blocking or other unyielding objects. Bends and tees shall be firmly blocked with concrete to side of trench to prevent water pressure from springing pipe sideways and upward. See thrust block details on drawings.

I. Contractor shall test all pipe lines for pressure and leakage.

J. Upon completion of the work, the Contractor shall disinfect all water lines as required by governing AHJs and the City of Oak Ridge.

K. Backfilling shall be as specified in Section 31 23 33 Trenching and Backfilling.

3.4 CLEAN UP

A. Valve Boxes, etc. shall be left clean and free of mud or debris of any kind.

END OF SECTION 33 10 00

SECTION 33 30 00 – SANITARY SEWERAGE

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Sanitary sewer system includes, but is not limited to the furnishing and installation of 4 and 6 inch sanitary sewer piping, cleanouts, stone envelope around pipe, trenching and backfill.

B. For flows from buildings, work shall begin at a point 5 feet from the building and extend to the tie point at the existing sanitary sewer manhole shown on the drawings.

1.2 RELATED WORK

A. Section 31 20 00 – Earth Moving

B. Section 31 23 33 – Trenching and Backfilling

1.3 QUALITY ASSURANCE

A. Sanitary sewer piping and appurtenances may be inspected at the manufacturing source, as well as, the job site by the Engineer.

B. Manufacturer's certifications will be required for all materials.

C. The Contractor shall notify the Owner's Designated Representative at least 48 hours prior to backfilling pipe. Pipe shall not be backfilled prior to the responsible party viewing the installation.

D. Viewing of the installation does not relieve Contractor of the responsibility of installing sanitary sewer and associated structures in strict accordance with project requirements.

E. Contractor shall provide a guarantee against defective materials and workmanship in accordance with applicable sections of the project specifications.

1.4 SUBMITTALS

A. Manufacturer's cut sheets and detailed product submittals will be required for all materials covered in this specification section.

PART 2 - PRODUCTS & MATERIALS

2.1 SANITARY SEWER SYSTEM

A. Pipe and fittings shall be manufactured from virgin rigid PVC (polyvinyl chloride) vinyl compounds with a cell class of 12454 as identified in ASTM D 1784.

B. PVC Schedule 40 pipe shall be Iron Pipe Size (IPS) conforming to ASTM D 1785. Injection molded PVC Schedule 40 fittings shall conform to ASTM D 2466. Pipe and fittings shall be manufactured as a system and be the product of one manufacturer. All pipe and fittings shall be manufactured in the United States. Pipe and fittings shall conform to NSF International Standard 61 and the health-effects portion of NSF Standard 14.

C. Bedding and backfill shall be as specified in Section 31 23 33 – Trenching and Backfilling.

D. Cleanouts shall be J.R. Smith 4225 with cover, “T” handle, and concrete pad. Refer to detail on drawings.

E. All cleanouts must be installed flush with concrete surfaces of sidewalks. Cleanouts installed in grass areas shall have a concrete pad cast around them. Refer to details on drawings.

PART 3 - EXECUTION

3.1 GENERAL

A. All excavation work shall be considered unclassified. Excavate all rock, if encountered, at no additional cost to the Owner.

B. Should rock be encountered in the trenches use a backhoe or ripper until the use of such equipment is not practical. Notify the Engineer and receive written instructions prior to further rock excavation.

3.2 SANITARY SEWER SYSTEM

A. Installation shall conform to all applicable plumbing and building code requirements. Buried pipe shall be installed in accordance with ASTM F 1668. Solvent cement joints shall be made in a two-step process with primer conforming to ASTM F 656 and solvent cement conforming to ASTM D 2564. The system shall be protected from chemical agents not compatible with PVC compounds. The system shall be hydrostatically tested after installation.

B. Lines and grades shall be set to conform to those shown on the drawings unless otherwise directed by the Engineer. Where grades and pipe lengths are shown on the drawings, they should be considered as approximate.

C. Coordinate all work closely with existing utilities and new storm drainage piping in order to avoid conflicts. Advise Engineer of any potential concerns at crossings of other utilities and/or storm piping.

D. The Contractor will deliver all pipe and fittings to the construction site. Care must be exercised in the handling of all materials. Pipe and appurtenances shall in no case be thrown from vehicles to the ground, but instead they shall be lowered gently and not allowed to roll against or strike other objects violently.

E. Unless otherwise shown on the drawings, trenches shall be excavated in open cut to the depth shown on the drawings. Trenches shall be of sufficient width to provide free working space on each side of the pipe and to permit proper backfilling around the pipe.

F. The excavation in earth shall be carried to the depths indicated on the drawings and / or directed by the Engineer to permit proper bedding of the pipe.

G. The trench shall be straight and uniform so as to permit laying of pipe to lines and grades shown on the drawings.

H. In excavating for pipe lines in rock, the excavation shall be carried to a depth of six (6") inches below the bottom of the pipe. All excavation shall be unclassified.

I. If unsuitable material is encountered in the trench bottom, the Engineer (at the recommendation of Owner's Geotechnical Consultant) may require additional excavation to ensure a firm foundation for the pipe. In such cases the trench bottom shall be brought back up to proper grade with bedding material as provided in Section 31 23 33 Trenching and Backfilling.

J. Contractor shall provide adequate means for promptly removing water from all excavations.

K. Separate trenches shall be provided for water lines and sanitary sewer lines.

L. No pipes shall be laid resting on a rock, brick, blocking or other unyielding objects.

M. Shoring, sheeting and bracing of excavations shall be as specified in Section 31 23 33 Trenching and Backfilling or as otherwise necessary to protect the persons and materials within the trench.

N. Pipe bedding and backfilling shall be as specified in Section 31 23 33 Trenching and Backfilling.

O. Contractor shall notify the Owner's Designated Representative at least 48 hours prior to backfilling in order for the installation to be viewed. If any portion of the work is found to be installed incorrectly or damaged, it shall be removed and re-installed to the Engineer's satisfaction.

3.3 CLEAN-UP

A. All piping and structures shall be left clean and totally free of mud or debris of any kind.

END OF SECTION 33 30 00

SECTION 33 40 00 – STORM WATER UTILITIES

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Storm drainage work includes, but is not limited to the furnishing and installation of storm drainage piping, roof drain collection piping, area drains, junction boxes, trench drains (where applicable), french drains, cleanouts, castings, fittings, drainage appurtenances, bedding and backfilling, shoring, and de-watering of trenches for storm sewers as required for safe and workmanlike construction.

B. Storm drainage work shall be begin at the attachment to downspouts, or for piping from internal roof drains (where applicable) work shall begin at a point 5 feet from the building. Refer to drawings for additional information.

1.2 RELATED WORK

A. Section 31 20 00 – Earth Moving

B. Section 31 23 33 – Trenching and Backfilling

1.3 QUALITY ASSURANCE

A. Storm drain pipe may be inspected at the manufacturing source, as well as, the job site by the Engineer.

B. The Contractor shall notify the Engineer at least 48 hours prior to backfilling pipe and drainage structures. Pipe shall not be backfilled prior to Owner's Designated Representative viewing the installation.

1.4 SHOP DRAWINGS

A. Submit shop drawings and material certifications for all products furnished under this section.

B. Separate detailed shop drawings are required for each individual structure. Manufacturer's cut sheets alone are not acceptable. Detailed information at a minimum shall include the following: Top casting elevation; type, size & manufacturer of casting. Structure detailing shall include all pipe sizes, inverts, angles of entry / exit, wall thickness & reinforcement, as well as, certification that structure is designed for depth and vehicular loadings that may be imposed during the life of the structure.

PART 2 - PRODUCTS

2.1 BEDDING AND BACKFILL MATERIAL

A. Shall be as shown on the drawings and / or specified in Section 31 23 33 – Trenching and Backfilling.

2.2 PIPE MATERIALS

A. Storm drain pipe shall be high density polyethylene (HDPE), unless cover requirements can not be met in which case sufficiently strong alternative pipe materials shall be provided by Contractor at no additional cost.

2.3 HDPE PIPE

A. HDPE high density polyethylene as manufactured by Advanced Drainage Systems (ADS) or equal as approved by the Engineer, and shall meet and / or exceed all requirements for N-12 piping (smooth interior / corrugated exterior). Pipe manufacturer shall certify that the pipe is designed for installation at the depths and with the imposed vehicular loadings as shown or implied by its location on the drawings.

B. All pipe joints shall be as specified by the manufacturer for a “watertight” joint.

C. All pipe shall be new materials not previously used.

D. ADS caps, adapters, fittings, etc. shall be used where needed or shown.

2.4 FRENCH DRAIN

A. Refer to the drawings for locations and elevations of french drains to be installed on the project.

B. French drain shall consist of the following: 8 inch diameter perforated pipe as manufactured by Advanced Drainage Systems (ADS). Bedding shall be Dense Graded Aggregate (DGA) with backfill using #57 stone. All stone (bedding and backfill) shall be enveloped with geotextile fabric with the exception of the top of the stone backfill which shall extend to the surface of the ground. Refer to drawings for additional detail.

2.5 APPURENANCE MATERIAL

A. For clay of shale brick comply with ASTM C32 sewer brick and manhole brick, grade SM.

B. For concrete masonry units comply with ASTM C139.

C. For mortar comply with ASTM C270, Type M, for pipe joints and manhole and inlet brick work.

D. Cast-in-place concrete shall have a minimum 28 day compressive strength of 3000 psi. Concrete exposed to weather (freezing / thawing) shall be 4000 psi, air entrained. Contractor shall submit concrete mix design to Engineer for approval prior to beginning any concrete work. Steel bar reinforcement shall comply with ASTM A615.

E. Structures for pipe endwalls shall be Sherman Dixie ET-200 series. Dimensions of structures shall be as required for pipe sizes. Pipe shall be fully grouted with non-shrink grout or approved alternative. Endwalls with flared wings may be used.

2.6 AREA DRAINS / ROOF DRAIN COLLECTION

A. Area drains shall be as manufactured by Advanced Drainage Systems (ADS) or equal as approved by the Engineer. Drain basins, in-line drains, and end drains (refer to drawings) shall be designed to accommodate number and size of pipes, angles of entry / exit, and drain inlet castings as shown on the drawings or otherwise required. Standard H-20 grates shall be utilized unless otherwise noted or required by Engineer. Furnish and install all adapters, bends, etc. as required to properly connect areas drains to N-12 piping. Fill sumps in drain basins with concrete to prevent ponding in bottoms. Eliminate ponding in in-line drains and end drains as well.

B. When buildings have perimeter guttering, downspout adapters as specified or directed by the Architect shall be used in order to provide a water-tight connection between building downspouts and the underground collection system. Contractor to coordinate with Architectural drawings for sizes and location of downspouts. Failure to show all downspout locations on the drawings shall not relieve the Contractor of the responsibility of making connections to underground collection system. Downspout adapters shall be installed “water tight”. Coordinate with downspout installer.

C. Refer to plumbing drawings for locations and sizes of piping from interior roof drains (if applicable). Where not shown on drawings, Contractor shall size roof drain collection piping in accordance with governing code criteria for a 1% slope and square footage of roof area contributing to each pipe. Detailed shop drawings along with pipe sizing information shall be submitted to the Engineer for approval. No additional payment shall be made to Contractor for increases in depth of structures required by Engineer during the shop drawing approval process.

PART 3 - EXECUTION

3.1 GENERAL

A. All pipe will be laid in an open trench of dimensions as shown on the drawings or otherwise required in order to allow proper placement of the type of pipe being used. No projecting conditions will be allowed.

B. Lengths of storm drain pipe, if shown on the drawings, are approximate horizontal distances center to center of structures. Any slopes shown are approximate. The Contractor shall install pipe based on actual field measurements after locating drainage structures in accordance with drawing requirements.

C. Coordinate all work closely with existing and new utilities in order to avoid conflicts. Advise Engineer of any potential concerns at crossings of utilities.

D. Particular care shall be exercised in establishing the relationship of storm drain pipe, drainage structure bases, and final drainage structure top conditions. Drainage structure tops are required to be located in specific positions and orientations. Subsurface construction to be located to allow drainage structure construction as detailed on the drawings or otherwise required without modification. In case of misalignment of drainage structure tops and bases, the Contractor will be required to correct the construction as directed by the Engineer.

E. Perform trench excavation in accordance in accordance with Section 31 23 33 – Trenching and Backfilling.

F. Joint construction shall be in strict accordance with manufacturer’s recommendations for a water-tight joint.

3.2 STRUCTURES & APPURTENANCES

A. All drainage structures are to be constructed as shown on the drawings and / or called for in these specifications in accordance with generally accepted good construction practices. Refer to Grading & Drainage Plan for locations. Sizes of structures to be as detailed on the drawings or where not shown, sizes shall be as required for the proper installation of the structure with pipes entering / existing at inverts and angles shown on the drawings.

B. Contractor shall furnish and install drainage structures as shown on the drawings.

C. Structure bottoms shall have pre-formed or shaped inverts.

D. All mortar joints shall be filled full. Joints shall be struck flush inside and out.

E. All pipe, where cut at the face of the structure wall, shall be cut and ground smooth with the face of the wall.

F. All joints around pipe and structure walls at the face of the wall shall be packed full with mortar. Oversized holes filled with brick, block, etc. will not be allowed. Holes should be fabricated to accept storm piping with minimum required clearances. Caution precast manufacturer regarding oversize holes.

G. The bottom and walls of drainage structures shall be clean of all debris and mortar as work progresses.

H. Structures shall be installed with minimum 6 inch stone leveling pad underneath. Pad and backfill shall be constructed using Dense Graded Aggregate (DGA).

3.3 CLEAN-UP

A. Storm piping and structures shall be left clean and free of mud and debris of any kind.

END OF SECTION 33 40 00

CONSTRUCTION DOCUMENTS:

OAK RIDGE HIGH SCHOOL SOFTBALL

OAK RIDGE SCHOOLS

15 WILBERFORCE AVE
OAK RIDGE, TN 37830

PROJECT NO.: **24023**

ISSUED: AUG 05, 2024

ARCHITECTURAL:
McCARTY HOLSAPLE McCARTY ARCHITECTS, INC.
550 W. MAIN STREET, STE. 300
KNOXVILLE, TN 37902
865.544.2000
www.mhminc.com

CIVIL:
ALLMON ENGINEERING
363 NASH AVE
COOKEVILLE, TN 38501
931.528.8184

STRUCTURAL:
HAINES STRUCTURAL GROUP
800 SOUTH GAY STREET, STE. 1750
KNOXVILLE, TN 37929
865.329.9920
www.haines-sg.com

PLUMBING, MECHANICAL, & ELECTRICAL:
ENGINEERING SERVICES GROUP, INC.
900 E. HILL AVE, #350
KNOXVILLE, TN 37915
865.522.0393
www.esg1989.com

CODE COMPLIANCE NOTES

PROJECT CODE AND REGULATORY REQUIREMENT INFORMATION

GENERAL PROJECT INFO

PROJECT NAME AND OWNER IDENTIFICATION	
PROJECT NAME	OAK RIDGE HIGH SCHOOL SOFTBALL
PROJECT ADDRESS	15 WILBERFORCE AVE. OAK RIDGE, TN 37830
PROJECT LOCATION MAP	SEE SHEET [G-001]
DESIGN PROFESSIONAL FIRM NAME	MCCARTY HOLSAPLE MCCARTY, INC
DESIGN PROFESSIONAL PROJECT #:	24023
DESIGN PROFESSIONAL CONTACT	AARON MILLER, AIA
DESIGN PROFESSIONAL ADDRESS	550 W. MAIN ST. STE.300
DESIGN PROFESSIONAL PHONE	865.544.2000
DESIGN PROFESSIONAL EMAIL	AMILLER@MHMINC.COM
DESIGN PROFESSIONAL LICENSE #:	102575
OTHER PROJECT INFORMATION:	N/A
LOCAL ORDINANCES AND JURISDICTIONS	
AUTHORITIES HAVING JURISDICTION	[STATE FIRE MARSHAL'S OFFICE, LOCAL CODES DEPARTMENT, ETC]
ZONING ORDINANCE	CITY OF OAK RIDGE ZONING CODE
OTHER	N/A
APPLICABLE CODES (TITLES AND EDITITION) AND REGULATORY REQUIREMENTS	
ACCESSIBILITY	2010 AMERICANS WITH DISABILITIES ACT ACCESSIBILITY GUIDELINES (ADAAG), 2009 ANSI A117.1
EXISTING BUILDING	2018 INTERNATIONAL EXISTING BUILDING CODE (IEBC 2018)
BUILDING	2018 INTERNATIONAL BUILDING CODE (IBC 2018)
FIRE PROTECTION	2017 NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)
ELECTRICAL	2017 NATIONAL ELECTRIC CODE (NEC 2017)
ENERGY CONSERVATION	2018 INTERNATIONAL ENERGY CONSERVATION CODE (IECC 2018)
FIRE	2018 INTERNATIONAL FIRE CODE (IFC 2018)
FUEL/GAS	2018 INTERNATIONAL FUEL GAS CODE (IFGC 2018)
MECHANICAL	2018 INTERNATIONAL MECHANICAL CODE (IMC 2018)
PLUMBING	2018 INTERNATIONAL PLUMBING CODE (IPC 2018)
PRIVATE SEWAGE DISPOSAL	N/A
PROPERTY MAINTENANCE	2018 INTERNATIONAL PROPERTY MAINTENANCE CODE
RESIDENTIAL	2018 INTERNATIONAL RESIDENTIAL CODE (IRC 2018)
ZONING	THE ZONING ORDINANCE OF THE CITY OF OAK RIDGE
OTHER	N/A
CODE SUMMARY:	

NEW SOFTBALL FIELD IN APPROXIMATE LOCATION OF EXISTING BASEBALL FIELD. NEW DUGOUTS AND BLEACHERS FOR SOFTBALL. NEW SCOREBOOTH AND CONCESSIONS FOR BOTH NEW SOFTBALL FIELD AND EXISTING BASEBALL FIELD.

SITE / ZONING REQUIREMENTS

LOCAL ZONING ORDINANCE REQUIREMENTS

CITY OF OAK RIDGE	ORIGINALLY PASSED JUNE 17, 1959 WITH AMENDMENTS THROUGH JANUARY 18, 2024
PROJECT REVIEW #:	[IBC-XXX-##-####]
APPLICATION OF REGULATIONS	DESCRIPTION / COMPLIANCE METHOD
ZONE:	RG-1
BUILDING SETBACKS FROM R.O.W.	FRONT: 50'-0"
	SIDE: 50'-0"
	BACK: 50'-0"
LOT COVERAGE	[###.##] ACRES
MAXIMUM HEIGHT ALLOWED	40'-0" ABOVE GRADE LEVEL
EASEMENTS:	EXISTING
FLOOD ZONE:	ZONE [X], DOES NOT IMPACT CURRENT PROPOSAL

BUILDING REQUIREMENTS

OCCUPANCY CLASSIFICATION (CHAPTER 3)

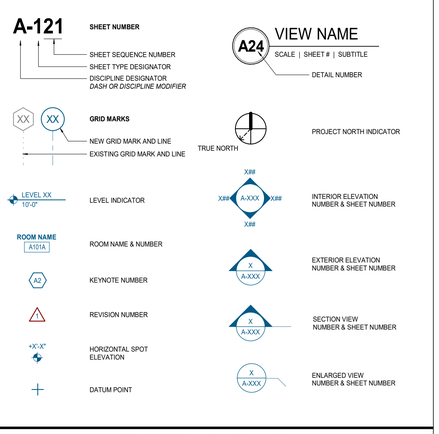
	IBC		NFPA
OCCUPANCY TYPE	A-5 - ASSEMBLY (IBC §303.6)	DUGOUTS, BLEACHERS, FIELD	ASSEMBLY OCCUPANCY (LSC §6.1.2)
	B - BUSINESS (IBC §304.1)	SCOREBOOTH / CONCESSIONS	BUSINESSY OCCUPANCY (LSC §6.1.11)

GENERAL BUILDING HEIGHTS AND AREAS (CHAPTER 5)

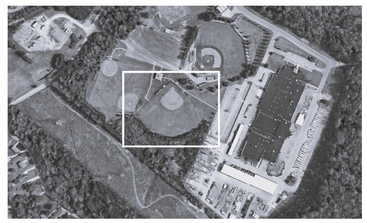
BUILDINGS ON SAME LOT (IBC §503.1.2 & IBC §705.3, EXCEPTION 2)	TWO OR MORE BUILDINGS ON SAME LOT SHALL BE REGULATED AS SEPERATED BUILDINGS OR SHALL BE CONSIDERED AS PORTIONS OF ONE BUILDING WHERE THE BUILDING HEIGHT, NUMBER OF STORIES OF EACH BUILDING AND THE AGGREGATE BUILDING AREA OF THE BUILDINGS ARE WITHIN THE LIMITATIONS SPECIFIED IN SECTION 504 AND 506		
PROJECT GRADE PLANE ELEVATION:	REFER TO CIVIL FOR FINISHED FLOOR ELEVATIONS		
BUILDING HEIGHT AND AREAS	**ALLOWABLE (TYPE VB)**	**ALLOWABLE (TYPE IIIB)**	**ACTUAL/ TOTALS (TYPE VB)**
BUILDING HEIGHT: (IBC TABLE 504.4)			
B - BUSINESS		LIMIT 55 FEET ABOVE GRADE PLANE	20 FEET ABOVE GRADE PLANE
A-5 - ASSEMBLY	LIMIT 40 FEET ABOVE GRADE PLANE		10 FEET ABOVE GRADE PLANE
BUILDING STORIES: (IBC TABLE 504.4)			
B - BUSINESS		LIMIT 3 STORIES ABOVE GRADE PLANE	2 STORIES ABOVE GRADE PLANE
A-5 - ASSEMBLY	UNLIMITED		1 STORY ABOVE GRADE PLANE
BUILDING AREAS: (TABLE 506.2, 504.4)			
AREA PER STORY	A-5: UNLIMITED	B: 19,000 SF	B: 160 SF A-5: UNLIMITED
ALLOWABLE BUILDING AREA	A-5: UNLIMITED	B: 57,000 SF	B: 320 SF A-5: UNLIMITED

SHEET INDEX

SYMBOLS LEGEND



PROJECT VICINITY MAP



SITE VICINITY MAP

PROJECT GENERAL NOTES

OWNER COORDINATION

1. ALL WORK SHALL CONFORM TO ALL INDUSTRY AND MANUFACTURERS' PUBLISHED STANDARDS AND THE OWNER'S REQUIREMENTS FOR QUALITY OF MATERIALS AND WORKMANSHIP AS WELL AS ALL REQUIREMENTS IN THE DOCUMENTS. THE CONTRACTOR SHALL BE RESPONSIBLE TO BECOME FAMILIAR AND COMPLY WITH THE LANDLORD'S STANDARD DETAILS OF CONSTRUCTION. ANY CONFLICTING REQUIREMENTS OF THE SOURCES LISTED ABOVE SHALL BE BROUGHT TO THE ATTENTION OF THE ARCHITECT BEFORE PROCEEDING WITH THE WORK.
2. ALL PENETRATIONS IN FLOOR SLABS SHALL BE REVIEWED AND APPROVED BY THE OWNER AND ARCHITECT PRIOR TO COMMENCING WITH THE WORK.

PERMITS AND SAFETY

1. THE CONTRACTOR FOR THE PROJECT SHALL BE RESPONSIBLE FOR OBTAINING ALL REQUIRED BUILDING PERMITS.
2. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR TAKING ALL NECESSARY PRECAUTIONS TO ENSURE THE SAFETY OF THE PUBLIC AND THE WORKMEN ON THE JOB SITE AND TO PREVENT ACCIDENTS OR INJURY TO ANY PERSONS ON, ABOUT, OR ADJACENT TO THE PREMISES WHERE THE WORK IS BEING PERFORMED. THE CONTRACTOR SHALL COMPLY WITH ALL OF THE LAWS, ORDINANCES, CODES, RULES AND REGULATIONS RELATIVE TO SAFETY AND THE PREVENTION OF ACCIDENTS.

CONSTRUCTION COORDINATION

1. WHERE AVAILABILITY OF SPACE IS LIMITED, COORDINATE INSTALLATION OF DIFFERENT COMPONENTS TO ASSURE MAXIMUM ACCESSIBILITY OF REQUIRED MAINTENANCE, SERVICE AND REPAIR.
2. COORDINATE TRADES TO PATCH FINISHES THAT ARE DAMAGED AS A RESULT OF CUTTING IN OF WORK.

CONTRACT DOCUMENTS

1. REFER TO COMPLETE SET OF ISSUED CONTRACT DOCUMENTS FOR APPLICABLE NOTES, ABBREVIATIONS, AND SYMBOLS. NOTES APPEAR ON VARIOUS DRAWINGS FOR DIFFERENT SYSTEMS AND MATERIALS. REVIEW ALL SHEETS AND APPLY NOTES TO RELATED BUILDING COMPONENTS.
2. DRAWINGS AND SPECIFICATIONS ARE COMPLEMENTARY AND ARE INTENDED TO INCLUDE OR IMPLY ALL ITEMS REQUIRED FOR THE PROPER EXECUTION AND COMPLETION OF THE WORK.
3. THE ARCHITECT AND ITS DESIGN TEAM ARE SOLELY RESPONSIBLE FOR INTERPRETATION OF THE CONTRACT DOCUMENTS.
4. THE CONTRACTOR SHALL NOTIFY THE ARCHITECT IN WRITING OF ANY OMISSIONS, DISCREPANCIES, AND/OR CONFLICTS IN THE DRAWINGS AND/OR SPECIFICATIONS BEFORE SUBMITTING THEIR BID/PRICE. THE ARCHITECT WILL CLARIFY THE DOCUMENTS IN AN ADDENDUM. IF ANY ADDENDUM IS NOT ISSUED BEFORE THE BID/PRICE IS SUBMITTED, THE CONTRACTOR'S BID/PRICE SHALL BE BASED ON THE HIGHER QUANTITY AND/OR HIGHER QUALITY.
5. DO NOT SCALE DRAWINGS. DIMENSIONS PROVIDED GOVERN. IF DIMENSIONS OR PROVIDED INFORMATION ARE IN QESTION, THE CONTRACTOR SHALL OBTAIN CLARIFICATION FROM THE ARCHITECT PRIOR TO PROCEEDING OR CONTINUING WITH ASSOCIATED AND AFFECTED WORK. PROCEEDING WITHOUT CLARIFICATION SHALL BE AT CONTRACTOR'S OWN RISK WHERE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL ASSOCIATED COSTS. LARGE SCALE DRAWINGS GOVERN OVER SMALL SCALE DRAWINGS.
6. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS, BENCHMARKS, WORKPOINTS, SPOT ELEVATIONS AND CONDITIONS SHOWN ON THE DRAWINGS AT THE JOB SITE AND SHALL NOTIFY THE ARCHITECT OF ANY OMISSIONS, DISCREPANCIES, AND/OR CONFLICTS BEFORE PROCEEDING WITH THE PROJECT.
7. FINISH FLOOR ELEVATIONS ARE TO TOP OF CONCRETE SLAB UNLESS NOTED OTHERWISE.
8. FIELD MEASURE AND CONFIRM DIMENSIONS FOR OWNER PROVIDED/CONTRACTOR INSTALLED EQUIPMENT.
9. EXIT SIGNS AND SMOKE DETECTORS LOCATED IN HARD CEILINGS SHALL BE POSITIONED AS REQUIRED BY THE AUTHORITY HAVING JURISDICTION AND SHALL BE CENTERED IN CORRIDORS AND LOCATED A DISTANCE OF 1'-0" FROM THE WALL TO THE CENTER OF THE FIXTURE UNLESS OTHERWISE NOTED.
10. EQUIPMENT AND FURNITURE SHOWN ARE NOT INCLUDED IN CONTRACT, UNLESS NOTED OTHERWISE.

CONSTRUCTION

1. NEW AND EXISTING OPENINGS IN RATED WALL, FLOOR, CEILING, AND ROOF ASSEMBLIES SHALL BE SEALED WITH PENETRATION SEALANT SYSTEMS MEETING OR EXCEEDING THE REQUIRED FIRE RESISTIVE RATINGS, OR PROTECTED WITH A FIRE RATED CHASE.
2. MAINTAIN THE FIRE RATING OF CONSTRUCTION AROUND CABINETS, PANELS, AND BOXES RECESSED IN FIRE RATED WALL, FLOOR, AND CEILING ASSEMBLIES.
3. PROVIDE NON-COMBUSTIBLE STIFFENERS, BRACING, BACKING PLATES AND/OR FIRE RETARDANT WOOD BLOCKING REQUIRED FOR SECURE INSTALLATION OF DOORS AND DOOR HARDWARE INCLUDING WALL-MOUNTED DOOR STOPS, MILLWORK, HANDRAILS, WALL-MOUNTED SHELVES, TOILET PARTITIONS, OPERABLE PARTITIONS, MISCELLANEOUS EQUIPMENT, AND SUSPENDED MECHANICAL AND ELECTRICAL EQUIPMENT.
4. ISOLATE DISSIMILAR METALS TO PREVENT GALVANIC CORROSION.
5. ALL EXTERIOR STEEL HANDRAILS, GUARDRAILS, AND BOLLARDS SHALL BE GALVANIZED AND PAINTED/COATED PRIOR TO INSTALLATION AND/OR SETTING IN PLACE OR EMBEDDING IN OTHER CONCRETE/MASONRY WORK, UNLESS NOTED OTHERWISE. PAINTING/COATING SHALL COVER ALL AREAS, INCLUDING THE PORTIONS EMBEDDED IN CONCRETE/MASONRY WORK.
6. PIPING LOCATED ABOVE GRADE AND INSIDE THE BUILDING SHALL BE CONCEALED IN FURRED SPACES WITH THE EXCEPTION OF PIPING IN STAIRWAYS, EQUIPMENT ROOMS AND POWERHOUSE. COORDINATE WITH ARCHITECT AND OTHER TRADES TO PROVIDE FURRING FOR PIPING INSTALLED IN FINISHED AREAS.
7. PROVIDE CONTINUOUS PERIMETER FIRE SAFING BETWEEN FLOORS AND COORDINATE THE INSTALLATION WITH THE EXTERIOR WALL. FIRE RATING OF FIRE SAFING SHALL MATCH FIRE RATING OF FLOOR CONSTRUCTION.

LIFE SAFETY

1. ALL WORK SHALL BE IN ACCORDANCE WITH ALL APPLICABLE CODES AND REGULATIONS HAVING AUTHORITY OVER THIS PROJECT. WHERE DIFFERENT CODES AND REGULATIONS SPECIFY DIFFERENT REQUIREMENTS, THE MOST RESTRICTIVE SHALL APPLY.
2. REFER TO DOOR SCHEDULE FOR RATED OPENINGS AND HARDWARE SETS.
3. ASSUMED CLEARANCE AT EGRESS DOORS:
   A. SINGLE 36" DOOR = 33" CLEAR
   B. SINGLE 48" DOOR = 45" CLEAR
   C. PAIR OF 36" DOORS (72") = 66" CLEAR
4. EGRESS DOORS SHALL SWING IN THE DIRECTION OF EGRESS TRAVEL WHEN SERVING 50 OR MORE OCCUPANTS.
5. ALL DOORS USED IN CONJUNCTION WITH EGRESS SHALL BE SO ARRANGED AS TO READILY OPEN FROM THE SIDE FROM WHICH EGRESS IS TO BE MADE WITHOUT THE USE OF A KEY, DEVICE, OR SPECIAL KNOWLEDGE.
6. FINAL LOCATIONS OF ALL LIFE SAFETY DEVICES AND FIXTURES ARE SUBJECT TO APPROVAL BY THE AUTHORITIES HAVING JURISDICTION
7. PROVIDE A PORTABLE FIRE EXTINGUISHER AS NOTED AND LOCATED ON THE FLOOR PLANS. MAKE NECESSARY PROVISIONS WITH WALL CONSTRUCTION TO PROVIDE ADEQUATE DEPTH FOR THE SPECIFIED EXTINGUISHER CABINETS, WHILE ALSO MAINTAINING ANY FIRE, SMOKE, AND/OR ACOUSTICAL RATING. REFER TO TYPICAL PARTITION DETAILS FOR FIRE EXTINGUISHER CABINET DETAIL. REFER TO SPECIFICATIONS FOR TYPE OF FIRE EXTINGUISHER PER TYPE OF LOCATION.
8. EXISTING WALLS SHOWN WITH NEW LIFE SAFETY RATINGS ARE TO BE UPGRADED TO THE NEW RATING, INCLUDING PROTECTIVE OPENINGS.
9. REFER ELECTRICAL DRAWINGS FOR LOCATION OF EMERGENCY LIGHTING, EXIT SIGNAGE, FIRE ALARM PULL STATIONS, HORN/STROBES, AND SMOKE DETECTORS.

MHM

McCarty Holsaple McCarty
550 W. Main St., Suite 300
Knoxville, TN 37902
t 865.544.2000
www.mhminc.com

Project Information:

24023

OAK RIDGE HIGH SCHOOL SOFTBALL
15 WILBERFORCE AVE
OAK RIDGE, TN 37830

OAK RIDGE SCHOOLS

AARON MILLER — REGISTERED ARCHITECT — 09/23/24 — COMMERCE No. 1025 — STATE OF TENNESSEE

Consultant:

#	ISSUED BY:	DATE
1	PERMITTING	08/12/24
2	BIDDING	09/23/2024

Issue Date:	AUG 05, 2024
PIC	A. MILLER
PM	A. MILLER
PA	G. TAYLOR
Drawn By:	G. TAYLOR
Checked By:	A. MILLER

Sheet Information:

G-001

SHEET INDEX

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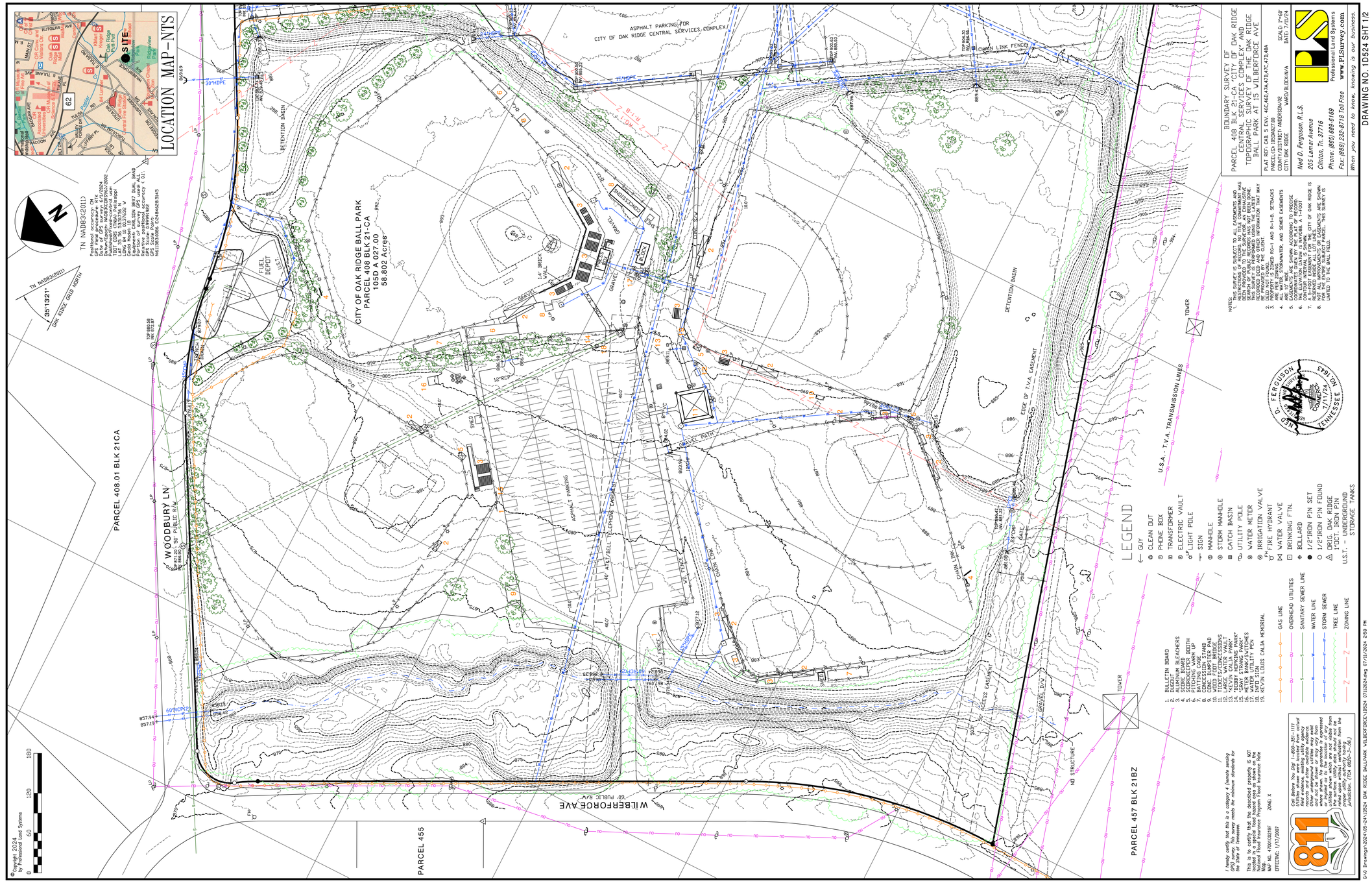

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MHM

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15 WILBERFORCE AVE
OAK RIDGE, TN 37830

OAK RIDGE SCHOOLS

Seal:

FOR REFERENCE ONLY

Consultant:

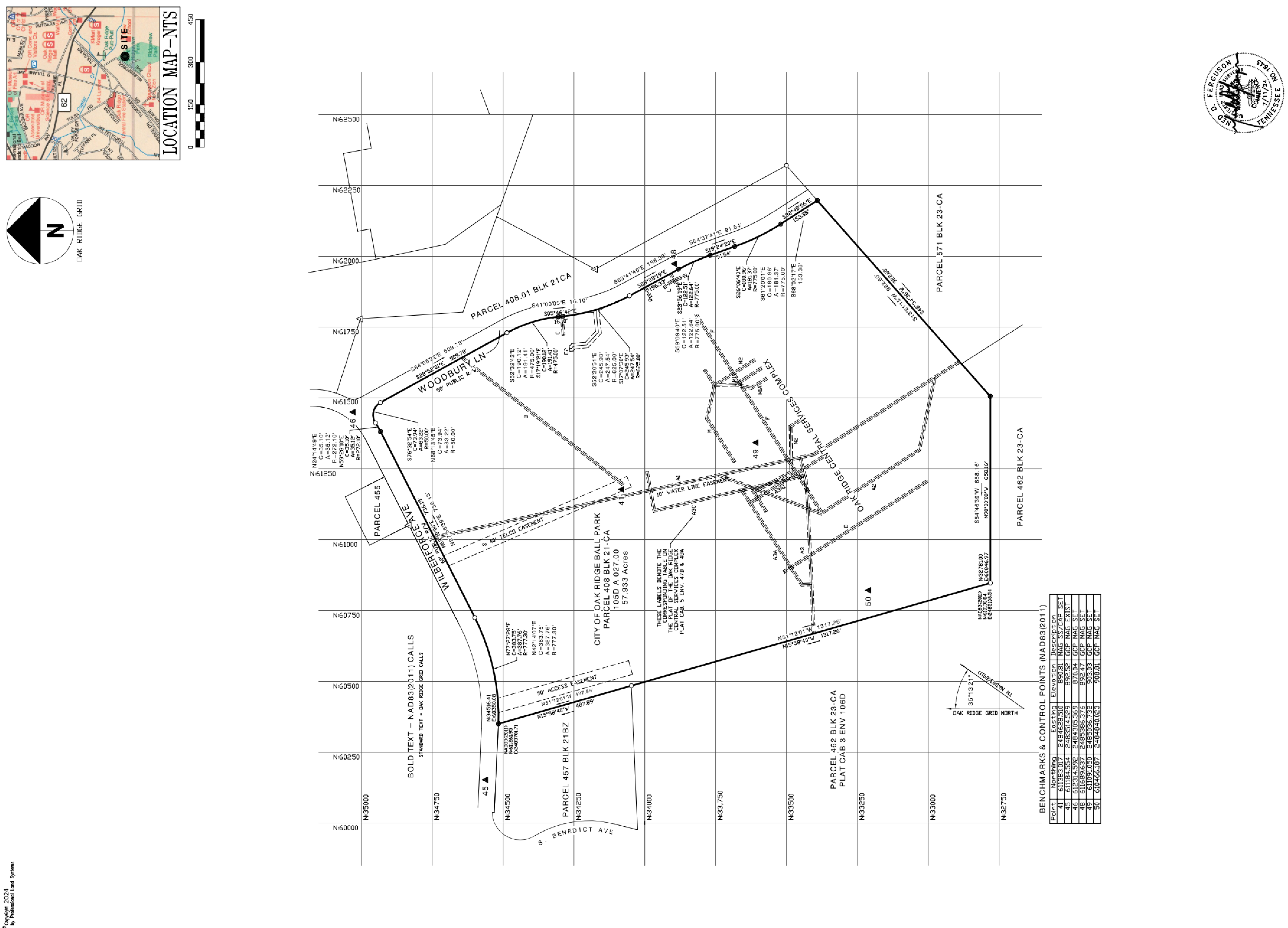
#	ISSUED BY:	DATE

Issue Date:	AUG 05, 2024
PIC	A. MILLER
PM	A. MILLER
PA	G. TAYLOR
Drawn By:	
Checked By:	A. MILLER

Sheet Information:

V-101

SURVEY



BOUNDARY SURVEY OF
PARCEL 408 BLK 21-CA "CITY OF OAK RIDGE CENTRAL SERVICES COMPLEX" AND
TOPOGRAPHIC SURVEY OF THE OAK RIDGE BALL PARK AT 15 WILBERFORCE AVE

PLAT REF: CAB. 5 ENV. 46C,46D,47A,47B,47C,47D,48A
PARCEL(S): 105DA027.00
COUNTY/DISTRICT: ANDERSON/02
CITY: OAK RIDGE — WARD/BLOCK: N/A
SCALE: 1"=150'
DATE: 7/11/24

Ned D. Ferguson, R.L.S.
205 Lamar Avenue
Clinton, Tn. 37716
Phone: (865) 689-6169
Fax: (888) 232-8718 Toll Free

Professional Land Systems
www.PLSurvey.com

When you need to know, knowing is our business.

DRAWING NO. 1D524 SHT 2/2

BENCHMARKS & CONTROL POINTS (NAD83(2011))

Point	Northing	Easting	Elevation	Description
41	611383.017	2484628.510	890.81	MAG SS/CAP SET
45	611184.554	2483514.529	892.52	GCP MAG EXIST
46	612314.592	2484305.369	870.04	GCP MAG SET
48	611689.637	2485386.376	892.47	GCP MAG SET
49	611091.050	2485036.732	903.03	GCP MAG SET
50	610466.187	2484840.023	908.81	GCP MAG SET

MHM

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OAK RIDGE SCHOOLS

Seal:

FOR REFERENCE ONLY

Consultant:

#	ISSUED BY:	DATE

Issue Date:	AUG 05, 2024
PIC	A. MILLER
PM	A. MILLER
PA	G. TAYLOR
Drawn By:	
Checked By:	A. MILLER

Sheet Information:

V-102

SURVEY

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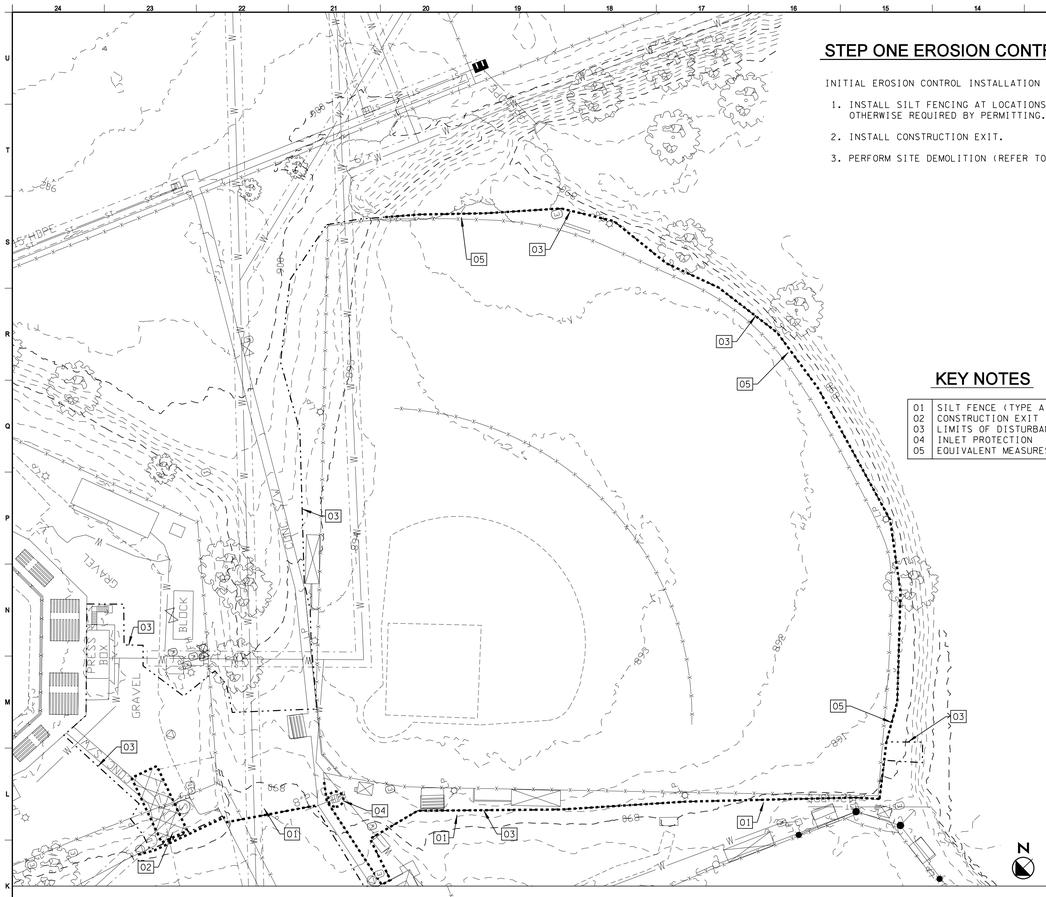
STEP ONE EROSION CONTROL

INITIAL EROSION CONTROL INSTALLATION

1. INSTALL SILT FENCING AT LOCATIONS SHOWN OR OTHERWISE REQUIRED BY PERMITTING.
2. INSTALL CONSTRUCTION EXIT.
3. PERFORM SITE DEMOLITION (REFER TO C201)

KEY NOTES

01	SILT FENCE (TYPE A)
02	CONSTRUCTION EXIT
03	LIMITS OF DISTURBANCE
04	INLET PROTECTION
05	EQUIVALENT MEASURES



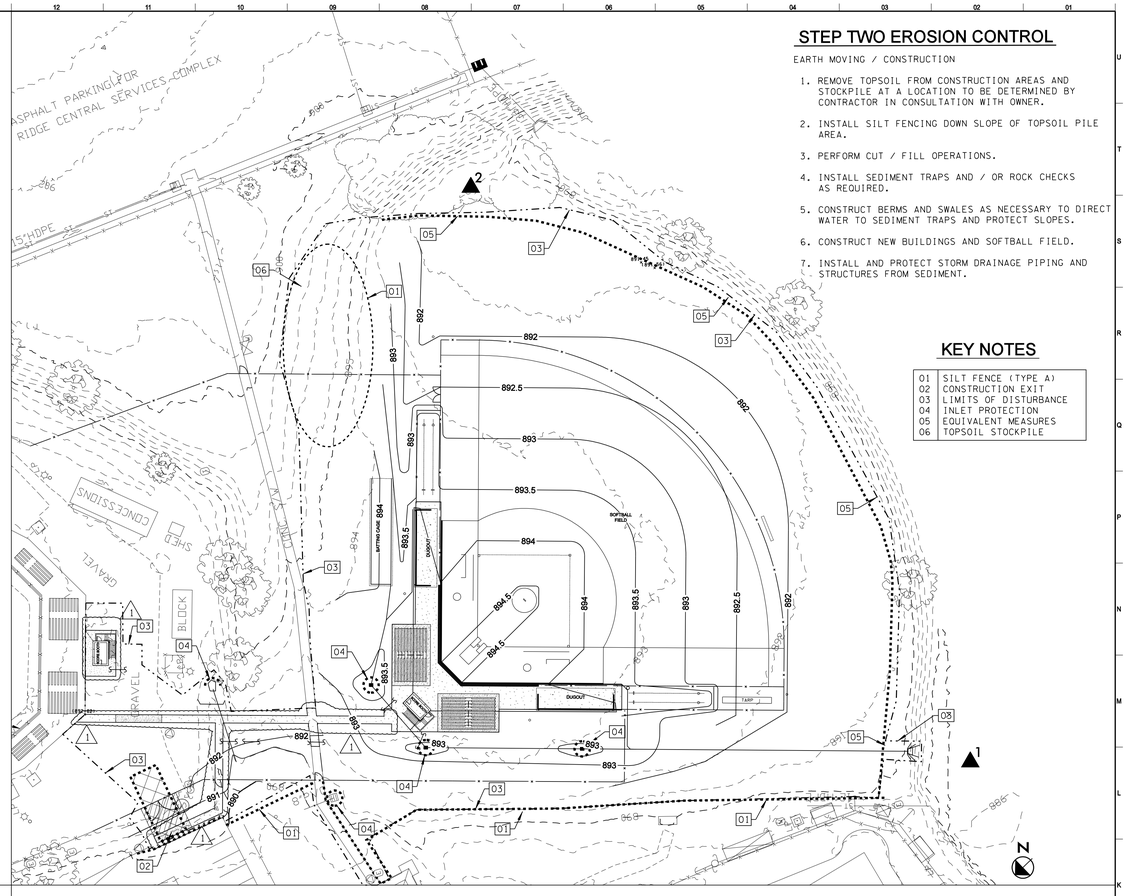
STEP TWO EROSION CONTROL

EARTH MOVING / CONSTRUCTION

1. REMOVE TOPSOIL FROM CONSTRUCTION AREAS AND STOCKPILE AT A LOCATION TO BE DETERMINED BY CONTRACTOR IN CONSULTATION WITH OWNER.
2. INSTALL SILT FENCING DOWN SLOPE OF TOPSOIL PILE AREA.
3. PERFORM CUT / FILL OPERATIONS.
4. INSTALL SEDIMENT TRAPS AND / OR ROCK CHECKS AS REQUIRED.
5. CONSTRUCT BERMS AND SWALES AS NECESSARY TO DIRECT WATER TO SEDIMENT TRAPS AND PROTECT SLOPES.
6. CONSTRUCT NEW BUILDINGS AND SOFTBALL FIELD.
7. INSTALL AND PROTECT STORM DRAINAGE PIPING AND STRUCTURES FROM SEDIMENT.

KEY NOTES

01	SILT FENCE (TYPE A)
02	CONSTRUCTION EXIT
03	LIMITS OF DISTURBANCE
04	INLET PROTECTION
05	EQUIVALENT MEASURES
06	TOPSOIL STOCKPILE



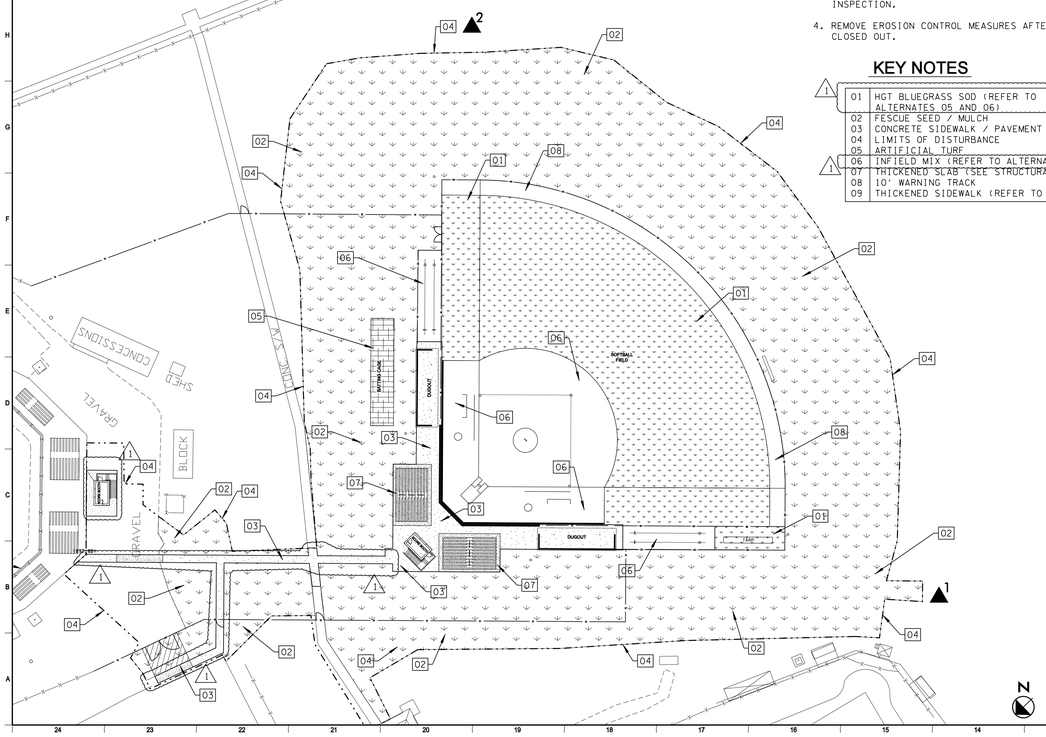
STEP THREE EROSION CONTROL

STABILIZATION

1. STABILIZE THE SITE BY INSTALLING LONG TERM MEASURES (I.E.: PAVEMENTS, SOD, SEEDING, ETC.)
2. REMOVE ANY SEDIMENT TRAPS AND / OR ROCK CHECKS AFTER SITE HAS BEEN STABILIZED.
3. SUBMIT NOTICE OF TERMINATION TO TDEC FOR FINAL INSPECTION.
4. REMOVE EROSION CONTROL MEASURES AFTER PERMIT CLOSED OUT.

KEY NOTES

1	01 HGT BLUEGRASS SOD (REFER TO ALTERNATES 05 AND 06)
	02 FESCUE SEED / MULCH
	03 CONCRETE SIDEWALK / PAVEMENT
	04 LIMITS OF DISTURBANCE
	05 ARTIFICIAL TURF
1	06 INFIELD MIX (REFER TO ALTERNATE 04)
	07 THICKENED SLAB (SEE STRUCTURAL)
	08 10' WARNING TRACK
	09 THICKENED SIDEWALK (REFER TO C301)

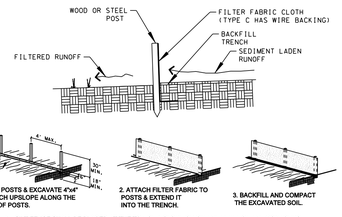


LEGEND

- HGT BLUEGRASS SOD (1)
- FESCUE SEED / MULCH
- ARTIFICIAL TURF
- SIDEWALK
- THICKENED SLAB REFER TO STRUCTURAL & ARCHITECTURAL
- EROSION CONTROL (SILT FENCE, ETC.)
- CONSTRUCTION EXIT
- INLET PROTECTION
- OUTFALL POINT

GENERAL NOTES

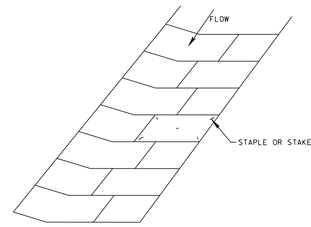
1. REFER TO STORM WATER POLLUTION PREVENTION PLAN (SWPPP) FOR ADDITIONAL INFORMATION REGARDING EROSION CONTROL.
2. EROSION CONTROL MEASURES SHOWN SHOULD BE CONSIDERED A MINIMUM. ADDITIONAL MEASURES MAY BE REQUIRED IN ORDER TO COMPLY WITH APPLICABLE PERMITS. CONTRACTOR SHALL FURNISH, INSTALL & MAINTAIN ALL EROSION CONTROL MEASURES AT NO ADDITIONAL COST TO THE OWNER AND SHALL MAKE ALL CORRECTIONS & PAY ALL FINES FOR FAILURE TO PROPERLY MAINTAIN THE SITE IN ACCORDANCE WITH TDEC STANDARDS.
3. PERFORM GRADING OPERATIONS IN A MANNER THAT DIRECTS RUNOFF TOWARD SEDIMENT TRAPS AND AWAY FROM STEEP SLOPES. UTILIZE SWALES AND BERMS AS NEED TO DIVERT RUNOFF.
4. CONTRACTOR TO REVIEW EROSION CONTROL PLAN AND SUBMIT REVISIONS AS NECESSARY FOR ENGINEER AND TDEC APPROVAL.
5. TOTAL ACREAGE TO BE DISTURBED BY CONSTRUCTION: 3.3 ACRES
6. TOPSOIL TO BE STOCKPILED ON SITE AT LOCATIONS APPROVED BY THE OWNER. INSTALL SILT FENCE DOWNSLOPE.
7. INSPECTIONS OF EROSION CONTROL SHALL BE CARRIED OUT BY THE CONTRACTOR 2 TIMES PER WEEK, A MINIMUM OF 72 HOURS APART. IN COMPLIANCE WITH TNCGP. THE CONTRACTOR'S EPSC INSPECTOR WILL BE REQUIRED TO HAVE COMPLETED THE TN EPSC LEVEL I CERTIFICATION CLASS.
8. ALL DISTURBED AREAS NOT RECEIVING PAVEMENTS, BUILDINGS, OR SOD SHALL BE STABILIZED BY SEEDING.
9. NO WORK SHALL BEGIN UNTIL A NOTICE OF COVERAGE FOR APPLICABLE PERMITTING HAS BEEN RECEIVED FROM TDEC AND ALL REQUIRED EROSION CONTROL MEASURES ARE IN PLACE.
10. REFER TO C502 FOR STORM DRAINAGE PIPING FROM AREA DRAINS AND DOWNSPOUTS.
11. REFER TO SPECIFICATION SECTION 31 25 00 EROSION AND SEDIMENTATION CONTROLS FOR VARIOUS TYPES / METHODS OF EROSION CONTROL.



1. SILT FENCE SHALL BE PLACED AT THE TOE OF A SLOPE OR ON THE LEVEL OF THE CONTOURS.
2. SILT FENCE SHALL BE EMBEDDED IN THE SOIL A MINIMUM OF SIX (6) INCHES.
3. SILT FENCE SHALL BE SECURELY ANCHORED IN PLACE BY EITHER STAKES OR STEEL POSTS DRIVEN INTO THE GROUND A MINIMUM OF 18".
4. INSPECTION SHALL BE FREQUENT AND REPAIR OR REPLACEMENT SHALL BE MADE PROMPTLY AS NEEDED.
5. SILT FENCE SHALL BE REMOVED WHEN IT HAS SERVED ITS USEFULNESS SO AS NOT TO BLOCK OR IMPEDE STORM FLOW OR DRAINAGE.

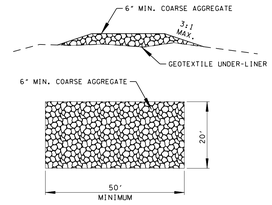
TYPE A (SIMILAR FOR TYPE C)

SILT FENCE

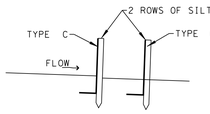


1. LAY SOD ACROSS THE DIRECTION OF FLOW.
2. USE STAKES OR STAPLES TO FASTEN SOD FIRMLY AT THE ENDS OF STRIPS AND IN THE CENTER, OR EVERY 3-4 FEET IF THE STRIPS ARE LONG. WHEN READY TO MOW, DRIVE STAKES OR STAPLES FLUSH WITH THE GROUND.
3. IN CRITICAL AREAS, SECURE SOD WITH NETTING. USE STAPLES.

SOD



CONSTRUCTION EXIT



EQUIVALENT MEASURES

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MHM

McCarty Holsaple McCarty
550 W. Main St., Suite 300
Knoxville, TN 37902
t 865.544.2000
www.mhminc.com

Project Information:

24023

OAK RIDGE HIGHSCHOOL SOFTBALL

15 WILBERFORCE AVE
OAK RIDGE, TN 37830

OAK RIDGE SCHOOLS

Seal:

Consultant:

Allmon Engineering
Cookeville, TN 38501

#	ISSUED BY:	DATE
1	BIDDING	09/23/24

Issue Date:	August 5, 2024
PIC	D. ALLMON
PM	
PA	
Drawn By:	T. NELSON
Checked By:	D. ALLMON

Sheet Information:

C101

EROSION CONTROL PLAN

GENERAL NOTES

1. CONTACT OWNER'S SURVEYOR FOR LOCATIONS, COORDINATES AND ELEVATIONS OF CONTROL POINTS TO BE USED ON THE PROJECT. PROTECT ALL ESTABLISHED CONTROL POINTS DURING DEMOLITION OPERATIONS. TRANSFER OR SET ADDITIONAL POINTS AS NECESSARY, REPLACE IF DISTURBED. REFER TO C301.
2. BOUNDARY & TOPOGRAPHIC SURVEY PERFORMED BY PROFESSIONAL LAND SYSTEM, CLINTON, TENNESSEE.
3. CONTRACTOR TO NOTIFY ALL UTILITY OWNERS PRIOR TO BEGINNING ANY DEMOLITION OPERATIONS. CONTRACTOR SHALL IDENTIFY AND PROTECT FROM DAMAGE ANY EXISTING UTILITIES OR PORTION THEREOF WHICH IS DESIGNATED TO REMAIN. CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING WORK WITH UTILITY PROVIDERS AND PAYING ANY AND ALL ASSOCIATED FEES AND OTHER COSTS RELATED TO WORK THAT UTILITY PROVIDERS PERFORM IN CONJUNCTION WITH DEMOLITION AND / OR CONSTRUCTION ACTIVITIES.
4. DEMOLISH, REMOVE, AND PROPERLY DISPOSE OF ALL CONCRETE AND ASPHALT PAVEMENTS, ETC. AS SHOWN ON THE DRAWINGS OR OTHERWISE NECESSARY FOR NEW CONSTRUCTION, UNLESS SPECIFICALLY NOTED ON THE DRAWINGS, OR INSTRUCTED BY THE ENGINEER TO REMAIN. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL LANDFILL TIPPING FEES, AND OTHER COSTS REQUIRED TO OBTAIN ANY PERMITS NECESSARY FOR OFFSITE DISPOSAL OF DEMOLITION DEBRIS AT A TDEC PERMITTED SITE.
5. CONTRACTOR TO PERFORM CLEARING, GRUBBING, REMOVAL, AND PROPER DISPOSAL OF TREES, INCLUDING ENTIRE ROOTBALL, AS INDICATED ON THE DRAWINGS AND / OR REQUIRED FOR NEW CONSTRUCTION. BACKFILL WITH AVAILABLE SOIL, UNLESS UNDER BUILDINGS AND / OR PAVEMENT AREAS WHERE BACKFILL WITH STONE IS REQUIRED.
6. REFER TO STORM WATER POLLUTION PREVENTION PLAN (SWPPP), EROSION CONTROL DRAWINGS, AND TECHNICAL SPECIFICATIONS FOR PERMITTING INFORMATION. NO WORK SHALL BE PERFORMED UNTIL ALL EROSION CONTROL MEASURES SILT FENCE, INLET PROTECTION, ETC.) ARE IN PLACE.
7. WHERE ONLY A PORTION OF CONCRETE AND / OR ASPHALT PAVEMENT IS TO BE REMOVED, SAWCUT NEAT, STRAIGHT LINES TO THE NEAREST CONTROL JOINT OR EXPANSION JOINT (AS APPLICABLE) SO NOT TO DAMAGE REMAINING SECTION OF PAVEMENT. PAVEMENT DAMAGED BY CONSTRUCTION SHALL BE REPLACED BY CONTRACTOR.
8. UNDERGROUND UTILITIES ARE SHOWN PER THE SURVEYOR. CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING / LOCATING ALL UNDERGROUND UTILITIES IN THE VICINITY OF DEMOLITION AND / OR NEW CONSTRUCTION AND ADVISE THE ENGINEER OF ANY POTENTIAL CONFLICTS. EXERCISE EXTREME CAUTION WHEN WORKING IN THE VICINITY OF UNDERGROUND UTILITIES WHICH ARE TO REMAIN.
9. CONTRACTOR SHALL BE RESPONSIBLE FOR REPAIRING ALL DAMAGE TO PUBLIC AND PRIVATE UTILITIES TO THE SATISFACTION OF UTILITY OWNERS. SHOULD UTILITY OWNERS PERFORM REPAIRS THEMSELVES, OR OUTSOURCE REPAIRS TO SOMEONE ELSE, CONTRACTOR SHALL PAY ALL ASSOCIATED COSTS.
10. CONTRACTOR TO INSTALL TEMPORARY CONSTRUCTION FENCING AND OTHER PROTECTIVE MEASURES BETWEEN ACTIVE CONSTRUCTION AND OTHER AREAS OF THE SITE BEING USED BY THE GENERAL PUBLIC. USE OF EXISTING FIELD FENCING SCHEDULED TO BE REMOVED AS TEMPORARY CONSTRUCTION FENCING IS AT THE DISCRETION OF THE CONTRACTOR.
11. ALL UTILITIES THAT SERVICE THE SITE SHALL REMAIN ACTIVE DURING THE CONSTRUCTION PERIOD. CONTRACTOR SHALL INSTALL TEMPORARY MEASURES AS REQUIRED TO MAINTAIN SERVICE AS APPROVED AND COORDINATED WITH OWNER. UPON COMPLETION OF DEMOLITION, ALL TEMPORARY MEASURES SHALL BE REMOVED.
12. CONSTRUCT TEMPORARY SHALLOW SWALES / DITCHES WHERE NECESSARY TO PREVENT PONDING WITHIN DEMOLITION AREA.
13. REFER TO C301 FOR LOCATION OF SAWCUTS AND TIE POINTS TO EXISTING.
14. WHERE SIGNS ARE TO BE REMOVED OR ARE NO LONGER APPLICABLE, THEY SHALL BE RETURNED TO THEIR RESPECTIVE OWNERS OR BE DISPOSED OF IF SO DIRECTED.

KEY NOTES

01	FENCE TO REMAIN
02	LIMIT OF DISTURBANCE
03	UTILITY POLE TO REMAIN
04	TREE TO REMAIN
05	REMOVE FENCE AND GATES
06	REMOVE CONCRETE PAD AND BLEACHERS. RETURN BLEACHERS TO OWNER
07	STRUCTURE TO BE REMOVED BY OWNER. CONCRETE INCLUDING FOOTING TO BE REMOVED BY CONTRACTOR
08	WATER METER TO REMAIN
09	REFER TO ALTERNATE FOR REMOVAL OF EXISTING ATHLETIC FIELD LIGHTING
10	WATER LINE TO REMAIN
11	FIRE HYDRANT TO REMAIN
12	MEMORIAL STONE TO BE RELOCATED BY OWNER
13	SAWCUT SIDEWALK / PAVEMENT
14	EXISTING SITE SIGN TO REMAIN
15	REMOVE SIDEWALK / CONCRETE CURB / ASPHALT
16	AREA DRAIN TO REMAIN
17	CONCRETE SIDEWALK / PAVEMENT TO REMAIN
18	EXISTING STRUCTURE TO REMAIN
19	REMOVE WOOD RAIL & POSTS
20	WOOD RAIL & POSTS TO REMAIN
21	MANHOLE TO REMAIN
22	REMOVE ALL ATHLETIC FIELD BASES, PLATES, FIELD MARKERS, ETC. AND RETURN TO OWNER
23	REMOVE PORTABLE FIELD FENCING AND RETUN TO OWNER
24	REMOVE SCOREBOARD, POSTS, AND FOUNDATIONS AND RETURN TO OWNER

LEGEND

- SANITARY SEWER LINE
- LIGHT POLE
- FIRE HYDRANT
- CLEAN OUT
- WATER LINE
- UTILITY EASEMENT
- FENCE / WOOD RAIL & POST
- TRANSFORMER
- IRRIGATION PIT

CALL BEFORE YOU DIG

UTILITIES PROTECTION CENTER

IN TENNESSEE CALL

1 - 800 - 351 - 1111

OR 811

THREE WORKING DAYS BEFORE YOU DIG

IT IS THE CONTRACTORS RESPONSIBILITY TO CONTACT UTILITY COMPANIES PRIOR TO ANY CONSTRUCTION. THE LOCATION OF UTILITIES SHOWN ON THESE PLANS ARE APPROXIMATE AND POSSIBLY INCOMPLETE. THEREFORE, CERTIFICATION TO THE LOCATION OF ALL UNDERGROUND UTILITIES IS WITHHELD.

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MHM

McCarty Holsaple McCarty
550 W. Main St., Suite 300
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t 865.544.2000
www.mhminc.com

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24023

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15 WILBERFORCE AVE
OAK RIDGE, TN 37830

OAK RIDGE SCHOOLS

Seal:

DAVID D. ALLMON
REGISTERED ENGINEER
No. 101623
STATE OF TENNESSEE
08/05/2024

Consultant:

Allmon Engineering
Cookeville, TN 38501

#	ISSUED BY:	DATE

Issue Date:	August 5, 2024
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Checked By:	D. ALLMON

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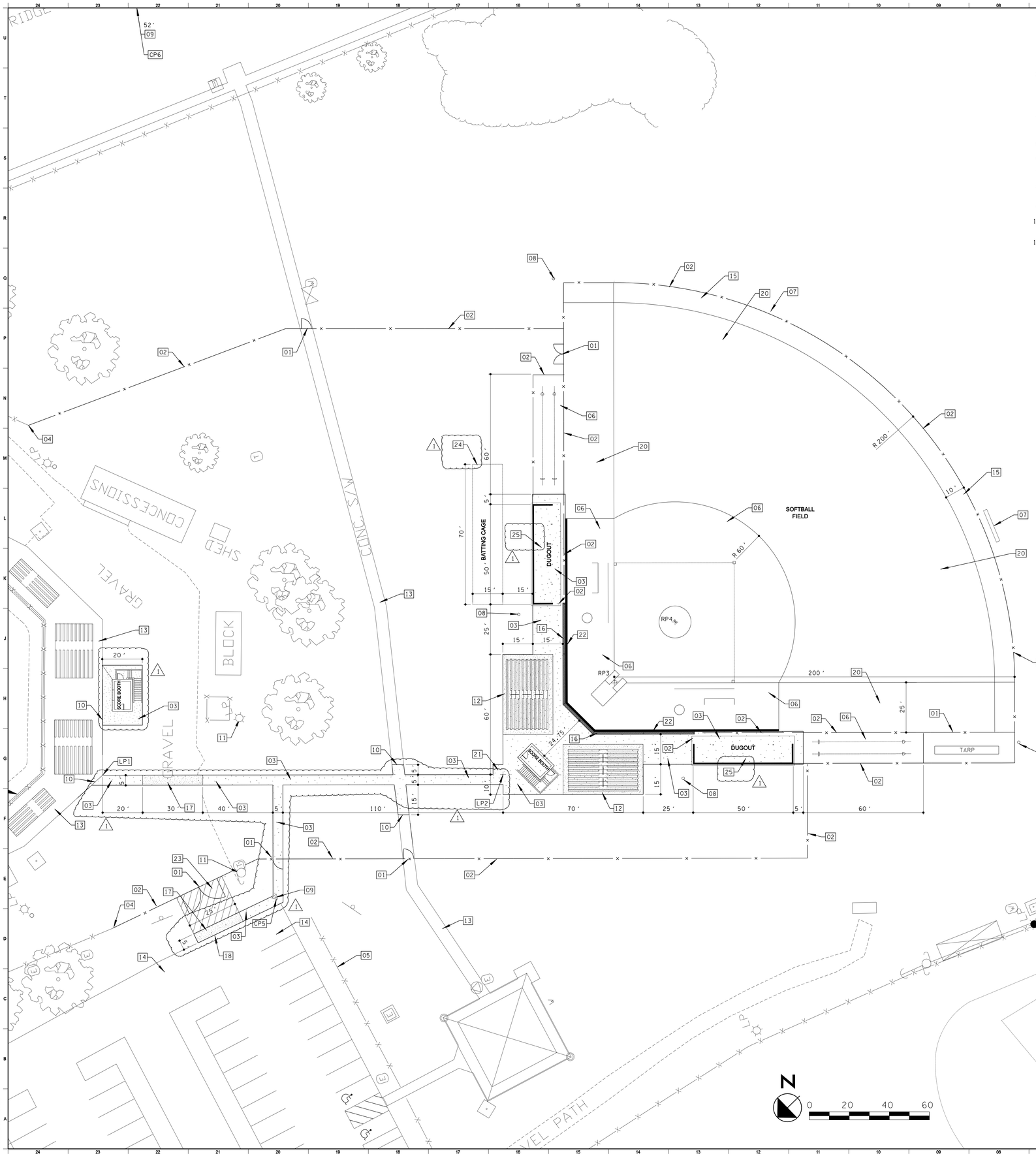
C201

SITE DEMOLITION PLAN



GENERAL NOTES

1. DIGITAL FILE WILL BE PROVIDED TO SUCCESSFULL BIDDER UPON EXECUTION OF STATEMENT OF LIABILITY.
2. CONTRACTOR TO VERIFY ALL LAYOUT DATA (COORDINATES, DIMENSIONS, ETC.) AND ADVISE THE ENGINEER OF ANY DISCREPANCIES WITH OVERALL SITE PLAN.
3. REFER TO COORDINATE TABLE FOR CONTROL POINTS, LAYOUT POINTS, & RADIUS POINTS. CONTACT OWNER'S SURVEYOR FOR CONTROL POINTS, LOCATIONS, COORDINATES, AND ELEVATIONS.
4. PROTECT ALL ESTABLISHED CONTROL POINTS DURING CONSTRUCTION OPERATIONS. ESTABLISH ADDITIONAL CONTROL POINTS AS NECESSARY. RE-INSTALL CONTROL POINTS THAT HAVE BEEN DAMAGED OR COMPROMISED DURING CONSTRUCTION IN COORDINATION WITH OWNER'S SURVEYOR.
5. TOPOGRAPHIC SURVEY PROVIDED BY PROFESSIONAL LAND SYSTEMS, CLINTON, TENNESSEE.
6. REFER TO ARCHITECTURAL FOR DIMENSIONAL LAYOUT OF BUILDINGS. ADVISE ENGINEER OF ANY DISCREPANCY.
7. REFER TO ARCHITECTURAL FOR FENCE TYPE, HEIGHTS, GATE LOCATIONS, AND DETAILS
8. REFER TO ARCHITECTURAL FOR JOINT PATTERN LOCATIONS OF SIDEWALKS AND EXTERIOR CONCRETE PAVEMENTS. INSTALL 2 #4 BARS DIAGONALLY IN SLAB AT ALL RE-ENTRANT CORNERS.
9. EXERCISE CAUTION WHEN WORKING IN THE VICINITY OF UNDERGROUND UTILITIES.
10. REFER TO ARCHITECTURAL SITE PLAN FOR LAYOUT AND DETAILS OF SOFTBALL FIELD, BLEACHERS, DUGOUTS, ETC. ADVISE ENGINEER OF ANY CONFLICTS.
11. ALL NOTES REFER TO NEW CONSTRUCTION ITEMS UNLESS THEY SPECIFICALLY SAY "EXISTING".

KEY NOTES

	01	GATES (REFER TO ARCHITECTURAL)
	02	FENCE (REFER TO ARCHITECTURAL)
	03	CONCRETE SIDEWALK (REFER TO ARCHITECTURAL FOR JOINT PATTERN)
	04	TIE TO EXISTING FENCE
	05	EXISTING WOOD / RAIL POSTS
	06	INFIELD MIX (REFER TO ARCHITECTURAL AND ALTERNATE 04)
1	07	SCOREBOARD (REFER TO STRUCTURAL & ELECTRICAL)
	08	ATHLETIC LIGHTING POLE (REFER TO ELECTRICAL AND ALTERNATE 01)
	09	SURVEY CONTROL POINTS
	10	TIE TO EXISTING CONCRETE
	11	EXISTING UTILITY POLE
	12	STRUCTURAL SLAB FOUNDATION WITH SIDEWALK FINISH (REFER TO STRUCTURAL & ARCHITECTURAL)
	13	EXISTING SIDEWALK / CONCRETE PAVEMENT
	14	EXISTING ASPHALT PAVING
	15	WARNING TRACK (REFER TO ARCHITECTURAL)
	16	BACKSTOP WALL AND NETTING SYSTEM (REFER TO ARCHITECTURAL & STRUCTURAL)
	17	7" CONCRETE OVER 4" STONE WITH #4 BARS AT 18" O.C.E.W.
	18	SIDEWALK FLUSH WITH ASPHALT
	19	COORDINATE LOCATIONS OF THICKENED SIDEWALK FOR STAIR POST SUPPORTS WITH STRUCTURAL
1	20	SOD OUTFIELD AND SIDELINES WHERE INDICATED ON C101 (REFER TO ALTERNATES 05 AND 06)
	21	DRINKING FOUNTAIN (REFER TO PLUMBING)
	22	12" FINE WASHED PEA GRAVEL
	23	GRAVEL DRIVE CONNECTING SIDEWALK WITH EXISTING GRAVEL
1	24	BATTING CAGE (REFER TO ARCHITECTURAL AND ALTERNATE 03)
	25	DUGOUT (REFER TO ARCHITECTURAL AND ALTERNATE 07)

COORDINATE TABLE			
I.D.	NORTHING	EASTING	DESCRIPTION
LP1	611,371.98	2,484,732.39	CORNER OF SIDEWALK
LP2	611,228.90	2,484,592.61	CORNER OF SIDEWALK
RP3	611,157.17	2,484,586.39	RADIUS 200'
RP4	611,114.17	2,484,586.91	RADIUS 60'
CP5	611,383.02	2,484,628.51	ELEV. 890.81
CP6	611,091.05	2,484,036.73	ELEV. 903.03

LEGEND

- SIDEWALK
- THICKENED SLAB REFER TO STRUCTURAL & ARCHITECTURAL
- GRAVEL DRIVE

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McCarty Holsaple McCarty
550 W. Main St., Suite 300
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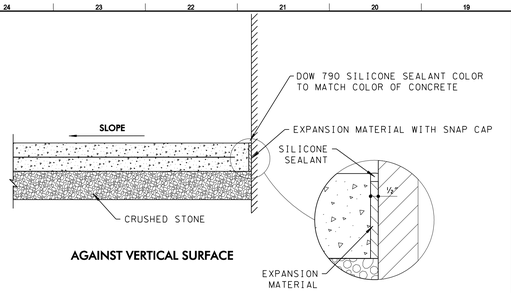
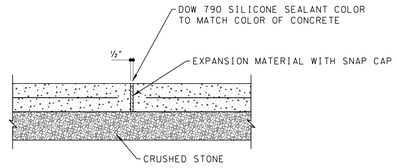
C301

SITE LAYOUT PLAN



AGAINST VERTICAL SURFACE



OTHER LOCATIONS

1 EXPANSION JOINT

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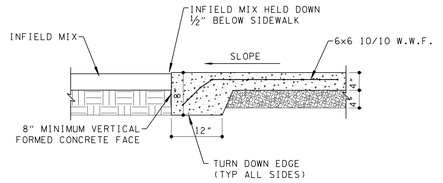
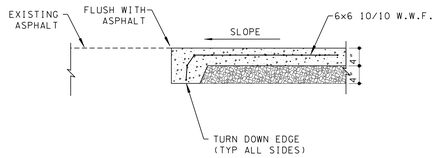


CONCRETE SIDEWALK AT ATHLETIC FIELD



CONCRETE SIDEWALK AT EXISTING ASPHALT

2 CONCRETE SIDEWALK

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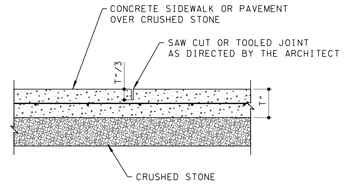

3 CONTRACTION JOINT

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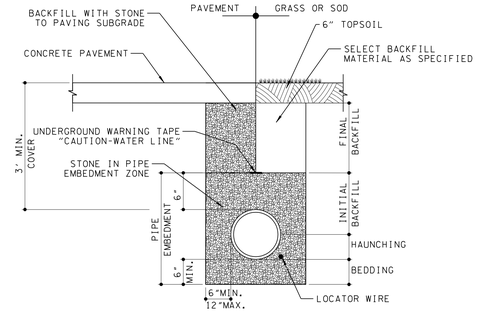


4 DOMESTIC WATER

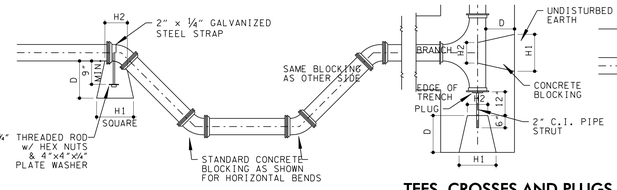
N.T.S.

TABLE OF DIMENSIONS FOR CONCRETE BLOCKING

USE 2" VALUES FOR WATER LINES 2" AND LESS

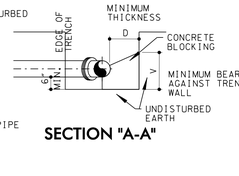
PIPE	2"					3"					4"					6"					8"				
	H1	H2	V	D	CU.FT	H1	H2	V	D	CU.FT	H1	H2	V	D	CU.FT	H1	H2	V	D	CU.FT	H1	H2	V	D	CU.FT
TEES, CROSSES & PLUGS	18"	10"	12"	18"	1.90	24"	12"	12"	18"	2.25	18"	12"	12"	18"	2.25	18"	12"	12"	18"	3.50	36"	18"	18"	18"	5.05
90° BENDS	18"	10"	12"	18"	1.90	24"	12"	12"	18"	2.25	24"	12"	24"	8"	2.25	24"	15"	24"	8"	3.50	39"	18"	24"	18"	7.30
45° BENDS	18"	6"	12"	18"	1.50	18"	8"	12"	18"	1.60	18"	8"	12"	8"	1.60	18"	10"	12"	8"	3.20	30"	11"	18"	18"	3.95
22½° BENDS	18"	6"	12"	18"	1.50	18"	8"	12"	18"	1.60	18"	8"	12"	8"	1.60	18"	12"	16"	8"	3.20	24"	11"	18"	18"	3.45
11¼° BENDS	18"	6"	12"	18"	1.50	18"	8"	12"	18"	1.60	15"	8"	12"	6"	1.60	18"	10"	18"	6"	3.20	24"	11"	16"	18"	3.40

NOTE: DIMENSIONS ARE CONTROLLED BY DIAMETER OF BRANCH MAIN.
PROVIDE BLOCKING FOR SMALLER DOMESTIC WATER LINES AS WELL: USE 2" BLOCKING FOR 1" & 1½" WATER



VERTICAL BENDS

TEES, CROSSES AND PLUGS



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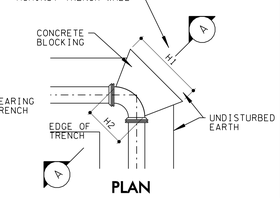

PLAN

HORIZONTAL BENDS

5 CONCRETE THRUST BLOCKING

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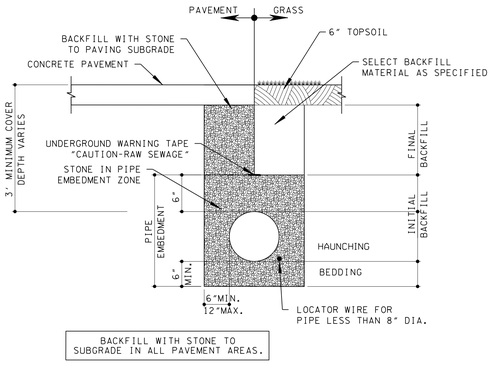
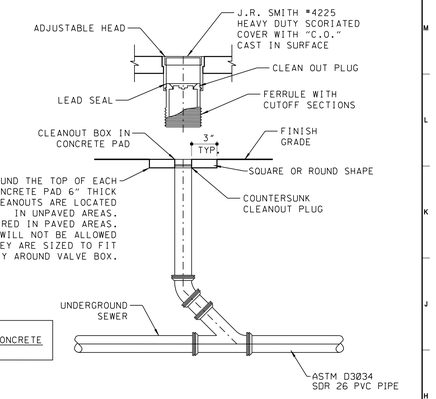


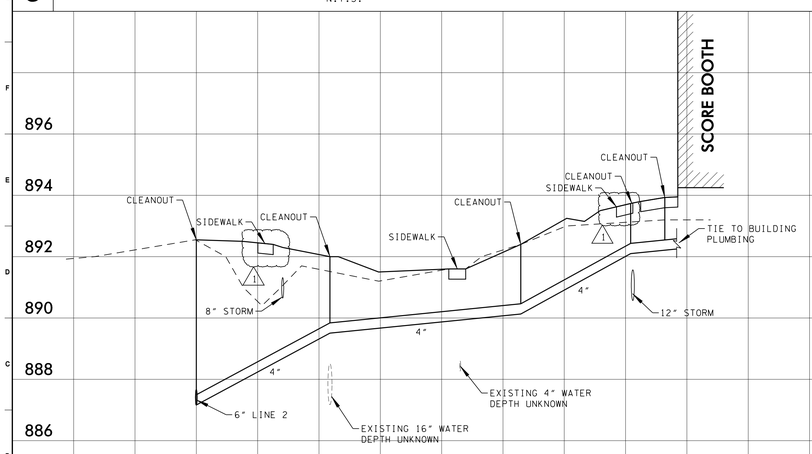
6 SANITARY SEWER

N.T.S.

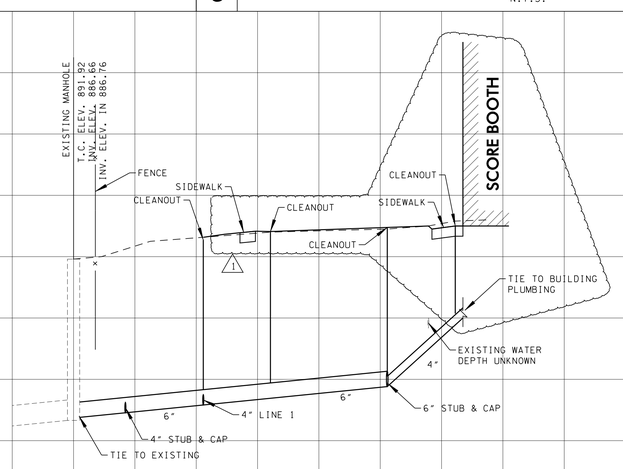


7 SANITARY SEWER CLEANOUT

N.T.S.



SANITARY SEWER LINE 1



SANITARY SEWER LINE 2

8 SANITARY SEWER PROFILES

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McCarty Holsaple McCarty
550 W. Main St., Suite 300
Knoxville, TN 37902
t 865.544.2000
www.mhminc.com

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Sheet Information:

C302

DETAILS & PROFILES

GENERAL NOTES

1. THE CONTRACTOR SHALL BE RESPONSIBLE FOR LOCATING AND VERIFYING THE SIZES, TYPE OF MATERIAL, & ELEVATIONS OF ALL EXISTING UTILITIES ASSOCIATED WITH THE PROJECT PRIOR TO CONSTRUCTION.
2. THE CONTRACTOR SHALL OBTAIN APPROVAL FROM ALL GOVERNING AGENCIES WITH JURISDICTION OVER THE PROJECT PRIOR TO MODIFICATION, REMOVAL OR INSTALLATION OF UTILITIES.
3. NO OTHER UTILITIES MAY BE INSTALLED IN THE SAME TRENCH AS WATER LINES OR SANITARY SEWER SERVICE LINES.
4. ALL WATER LINES SHALL HAVE A MINIMUM COVER OF 3'-0" ABOVE TOP OF PIPE.
5. ALL TRENCHING, PIPE LAYING AND BACKFILLING SHALL BE IN ACCORDANCE WITH FEDERAL OSHA REGULATIONS, PROJECT DETAILS, AND SPECIFICATIONS.
6. BEDDING AND BACKFILL FOR UTILITY LINES UNDER PAVEMENTS TO BE COMPACTED STONE FOR FULL DEPTH.
7. REFER TO PLUMBING DRAWINGS FOR CONTINUATION OF SANITARY SEWER AND DOMESTIC WATER WITHIN THE BUILDINGS. SITE UTILITY WORK BEGINS AT A POINT 5' FROM FACE OF BUILDING UNLESS OTHERWISE NOTED.
8. REFER TO C502 FOR ROOF DRAIN COLLECTION AND STORM DRAIN PIPING. COORDINATE SLOPES OF GRAVITY LINES TO AVOID CONFLICTS IN FIELD. OBTAIN APPROVAL OF ENGINEER PRIOR TO MAKING MODIFICATIONS.
9. CONTRACTOR TO VERIFY ALL CROSSINGS OF WATER, SANITARY, STORM, ETC. AS SHOWN ON THE DRAWINGS AND ADVISE ENGINEER OF ANY POTENTIAL CONFLICTS. POTHOLE AT ALL SANITARY SEWER CROSSINGS.
10. EXERCISE EXTREME CAUTION WHEN WORKING IN THE VICINITY OF UTILITIES WHICH ARE TO REMAIN.
11. REFER TO ELECTRICAL DRAWINGS FOR SITE LIGHTING & UNDERGROUND ELECTRIC
12. THE LOCATION OF ALL EXISTING UTILITIES SHOWN ON THE DRAWINGS IS APPROXIMATE AS PROVIDED BY SURVEYOR. THE EXACT LOCATIONS AND DEPTHS SHALL BE DETERMINED IN THE FIELD BY THE CONTRACTOR AND COORDINATED WITH THE UTILITY OWNERS INVOLVED.
13. PROVIDE ALL PROTECTIVE MEASURES TO SAFEGUARD THE EXISTING AND NEW UTILITIES FROM DAMAGE DURING THE CONSTRUCTION OF THIS PROJECT. FURNISH ANY SPECIAL EQUIPMENT REQUIRED TO WORK OVER AND AROUND THE UTILITIES.
14. ALL SANITARY SEWER BRANCH CONNECTIONS SHALL BE MADE WITH 45° WYE.
15. PROVIDE CLEANOUTS IN SANITARY SEWER LATERALS AT ALL BENDS, OTHER LOCATIONS SHOWN, AND AS REQUIRED BY CODE OR DIRECTED BY THE ENGINEER. A CLEANOUT SHOULD BE INSTALLED AT THE INTERFACE OF BUILDING PLUMBING AND SITE UTILITIES.
16. DOMESTIC WATER LINE SHALL BE SCHEDULE 40 PVC. ALL MATERIALS AND INSTALLATION SHALL BE IN ACCORDANCE WITH AHJs AND APPLICABLE CODES.
17. COORDINATE LOCATIONS OF ALL UTILITIES WITH SITE ELECTRICAL.
18. SANITARY SEWER LINE TO BE PVC SDR 26 INSTALLED WITH 3' MINIMUM COVER.
19. CONTRACTOR TO RELOCATE EXISTING UTILITIES AS NEEDED FOR NEW CONSTRUCTION.
20. REFER TO MECHANICAL FOR SIZE, THICKNESS, AND LOCATION OF CONCRETE PADS FOR HVAC.
21. REFER TO MECHANICAL, PLUMBING, & ELECTRICAL DRAWINGS FOR ADDITIONAL INFORMATION WHICH MAY AFFECT SITE UTILITIES.
22. CAUTION, UNKNOWN DEPTH AND DIRECTION OF EXISTING SANITARY SEWER PIPING. CONTRACTOR TO DETERMINE LOCATION AND DEPTH OF ALL UNDERGROUND GRAVITY PIPES PRIOR TO BEGINING INSTALLATION OF STORM AND / OR SANITARY SEWER PIPING.

1. CONTRACTOR TO CLOSELY COORDINATE UTILITIES, GRADING, DRAINAGE, AND INSTALLATION OF INFIELD MIX / SOD WITH OAK RIDGE SCHOOLS / CITY OF OAK RIDGE WHO WILL BE INSTALLING IRRIGATION SYSTEM FOR SOFTBALL FIELD.

LEGEND

- 3/4" W — WATER LINE
- SA — SANITARY SEWER
- S — EXISTING SANITARY SEWER LINE
- EXISTING UTILITY POLE
- EXISTING FIRE HYDRANT
- CO — CLEAN OUT

KEY NOTES

01	6" SANITARY SEWER
02	4" SANITARY SEWER
03	EXISTING 8" SANITARY SEWER LINE
04	EXISTING 16" WATER LINE
05	¾" WATER LINE
06	6x4 WYE
07	EXISTING 8" WATER LINE
08	TIE TO EXISTING SANITARY SEWER MANHOLE
09	TIE TO EXISTING WATER LINE
10	ATHLETIC FIELD LIGHTING
11	QUICK COUPLER VALVE FOR WATER ACCESS AT PITCHER'S MOUND (BY OWNER) TO BE SERVED FROM FIELD IRRIGATION LINES (BY OWNER)
12	STORM PIPE CROSSING
13	UTILITY EASEMENT
14	EXISTING FIRE HYDRANT
15	EXISTING UTILITY POLE
16	HVAC (REFER TO MP&E)
17	EXISTING SANITARY SEWER CLEANOUT (CAUTION)
18	EXISTING 6" WATER LINE
19	SANITARY SEWER CLEANOUT
20	WATERTIGHT CAP ON SANITARY SEWER STUB
21	CROSSING OR VERY NEAR EXISTING UNDERGROUND UTILITY OF UNKNOWN DEPTH
22	DRAIN FROM WATER FOUNTAIN TO 4" SANITARY SEWER PIPE
23	FEED WATER FOUNTAIN WITH ¾" WATER LINE FROM CONCESSION BUILDING

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IN TENNESSEE CALL

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OR 811

THREE WORKING DAYS BEFORE YOU DIG

IT IS THE CONTRACTORS RESPONSIBILITY TO CONTACT UTILITY COMPANIES PRIOR TO ANY CONSTRUCTION. THE LOCATION OF UTILITIES SHOWN ON THESE PLANS ARE APPROXIMATE AND POSSIBLY INCOMPLETE. THEREFORE, CERTIFICATION TO THE LOCATION OF ALL UNDERGROUND UTILITIES IS WITHHELD.

N

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MHM
McCarty Holsaple McCarty
550 W. Main St., Suite 300
Knoxville, TN 37902
t 865.544.2000
www.mhminc.com

Project Information:

24023

OAK RIDGE HIGHSCHOOL SOFTBALL

15 WILBERFORCE AVE
OAK RIDGE, TN 37830

OAK RIDGE SCHOOLS

Seal:

DAVID D. ALLMON — LICENSED ARCHITECT — 09/23/2024 — STATE OF TENNESSEE

Consultant:

Allmon Engineering
Cookeville, TN 38501

#	ISSUED BY:	DATE
1	PERMITTING	08/12/2024
2	BIDDING	09/23/24

Issue Date:	August 5, 2024
PIC	D. ALLMON
PM	
PA	
Drawn By:	T. NELSON
Checked By:	D. ALLMON

Sheet Information:

C401

SITE UTILITIES PLAN

GENERAL NOTES

1. REFER TO DRAWING C301, GENERAL NOTE 3 FOR INFORMATION REGARDING SURVEY CONTROL POINTS.
2. THE GRADING PLAN HAS BEEN DESIGNED TO PROVIDE POSITIVE DRAINAGE (NO PONDING).
3. TOPOGRAPHIC SURVEY PROVIDED BY PROFESSIONAL LAND SYSTEMS, CLINTON, TENNESSEE.
4. REFER TO C101 EROSION CONTROL PLAN FOR STABILIZATION MEASURES (RIP-RAP, ETC.).
5. DOWNSPOUT COLLECTION PIPING SHALL BE ADS N-12 HDPE PIPE. REFER TO ARCHITECTURAL FOR DOWNSPOUT LOCATIONS & ADAPTERS. PROVIDE CLEANOUTS AT ALL BENDS.
6. CONTRACTOR TO CAREFULLY COMPACT BACKFILL AS REQUIRED BY MANUFACTURER IN ORDER TO SAFELY MEET MAXIMUM COVER REQUIREMENTS FOR TYPE AND SIZE OF PIPE BEING INSTALLED. IF COVER REQUIREMENTS MINIMUM OR MAXIMUM) CANNOT BE MET, CONTRACTOR SHALL SUBSTITUTE RCP OR DIP AS APPROPRIATE FOR HDPE PIPE AT NO ADDITIONAL COST TO THE OWNER.
7. FIELD VERIFY TOP CASTING ELEVATION OF ALL STRUCTURES BEFORE ORDERING. NO ADDITIONAL PAYMENT WILL BE RECEIVED BY CONTRACTOR FOR INCREASES OR DECREASES IN STRUCTURE HEIGHT NECESSARY TO MEET FIELD CONDITIONS.
8. MAXIMUM LONGITUDINAL SLOPE ON SIDEWALKS IS 5% (REFER TO ELEVATIONS SHOWN).
9. FRENCH DRAIN SHALL BE 8" HDPE PERFORATED PIPE WITH DGA BEDDING AND #57 STONE BACKFILL.
10. CONTRACTOR TO BRING SUBGRADE TO WITHIN PLUS OR MINUS 0.10 BEFORE 6 INCHES OF TOPSOIL IS INSTALLED.
11. USING LASER EQUIPMENT, GRADE THE SOFTBALL FIELD TO ESTABLISH THE SUBGRADE TO PLUS OR MINUS ¼ INCH OVER THE PLANE OF THE FIELD. THIS ASSURES THAT NO POINT ACROSS THE FULL WIDTH AND FULL LENGTH OF THE FIELD WILL BE MORE THAN ¼ INCH ABOVE OR BELOW THE SPECIFIED PLAN. LASER EQUIPMENT HAS THE ABILITY TO GRADE TO PLUS OR MINUS ⅛ INCH OVER THE SURFACE OF AN athletic FIELD.
12. AFTER LASER GRADING HAS BEEN COMPLETED TO THE ACCURACY SPECIFIED, CONTRACTOR SHALL SUBMIT A TOPOGRAPHIC SURVEY PREPARED BY A TENNESSEE LICENSED SURVEYOR TO THE ENGINEER AS PROOF THAT THE FIELD IS READY TO RECIEVE SOD. SURVEY SHALL BE COMPLETE AND ACCURATE SHOWING 0.10 FOOT CONTOURS AND SPOT ELEVATIONS TO THE NEAREST 0.01 ON A 10 FOOT GRID AND AT ANY OTHER LOCATIONS THAT THE ENGINEER MAY REQUEST. IF THE INITIAL SURVEY DATA REVEALS DEFICIENCIES, CONTRACTOR SHOULD REFINE GRADING AND RE-SURVEY. AS-BUILT SHOULD NOT BE SUBMITTED TO ENGINEER FOR REVIEW UNTIL ACCURACY HAS BEEN MET. SOD SHALL NOT BE INSTALLED UNTIL THIS HAS BEEN ACCOMPLISHED.
13. INFIELD MIX SHALL BE INSTALLED FLUSH WITH TOP OF SOD (NO EDGE TO TRAP WATER). REFER TO ARCHITECTURAL FOR INFIELD MIX. INFIELD MIX SHALL ALSO BE SET ½" BELOW TOP OF CONCRETE SIDEWALK AT BOTH DUGOUTS.

1 CONTRACTOR TO CLOSELY COORDINATE UTILITIES, GRADING, DRAINAGE, AND INSTALLATION OF INFIELD MIX / SOD WITH OAK RIDGE SCHOOLS / CITY OF OAK RIDGE WHO WILL BE INSTALLING IRRIGATION SYSTEM FOR SOFTBALL FIELD.

KEY NOTES

	01	DOWNSPOUT AT SPLASH BLOCK
	02	HALF CONTOURS SHOWN FOR ACCURACY WITHIN SOFTBALL FIELD AT DRAINAGE SWALE ONLY
	03	STORM WATER CLEAN OUT
	04	LIMITS OF DISTURBANCE
	05	DOWNSPOUT COLLECTOR PIPE
	06	12" STORM PIPE
	07	WATER LINE CROSSING
	08	SANITARY SEWER CROSSING
	09	8" FRENCH DRAIN (REFER TO C502)
	10	TIE TO DOWNSPOUTS WITH WATERTIGHT ADAPTER (REFER TO ARCHITECTURAL
	11	ENDWALL
	12	CONTOUR 892.00
2	13	TURF UNDERDRAIN (REFER TO ARCHITECTURAL AND ALTERNATE 03)
	14	AREA DRAIN
	15	8" SOLID WALL PIPE
	16	CONTOUR 891.00
	17	8" STORM PIPE
	18	8" PERFORATED PIPE
2	19	6" STORM PIPE

LEGEND

- 893 — EXISTING CONTOUR
- 893 — PROPOSED CONTOUR
- (892.82) EXISTING SPOT ELEVATION
- 893.55 PROPOSED SPOT ELEVATION

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MHM

McCarty Holsaple McCarty
550 W. Main St., Suite 300
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t 865.544.2000
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OAK RIDGE SCHOOLS

Seal:

DAVID D. ALLMON — REGISTERED LANDSCAPE ARCHITECT — 09/23/2024 — STATE OF TENNESSEE

Consultant:

Allmon Engineering
Cookeville, TN 38501

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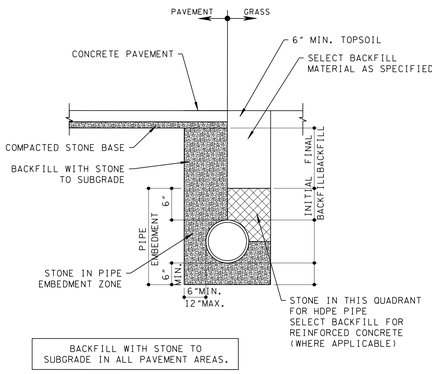
Checked By:	D. ALLMON

Sheet Information:

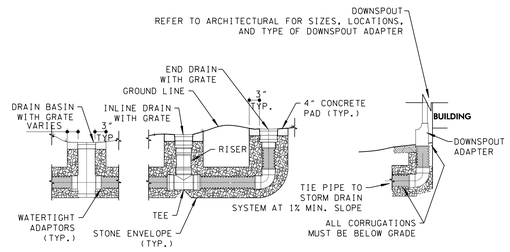
C501

GRADING & DRAINAGE PLAN



1 STORM PIPING / ROOF DRAIN

N.T.S.

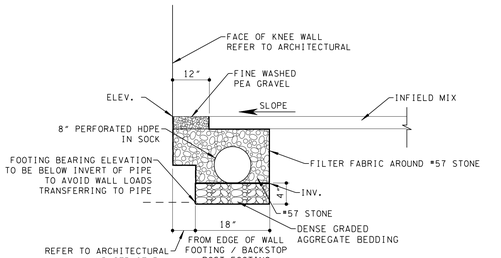


DRAIN BASIN **INLINE / END DRAIN** **DOWN SPOUT**

1. USE STANDARD H-20 GRATES, UNLESS OTHERWISE DIRECTED BY THE ENGINEER DURING SHOP DRAWING REVIEW.
2. FILL SUMP IN DRAIN BASIN WITH CONCRETE OR INSTALL MANUFACTURER'S INSERT IN ORDER TO PREVENT PONDING IN THE SUMP WHERE MOSQUITOS MIGHT BREED.
3. ALL INSTALLATIONS TO BE "DRAIN BASINS" UNLESS SPECIFICALLY CALLED FOR AS "INLINE DRAIN" OR "END DRAIN".
4. CONCRETE PADS AROUND DRAINS SHALL BE FORMED TO MATCH THE ROUND OR SQUARE SHAPE OF THE DRAIN AT THE SURFACE AND RECIEVE A SMOOTH EXPOSED FINISH.

2 AREA DRAIN

N.T.S.



3 FRENCH DRAIN (FD)

SIMILAR ALONG FRONT OF DUGOUT

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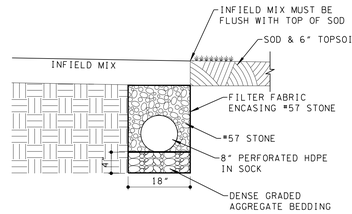
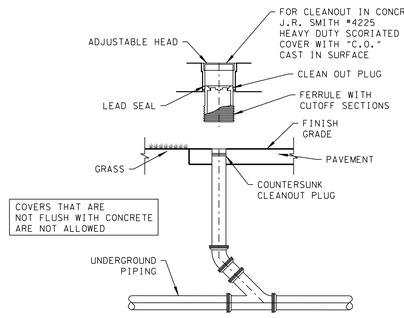


4 PERFORATED PIPE (PP) ALONG SOFTBALL INFIELD LINE

N.T.S.

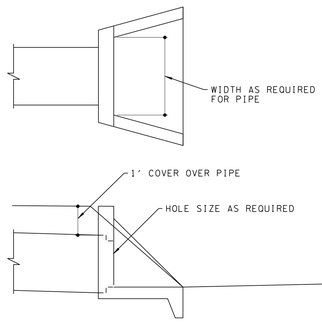
CLEANOUTS IN GRASS AREA SHALL BE PVC WITH A 6" THICK CONCRETE PAD / COLLAR AROUND ITS PERIMETER IN ORDER TO PROTECT FROM DAMAGE. CONCRETE SHALL BE FORMED TO MATCH THE ROUND OR SQUARE SHAPE OF CLEANOUT AT THE SURFACE AND RECEIVE A SMOOTH EXPOSED FINISH. TOP OF CLEANOUT PLUG SHALL NOT EXTEND HIGH ENOUGH TO BE DAMAGED BY MOWING. PRECAST COLLARS (IF USED) MUST FIT TIGHTLY AROUND CLEANOUT.

CLEANOUTS IN CONCRETE OR ASPHALT PAVING AREA SHALL BE PROTECTED BY US FOUNDRY 7621 RING & FE COVER (HEAVY DUTY)



5 EXTERIOR CLEANOUT

N.T.S.



6 PRECAST ENDWALL

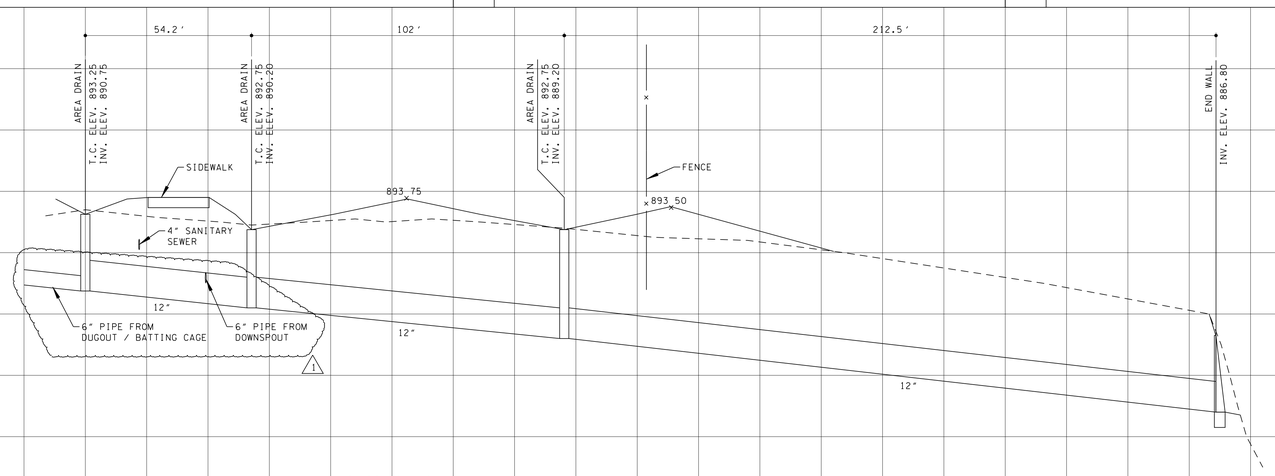
N.T.S.

7 NOT USED

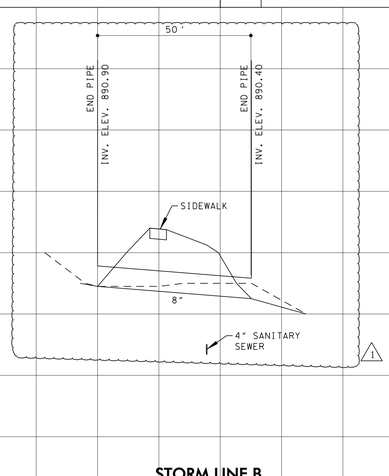
N.T.S.

8 NOT USED

N.T.S.



STORM LINE A



STORM LINE B

9 STORM DRAIN PROFILES

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McCarty Holsaple McCarty
550 W. Main St., Suite 300
Knoxville, TN 37902
t 865.544.2000
www.mhminc.com

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Consultant:

Allmon Engineering
Cookeville, TN 38501

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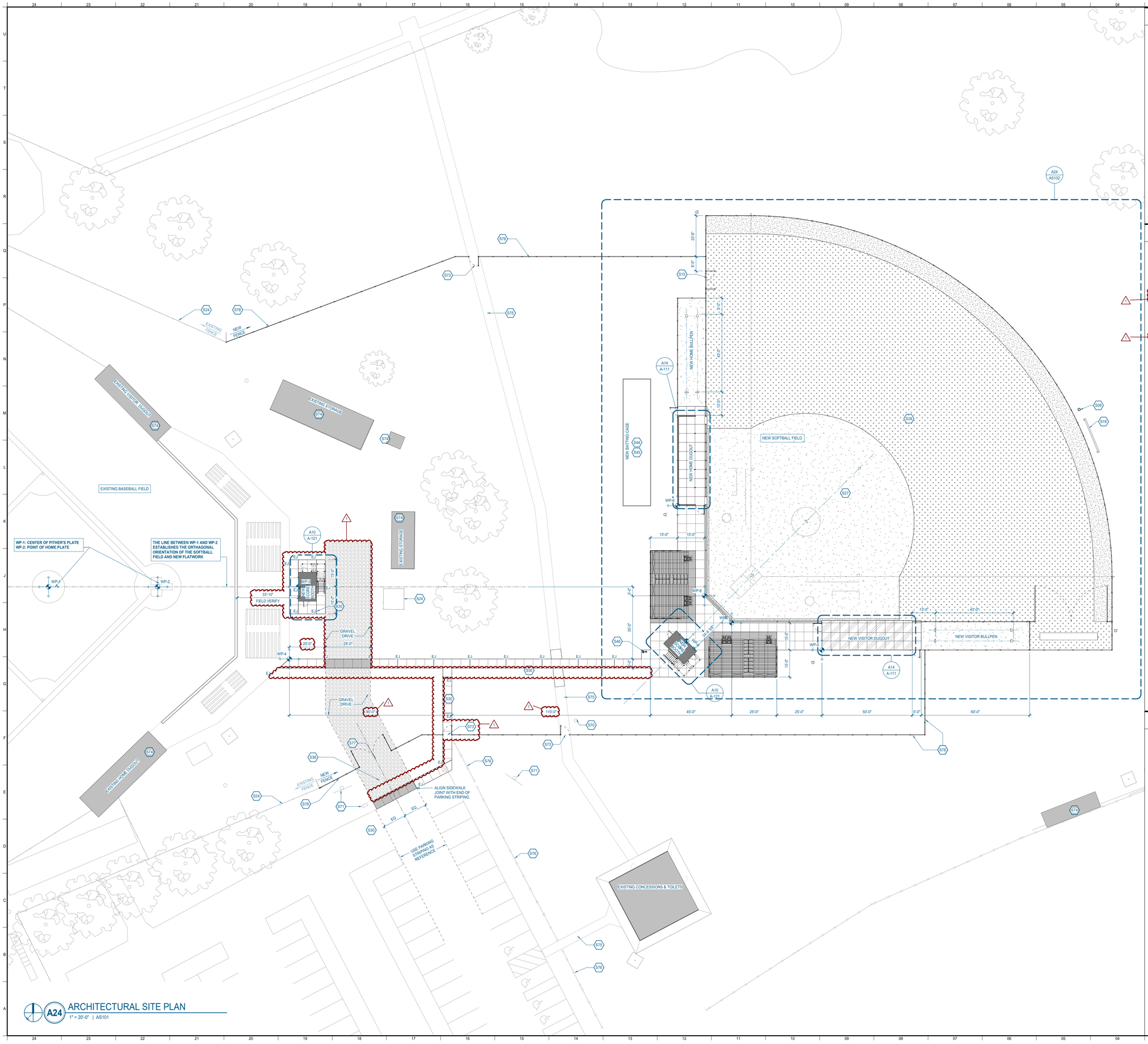
Issue Date:	August 5, 2024
PIC	D. ALLMON
PM	
PA	
Drawn By:	T. NELSON
Checked By:	D. ALLMON

Sheet Information:

C502

DRAINAGE DETAILS / PROFILES



A24 ARCHITECTURAL SITE PLAN
1" = 20'-0" | AS101

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GENERAL NOTES - SITE PLAN

A. INFORMATION USED TO GENERATE THIS SITE PLAN CAME FROM SITE SURVEY DATED JULY 11, 2024. - REFER TO V101 & CIVIL DRAWINGS PRIOR TO COMMENCING CONSTRUCTION. THE CONTRACTOR SHALL EMPLOY A REGISTERED SURVEYOR TO LAY OUT/STAKE THE SCOPE OF WORK FOR THE OWNER'S AND ARCHITECTS REVIEW
B. CONTRACTOR SHALL VERIFY LOCATION OF ALL EXISTING UTILITIES PRIOR TO CONSTRUCTION
C. CONSTRUCT ALL SIDEWALKS WITH A MAXIMUM 2% CROSS SLOPE AWAY FROM BUILDING, UNLESS NOTED OTHERWISE. SLOPE AWAY FROM BUILDING IF ADJACENT.
D. "C.J." STANDS FOR CONTROL JOINT; "E.J." STANDS FOR EXPANSION JOINT.
E. NEW SIDEWALKS ARE LAID OUT WITH CONTROL JOINTS EVERY 5'-0" O.C. AND EXPANSION JOINTS EVERY 20'-0" O.C. UNLESS NOTED OTHERWISE
F. DIMENSIONS SHOWN ON SITE PLAN ARE TO FRONT FACE OF CURB, EXTERIOR FACE OF MASONRY/CONCRETE ON BUILDING, AND CENTERLINE OF STRIPING UNLESS NOTED OTHERWISE. NOTIFY ARCHITECT IMMEDIATELY OF ANY DISCREPANCIES. DO NOT SCALE THE DRAWINGS.
G. REFER TO CIVIL FOR ELEVATIONS, SIDEWALKS, AND LOCATION OF BUILDINGS.
H. REFER TO CIVIL DRAWINGS FOR EXISTING SITE ITEMS TO REMAIN, TO BE REMOVED, TO BE RELOCATED AND THE RESPONSIBLE PARTY FOR EACH.
I. ALL GRADING AND FINISH SURFACES SHALL SLOPE AWAY FROM BUILDINGS.
J. CONTRACTOR TO VERIFY ALL GATE LOCATIONS AND SIZES WITH OWNER PRIOR TO INSTALLATION.

KEYNOTES - SITE PLAN

S08 10 75 00 – NEW FLAGPOLE WITH INGROUND LIGHTING – REFER TO ELECTRICAL
S15 32 31 13 – NEW 10'-0" WIDE DOUBLE LEAF FENCE GATE (TWO 5'-0" LEAFS)
S18 NEW SCOREBOARD BY OWNER - REFER TO STRUCTURAL AND ELECTRICAL. VERIFY LOCATION WITH OWNER PRIOR TO ELECTRICAL INSTALL
S24 EXISTING CHAIN LINK FENCING TO REMAIN
S27 ALTERNATE 04: 32 18 23 NEW SKINNED INFIELD MIX
S26 ALTERNATE 05: NEW GRASS OUTFIELD - REFER TO CIVIL
S30 NEW CONCRETE SIDEWALK WITH CONTROL JOINTS @ 5'-0" OC - REFER TO CIVIL
S36 NEW GRAVEL DRIVE CONNECTING NEW CONCRETE SIDEWALK TO EXISTING GRAVEL DRIVE - REFER TO CIVIL
S44 NEW BATTING CAGE BY OWNER
S45 ALTERNATE 03: PROVIDE TURF AT BATTING CAGE
S46 NEW PEDESTAL DRINKING FOUNTAIN - REFER TO PLUMBING.
S70 EXISTING MONUMENT SIGN TO BE RELOCATED BY OWNER
S71 EXISTING SIGNAGE TO REMAIN
S73 32 31 13 - NEW 5'-0" WIDE SINGLE LEAF FENCE GATE
S74 EXISTING BUILDING TO REMAIN
S75 EXISTING SIDWEALK TO REMAIN
S76 EXISTING WOOD RAIL TO REMAIN
S77 32 31 13 – NEW 20'-0" WIDE DOUBLE LEAF FENCE GATE (TWO 10'-0" LEAFS)
S78 32 31 13 - NEW 6'-0" HIGH CHAIN LINK PERIMETER FENCING

SITE PLAN LEGEND

- EXISTING SIDEWALK
- NEW SIDEWALK (EJ, CJ) — "CJ" INDICATES CONTROL JOINT; "EJ" INDICATES EXPANSION JOINT
- EXISTING BUILDING
- NEW BUILDING
- POWERPOLE
- NEW SITE LIGHTING
- PROPERTY LINE
- NEW FENCE. REFER TO KEYNOTES FOR ADDITIONAL INFORMATION
- EXISTING FENCE
- KEYNOTE MARK (XX)
- OBJECTS OVERHEAD
- CENTERLINE OF OBJECT

MHM

McCarty Holsaple McCarty
550 W. Main St., Suite 300
Knoxville, TN 37902
t 865.544.2000
www.mhminc.com

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24023

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OAK RIDGE, TN 37830

OAK RIDGE SCHOOLS

Consultant:

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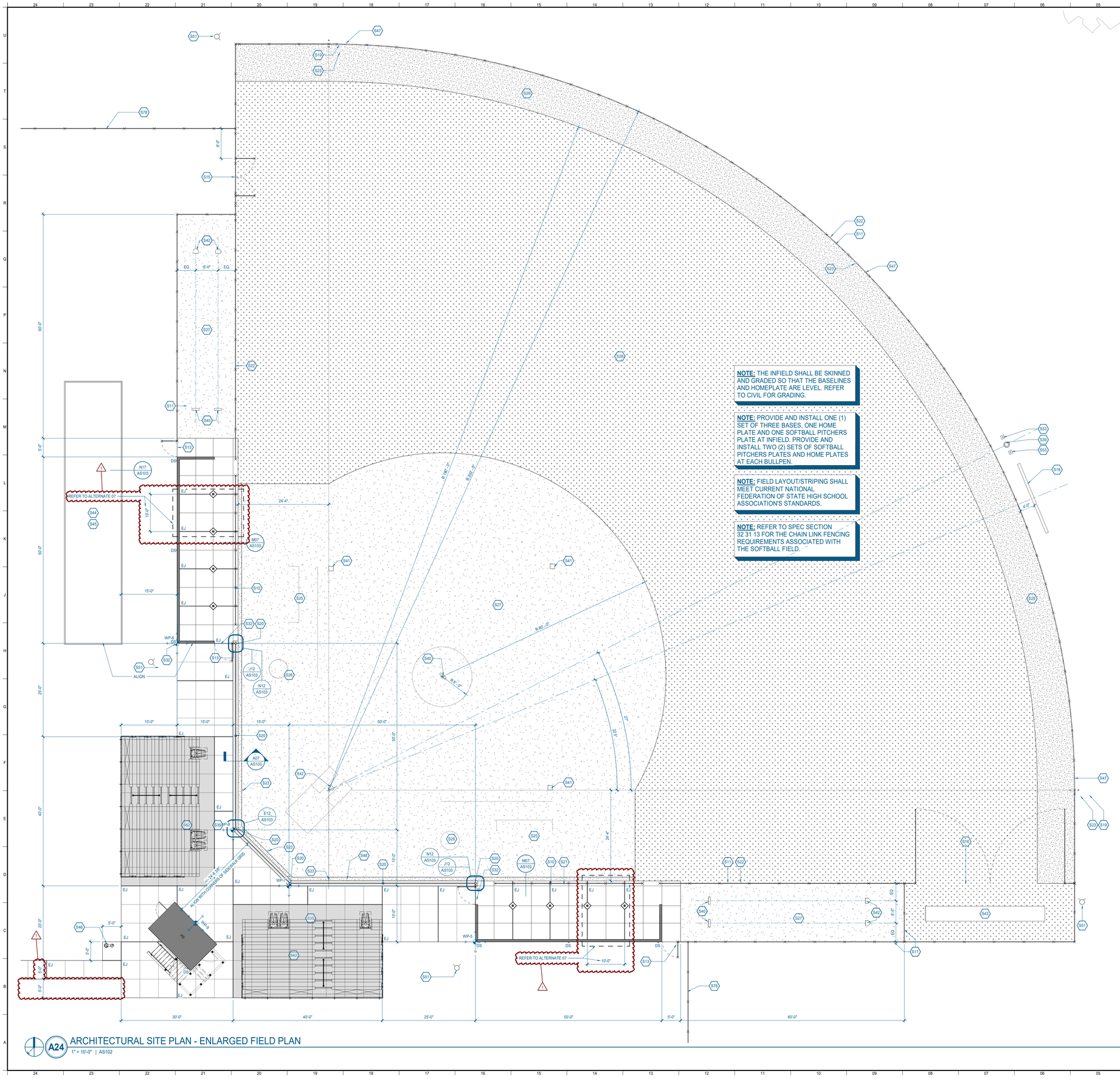
1	BIDDING	09/23/2024

Issue Date:	AUG 05, 2024
PIC	A. MILLER
PM	A. MILLER
PA	G. TAYLOR
Drawn By:	G. TAYLOR
Checked By:	A. MILLER

Sheet Information:

AS101

ARCHITECTURAL SITE PLAN



ARCHITECTURAL SITE PLAN - ENLARGED FIELD PLAN

A24 | 1" = 10'-0" | AS102

9/17/2024 3:44:13 PM

GENERAL NOTES - SITE PLAN

A. INFORMATION USED TO GENERATE THIS SITE PLAN CAME FROM SITE SURVEY DATED JULY 11, 2024. - REFER TO V101 & CIVIL DRAWINGS PRIOR TO COMMENCING CONSTRUCTION, THE CONTRACTOR SHALL EMPLOY A REGISTERED SURVEYOR TO LAY OUT/STAKE THE SCOPE OF WORK FOR THE OWNER'S AND ARCHITECTS REVIEW
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H. REFER TO CIVIL DRAWINGS FOR EXISTING SITE ITEMS TO REMAIN, TO BE REMOVED, TO BE RELOCATED AND THE RESPONSIBLE PARTY FOR EACH.
I. ALL GRADING AND FINISH SURFACES SHALL SLOPE AWAY FROM BUILDINGS.
J. CONTRACTOR TO VERIFY ALL GATE LOCATIONS AND SIZES WITH OWNER PRIOR TO INSTALLATION.

KEYNOTES - SITE PLAN

S10 32 31 13 - NEW 4'-0" HIGH CHAIN LINK FENCING. INSTALL FENCE FABRIC ON INTERIOR PLAYING FIELD SIDE OF POLES
S11 32 31 13 - NEW 6'-0" HIGH CHAIN LINK ATHLETIC FIELD FENCING. INSTALL FENCE FABRIC ON INTERIOR PLAYING FIELD SIDE OF POLES
S13 32 31 13 - NEW 4'-0" WIDE SINGLE LEAF FENCE GATE
S15 32 31 13 – NEW 10'-0" WIDE DOUBLE LEAF FENCE GATE (TWO 5'-0" LEAFS)
S16 32 31 13 - NEW 40'-0" WIDE DOUBLE LEAF FENCE GATE WITH GATE WHEELS (TWO 20'-0" LEAFS)
S18 NEW SCOREBOARD BY OWNER - REFER TO STRUCTURAL AND ELECTRICAL. VERIFY LOCATION WITH OWNER PRIOR TO ELECTRICAL INSTALL
S19 11 68 33 - NEW FOUL POLE. INSTALL OUTSIDE FENCE LINE
S20 11 68 33 - NEW BACKSTOP NET SYSTEM AND POLES SET IN PARTIAL HEIGHT MASONRY WALL. TOP OF NETTING AT 28'-0" ABOVE FINISHED GRADE
S21 INSTALL BLACK FENCE TOPPER ALONG TOP AND DOWN BOTH END POSTS
S22 11 68 33 – PROVIDE CORRUGATED PLASTIC FENCE TOPPER ON THIS SECTION OF FENCING
S23 11 68 33 - PERMANENT FIELD MARKER. COORDINATE INSTALLATION LOCATIONS WITH OWNER
S25 NEW 5'-0" x 20'-0" COACHES BOX
S26 NEW 4'-0" DIAMETER ON DECK CIRCLE
S27 ALTERNATE 04: 32 18 23 NEW SKINNED INFIELD MIX
S28 ALTERNATE 05: NEW GRASS OUTFIELD - REFER TO CIVIL
S29 ALTERNATE 04: 32 18 23 WARNING TRACK
S32 ALIGN EDGE OR JOINT OF SIDEWALK WITH CORNER OF BUILDING
S35 HATCHED AREA INDICATES BLEACHER SUPPORT SLAB - REFER TO STRUCTURAL. PROVIDE EXPANSION JOINTS AT PERIMETER. CONTROL JOINTS SPACED AT 5'-0" OC WITHIN.
S39 10 75 16 - NEW FLAG POLE
S40 11 68 33 - NEW PITCHERS PLATE
S41 11 68 33 - NEW BASE
S42 11 68 33 - NEW HOME PLATE
S43 FIELD TARP - BY OWNER
S44 NEW BATTING CAGE BY OWNER
S45 ALTERNATE 07: PROVIDE TIDE AT BATTING CAGE
S46 NEW PEDESTAL DRINKING FOUNTAIN - REFER TO PLUMBING.
S47 11 68 33 - NEW OUTFIELD DISTANCE MARKER
S48 12" FINE DECORATIVE DRAINAGE STONE - REFER TO CIVIL
S51 ALTERNATE: NEW ATHLETIC LIGHTING FIXTURE – REFER TO ELECTRICAL
S53 FLAG POLE LIGHTING WITH CONCRETE SURROUNDS - REFER TO ELECTRICAL
S62 NEW BLEACHER SEATING
S78 32 31 13 - NEW 6'-0" HIGH CHAIN LINK PERIMETER FENCING

SITE PLAN LEGEND

- EXISTING SIDEWALK
- NEW SIDEWALK (EJ / CJ) — "CJ" INDICATES CONTROL JOINT; "EJ" INDICATES EXPANSION JOINT
- EXISTING BUILDING
- NEW BUILDING
- POWERPOLE
- NEW SITE LIGHTING
- PROPERTY LINE
- NEW FENCE. REFER TO KEYNOTES FOR ADDITIONAL INFORMATION
- EXISTING FENCE
- KEYNOTE MARK (XX)
- OBJECTS OVERHEAD
- CENTERLINE OF OBJECT

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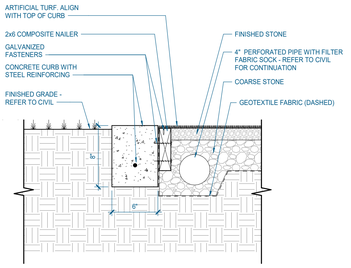
Checked By:	A. MILLER

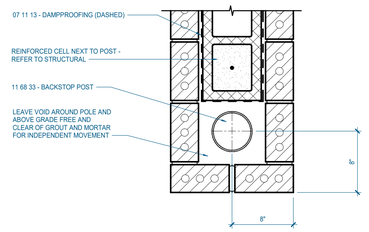
Sheet Information:

AS102

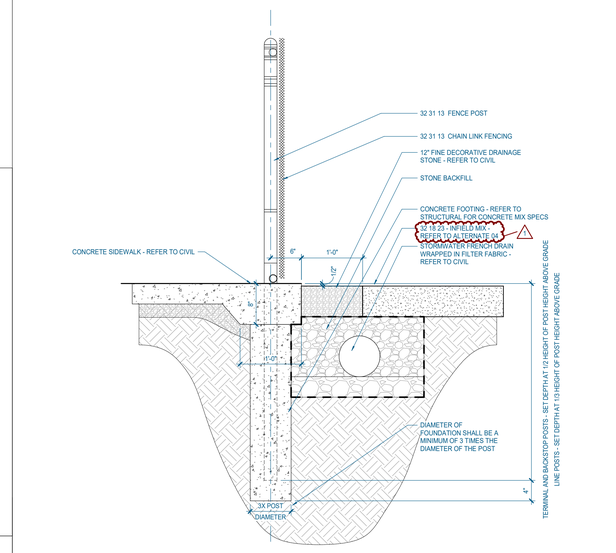
ENLARGED FIELD PLAN



N17 BATTING CAGE CURB - ALTERNATE NO. 03
1 1/2" = 1'-0" | AS103

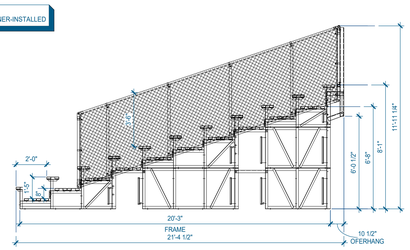


N12 BACKSTOP DETAIL @ END OF WALL
1 1/2" = 1'-0" | AS103

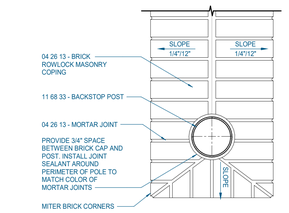


M07 SIDEWALK FIELD TRANSITION
1" = 1'-0" | AS103

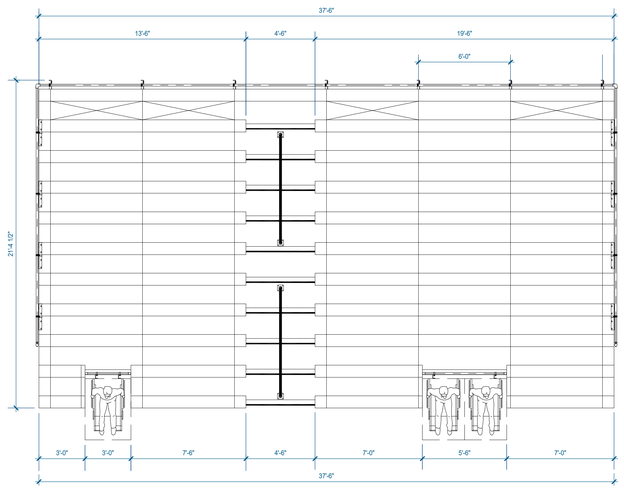
FOR REFERENCE ONLY:
OWNER-FURNISHED/OWENER-INSTALLED



J20 BLEACHER DRAWING - ELEVATION
1/4" = 1'-0" | AS103



J12 BACKSTOP CAP DETAIL @ END OF WALL
1 1/2" = 1'-0" | AS103

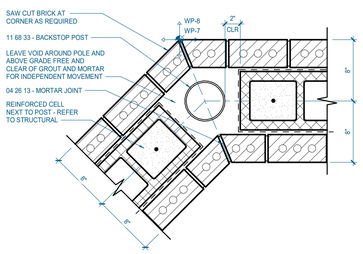


SEATING CAPACITY PER BLEACHER:
NET SEATS: 231
WHEELCHAIR SPACES: 3

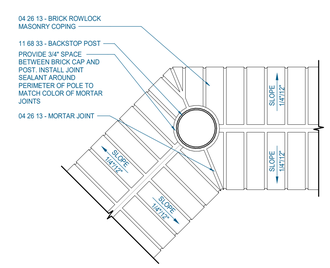
TOTAL OF (2) BLEACHERS:
TOTAL SEATING: 462 WITH (6) WHEELCHAIR SPACES

FOR REFERENCE ONLY:
OWNER-FURNISHED/OWENER-INSTALLED

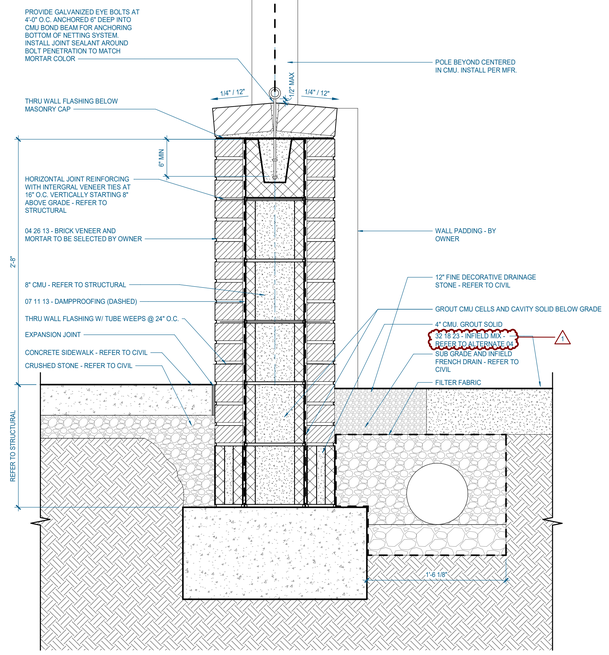
A20 BLEACHER DRAWING - PLAN
1/4" = 1'-0" | AS103



E12 BACKSTOP DETAIL @ CORNER
1 1/2" = 1'-0" | AS103



A12 BACKSTOP CAP DETAIL @ CORNER
1 1/2" = 1'-0" | AS103



A07 BACKSTOP WALL SECTION
1 1/2" = 1'-0" | AS103

9/17/2024 3:44:14 PM

MHM

McCarty Holsaple McCarty
550 W. Main St., Suite 300
Knoxville, TN 37902
t 865.544.2000
www.mhminc.com

Project Information:

24023

OAK RIDGE HIGH SCHOOL SOFTBALL

15 WILBERFORCE AVE
OAK RIDGE, TN 37830

OAK RIDGE SCHOOLS

Consultant:

#	ISSUED BY:	DATE
1	BIDDING	09/23/2024

Issue Date:	AUG 05, 2024
PIC	A. MILLER
PM	A. MILLER
PA	G. TAYLOR
Drawn By:	G. TAYLOR
Checked By:	A. MILLER

Sheet Information:

AS103

SITE DETAILS & BLEACHER DRAWINGS

ABBREVIATIONS LEGEND

ABBREVIATIONS WHEN USED IN COMPOSITION MAY INCLUDE PERIODS FOR CLARIFICATION

A/C	AIR CONDITION(ING)(ED)	MACH	MACHINE
AP	ACCESS PANEL	MAINT	MAINTENANCE
(ACP-)	ACOUSTICAL CEILING PANEL	MAS	MASONRY
(ACT-)	ACOUSTICAL CEILING TILE	MATL	MATERIAL
ADA	AMERICANS W/ DISABILITIES	MAX	MAXIMUM
	ACT	MDO	MEDIUM DENSITY OVERLAY
ADJ	ADJUSTABLE	MDF	MEDIUM DENSITY
AFF	ABOVE FINISHED FLOOR		FIBERBOARD
AHU	AIR HANDLING UNIT	MECH	MECHANICAL
ALT	ALTERNATE	MEMB	MEMBRANE
ALUM	ALUMINUM	MEZZ	MEZZANINE
ANOD	ANODIZE(D)	MEP	MECHANICAL, ELECTRICAL,
ARCH	ARCHITECT(URAL)		PLUMBING
		MFR	MANUFACTURER
B/B	BACK TO BACK	MH	MANHOLE
BD	BOARD	MIN	MINIMUM
BN	BENCH	MIRR	MIRROR
BLDG	BUILDING	MISC	MISCELLANEOUS
BLK	BLOCK(ING)	MKR BD	MARKER BOARD
BM	BEAM	MO	MASONRY OPENING
BMK	BENCHMARK	MTD	MOUNTED
BOT	BOTTOM	MTG	MEETING
BOT/	BOTTOM OF	MTL	METAL
BR	BRICK	MULL	MULLION
BRZ	BRONZE	MVBL	MOVABLE
BUR	BUILT-UP ROOFING		
		N	NORTH
CB	CATCH BASIN	N/A	NOT APPLICABLE
CH	COAT HOOK	NIC	NOT IN CONTRACT
CIP	CAST-IN-PLACE	NO	NUMBER
CIRC	CIRCULATION	NOM	NOMINAL
CJ	CONTROL JOINT	NTS	NOT TO SCALE
CL	CENTERLINE		
CLG	CEILING	OA	OVERALL
CLR	CLEAR / CLEARANCE	OC	ON CENTER
CMU	CONCRETE MASONRY UNIT	OD	OUTSIDE DIAMETER
CO	CLEANOUT	OF/CI	OWNER FURNISHED,
COL	COLUMN		CONTRACTOR INSTALLED
CONC	CONCRETE	OFD	OVERFLOW DRAIN
CONF	CONFERENCE	OFF	OFFICE
CONN	CONNECTION	OH	OVERHEAD
CONST	CONSTRUCTION	OP/CI	OWNER PURCHASED,
CONT	CONTINUOUS		CONTRACTOR INSTALLED
COORD	COORDINATE	OP/OI	OWNER PURCHASED,
CORR	CORRIDOR		OWNER INSTALLED
CP/CI	CONTRACTOR PURCHASED,	OPH	OPPOSITE HAND
	CONTRACTOR INSTALLED	OPNG	OPENING
CTR	CENTER	OPP	OPPOSITE
CU	CUBIC		
CW	CURTAIN WALL	PA	PUBLIC ADDRESS
		PB	PARTICLE BOARD
D	DEPTH	PC	PRE-CAST
DBL	DOUBLE	PCC	PRE-CAST CONCRETE
DEG	DEGREE		
DEMO	DEMOLISH, DEMOLITION	PERF	PERFORATED
DEPT	DEPARTMENT	PERP	PERPENDICULAR
DF	DRINKING FOUNTAIN	PL	PLATE
DIA	DIAMETER	PLAM	PLASTIC LAMINATE
DIAG	DIAGONAL	PLAS	PLASTER
DIM	DIMENSION	PLBG	PLUMBING
DISP	DISPENSER	PLY	PLYWOOD
DIV	DIVISION	P	PAINT(ED)
DN	DOWN	PNL	PANEL
DR	DOOR	POL	POLISHED
DS	DOWNSPOUT	PREFAB	PREFABRICATED
DW	DISHWASHER	PRKG	PARKING
DWG	DRAWING	PROJ	PROJECT
DWV	DRAINAGE, WASTE AND VENT	PS	PROJECTION SCREEN
		PROP	PROPERTY
E	EAST	PSF	POUNDS PER SQUARE FOOT
EA	EACH	PSI	POUNDS PER SQUARE INCH
EIFS	EXTERIOR INSULATION AND	PT	POINT
	FINISH SYSTEM	PTD	PAPER TOWEL DISPENSER
EJ	EXPANSION JOINT	PTN	PARTITION
EL	ELEVATION	PVG	PAVING
ELEC	ELECTRICAL		
ELEV	ELEVATOR	QTY	QUANTITY
EMER	EMERGENCY		
EOS	EDGE OF SLAB	R	RADIUS
EQ	EQUAL, EQUIVALENT	RI	RISER
EQUIP	EQUIPMENT	RCP	REFLECTED CEILING PLAN
ETC	ETCETERA	REC	RECESSED
ETR	EXISTING TO REMAIN	REF	REFERENCE
EXIST	EXISTING	REFR	REFRIGERATOR
EXP	EXPANSION	REINF	REINFORCING
EXT	EXTERIOR, EXTERNAL	REQD	REQUIRED
		RESIL	RESILIENT
F/	FACE OF	REV	REVISION
F/F	FACE TO FACE	RFG	ROOFING
FA	FIRE ALARM	RH	RIGHT HAND
FABR	FABRICATE(D)	RO	ROUGH OPENING
FC	FIRE CABINET	RM	ROOM
FD	FLOOR DRAIN	ROW	RIGHT OF WAY
FDTN	FOUNDATION	RUB	RUBBER
FE	FIRE EXTINGUISHER	RVL	REVEAL
FEC	FIRE EXTINGUISHER CABINET		
FF	FINISHED FLOOR	S	SOUTH
FH	FIRE HYDRANT	SA	SOUND ATTENUATION
FHC	FIRE HOSE CABINET	SAN	SANITARY
FIN	FINISH(ED)	SC	SOLID CORE
FIXT	FIXTURE	SCHED	SCHEDULE
FLASH	FLASHING	SECT	SECTION
FLEX	FLEXIBLE	SF	SQUARE FOOT (FEET)
FLR	FLOOR, FLOORING	SIGN	SIGNAGE
FO	FINISHED OPENING	SGL	SINGLE
FRTW	FIRE RETARDANT (WOOD)	SHR	SHOWER
FT	FEET (FOOT)	SHT	SHEET
FTG	FOOTING	SIM	SIMILAR
FURN	FURNISH, FURNITURE	SP	STANDPIPE
FURR	FURRING	SPEC	SPECIFICATION
		SPKR	SPEAKER
GA	GAUGE	SQ	SQUARE
GALV	GALVANIZED	SS	SERVICE SINK
GB	GRAB BAR	SST	STAINLESS STEEL
GEN	GENERAL	STC	SOUND TRANSMISSION
GFRC	GLASS FIBER		CLASS
	REINFORCED CONCRETE	STD	STANDARD
GFRG	GLASS FIBER	STL	STEEL
	REINFORCED GYPSUM	STOR	STORAGE
GL	GLASS	STRUCT	STRUCTURE, STRUCTURAL
GD	GROUND	SUSP	SUSPENDED
GLULAM	GLUE LAMINATED WOOD		
GR	GRADE	TR	TREAD
GSU	GLAZED STRUCTURAL UNIT	T/	TOP OF
GT	GREASE TRAP	T/B	TOP AND BOTTOM
		TG	TONGUE AND GROOVE
H	HIGH	TEL	TELEPHONE
HB	HOSE BIB	TEMP	TEMPORARY
HC	HOLLOW CORE	THK	THICK, THICKNESS
HDF	HIGH DENSITY FIBERBOARD	TKBD	TACKBOARD
HDWR	HARDWARE	TOPO	TOPOGRAPHY, TOPOGRAPHIC
HDWD	HARDWOOD	TLT	TOILET
HM	HOLLOW METAL	TS	TUBE STEEL
HO	HOLD OPEN	TV	TELEVISION
HORIZ	HORIZONTAL	TYP	TYPICAL
HP	HIGH POINT		
HR	HOUR	U	HEAT TRANSFER
HPC	HIGH PERFORMANCE COATING		COEFFICIENT
HRL	HANDRAILS	UC	UNDER CABINET
HT	HEIGHT	UH	UNIT HEATER
HTG	HEATING	UL	UNDERWRITER'S
HTR	HEATER		LABORATORIES
HVAC	HEATING, VENTILATION	UNO	UNLESS NOTED OTHERWISE
	AIR CONDITIONING	UTIL	UTILITY
HW	HOT WATER		
HYD	HYDRANT	VERT	VERTICAL
		VIF	VERIFY IN FIELD
ID	INSIDE DIAMETER	VOL	VOLUME
IN	INCH(ES)		
INCL	INCLUDE, INCLUDING	W	WEST
INSUL	INSULATION	W/	WITH
INT	INTERIOR	W/O	WITHOUT
INTERM	INTERMEDIATE	WC	WATER CLOSET
INV	INVERT	WD	WOOD
		WF	WIDE FLANGE
JAN	JANITOR	WH	WATER HEATER
JT	JOINT	WM	WIRE MESH
		WRB	WATER RESISTIVE AIR
KD	KNOCK DOWN		BARRIER
		WP	WATERPROOFING
L	LONG, LENGTH	WT	WEIGHT
LAM	LAMINATE(D)	WWF	WELDED WIRE FABRIC
LAV	LAVATORY		
LF	LINEAR FOOT (FEET)	YD	YARD
LH	LEFT HAND		
LKR	LOCKER	ZN	ZINC
LP	LOW POINT		
LT	LIGHT(S)		
LWC	LIGHT WEIGHT CONCRETE		

INTERIOR ABBREVIATIONS

ACP	SOUND-ABSORBING CEILING UNITS	LT	LINOLEUM TILE
APC	ACOUSTIC PANEL CEILINGS (LAY-IN)	LVT	LUXURY VINYL TILE
ATC	ACOUSTIC TILE CEILINGS	MG	MIRRORED GLASS
AWP	SOUND-ABSORBING WALL UNITS	MPC	METAL PANEL CEILINGS
		(P-)	PAINT COLOR
BPG	BACK PAINTED GLASS	PLAM	PLASTIC LAMINATE
		PWF	PARQUET WOOD FLOORING
CFT	CORK FLOORING	(PT-)	PORCELAIN TILE
CG	CORNER GUARDS		
CPL	CHEMICAL RESISTANT PLAM	RAF	RESILIENT ATHLETIC FLOORING
CPT	CARPET TILE	(RB-)	RUBBER BASE
CT	CERAMIC TILE	(RS-)	ROLLER SHADES
CTZ	PORTLAND CEMENT TERRAZZO		
		SDT	STATIC-DISSIPATIVE TILE
CUR	CURTAIN	SF	STONE FLOORING
CVT	CONDUCTIVE VINYL TILE	SFB	STONE FLOORING BASE
		SFC	STRETCHED-FABRIC CEILING
DRP	DRAPERY	SFW	STRETCHED-FABRIC WALL
DSB	DIMENSION STONE BASE	SSM	SOLID SURFACE MATERIAL
DST	DIMENSION STONE TILE	STH	STONE THRESHOLD
		SV	SHEET VINYL FLOORING
FC	FILE CABINET	SVT	SOLID VINYL FLOOR TILE
FSF	FLUID-APPLIED SPORTS FLOORING	VB	VINYL BASE
FWC	FABRIC-WRAPPED CEILING PANEL	VCT	VINYL COMPOSITION TILE
		VDB	VISUAL DISPLAY BOARDS
FWP	FABRIC WRAPPED PANELS	VLB	VERTICAL LOUVER BLINDS
		VWC	VINYL WALL COVERINGS
GCM	GLAZED CERAMIC MOSAIC TILE		
GQT	GLAZED QUARRY TILE	WAF	WOOD ATHLETIC FLOORING
GWT	GLAZED WALL TILE	WB	WOOD BASE
GYP	GYPSUM	WD	WOOD
		WG	WALL GUARDS
LMC	LINEAR METAL CEILINGS	WP	WOOD PANELING
LP	LAMINATE CLAD PANELING	WV	WOOD VENEER LAMINATE
LS	LINOLEUM SHEET	WWC	WOOD VENEER WALL COVERINGS
LSG	LATEX SEMI-GLOSS		

MATERIALS

- COMPACTED FILL EARTH WORK
- UNDISTURBED SOIL
- GRAVEL, POROUS FILL
- SAND
- ASPHALT
- STRUCTURAL CONCRETE
- LIGHTWEIGHT CONCRETE
- TERRAZZO
- CUT STONE
- CAST STONE
- BRICK, COMMON FACE
- BRICK, GLAZED
- CONCRETE MASONRY UNIT
- STRUCTURAL CLAY TILE
- STEEL
- ALUMINUM/ORNAMENTAL METAL
- CONTINUOUS WOOD FRAMING
- BLOCKING OR SHIM
- FINISH WOODWORK
- PLYWOOD
- PARTICLE BOARD
- GYPSUM WALL BOARD
- WATERPROOFING/ DAMPPROOFING/ AIR/ MOISTURE BARRIER
- RIGID INSULATION
- BATT INSULATION
- CARPETING (LARGE SCALE)
- RESILIENT FLOORING
- PLASTIC LAMINATE
- LEAD-LINED GYPSUM WALLBOARD
- GLASS
- GLASS BLOCK
- ACOUSTICAL CEILING BOARD
- WOOD FLOORING
- SPRAY-ON FIREPROOFING OR INSULATION
- EXTERIOR SHEATHING
- SOLID SURFACING
- EIFS
- PLASTER STUCCO W/ METAL LATH

SYMBOLS LEGEND

SHEET NUMBER

A-121

- SHEET SEQUENCE NUMBER
- SHEET TYPE DESIGNATOR
- DISCIPLINE DESIGNATOR *DASH FOR DISCIPLINE 2nd DIGIT WHEN SINGLE DIGIT*

NORTH ARROW

PROJECT NORTH

TRUE NORTH

VERTICAL ELEVATIONS

LEVEL XX 10'-0"

LEVEL XX 10'-0"

EL +X'-X"

TOS +X'-X"

VERTICAL SPOT ELEVATION TOS: TOP OF STEEL TOM: TOP OF MASONRY

MATCH LINE

MATCHLINE

A24 / A-101

SHEET NUMBER ON WHICH CONTINUATION IS FOUND

KEYNOTE TAGS

A2 — PLAN KEYED NOTE

00.00.00 DESCRIPTION — SPECIFICATION KEYNOTE

ROOM NAME AND NUMBER

ROOM NAME

A101A

150 SF

FINISH MATERIAL TAGS

XXX — FINISH MATERIAL TAG

XX / XX — FINISHED FLOORING TRANSITION

ROOM FINISH TAG

ROOM NAME

XXX-# | XX-# | XX-#

- BASE FINISH
- FLOOR FINISH
- WALL FINISH

AREA NAME AND OCCUPANCY

AREA NAME — OCCUPANCY TYPE

1500 SF / OCC / SF — XXX — TOTAL OCCUPANTS

OCC. LOAD FACTOR

TOTAL OCC. AREA

ACCENT FINISH SYMBOLS

PWT-1 — ACCENT WALL

PWT-1 | PB-1 — ACCENT WALL & BASE

DOOR TAGS

USE ROOM NUMBER WITH DOOR MARK

301A

OCCUPANT LOAD

999 / 999

MAX. OCCUPANT LOAD

CASEWORK TAG / DIMENSION

B1 / 36"W — CABINET TYPE; CABINET WIDTH

36" B1

OPENING TYPE SYMBOL

XX — INTERIOR OPENING TAG (NUMERIC)

XX — EXTERIOR OPENING TAG (ALPHA)

GLAZING PANEL TAG

GL-X — GLAZING TYPE

DIMENSIONS

XX'-XX" SUFFIX

XX'-XX" SUFFIX

SUFFIXES

CLEAR: CLEAR EXACT DIMENSION

RO: ROUGH OPENING

MO: MASONRY OPENING

GRAPHIC SCALE

0 — 1/2" — 1" — 2"

SHEET NUMBER

A24 VIEW NAME

1/8" = 1'-0" | A-101 | SUB-TITLE

DRAWING REVISION

1

SPOT ELEVATIONS/COORDINATES

+X'-X" — HORIZONTAL SPOT ELEVATION

E/W XX'-XX" N/S XX'-XX" — SPOT COORDINATES

BREAK LINE

PROPERTY LINE

N 90°00'00" E

Distance

PROJECT SCOPE BOUNDARY

CONSTRUCTION JOINTS

EJ

CJ

EQUIPMENT | FURNITURE TAG

EQ-XXXX

FF-XXXX

EXIT SIGN WITH DIRECTION

WALL MOUNTED

CEILING MOUNTED

FIRE EXTINGUISHER CABINET

WALL MTD — FE

RECESSED — FEC (R)

SEMI-RECESSED — FEC (SR)

SURFACE MTD — FEC (S)

TOILET ACCESSORY TAG

TA1 — SPECIALTY EQUIPMENT TAG, REFER TO SPECS

PARTITION TAG

A30

- FIRE RATING / PARTITION HEIGHT
- FRAMING SIZE
- PARTITION TYPE

ITEMS NOT IN SCOPE

AREA NOT IN SCOPE

OWNER FURNISHED EQUIPMENT / ITEM

ROOF DRAIN

RD — OD — OVERFLOW — ROOF DRAIN

CEILING TAG

XXX-X / X'-X" — CEILING MATERIAL; CEILING HEIGHT

+X'-X" — SOFFIT/BULKHEAD HEIGHT

WORK POINTS

WP-# DIST. DIST.

ARCHITECTURAL GENERAL NOTES

CONTRACT DOCUMENTS

1. DRAWINGS AND SPECIFICATIONS ARE COMPLEMENTARY AND ARE INTENDED TO INCLUDE OR IMPLY ALL ITEMS REQUIRED FOR THE PROPER EXECUTION AND COMPLETION OF THE WORK.
2. WHERE A DETAIL IS SHOWN OR NOTE IS DESCRIBED FOR ONE CONDITION, IT SHALL BE ASSUMED TO APPLY TO ALL LIKE OR SIMILAR CONDITIONS, EVEN THOUGH NOT SPECIFICALLY NOTED AS SUCH ON THE DRAWINGS.
3. DIMENSIONS SHOWN ON THE FLOOR PLANS FOR NEW CONSTRUCTION ARE TO THE FACE OF STUD FRAMING, TO CENTER LINE OF COLUMNS AND TO FACE OF CONCRETE OR MASONRY WALLS, UNLESS OTHERWISE INDICATED. DIMENSIONS IN RENOVATED AREAS ARE FROM FINISH FACE OF EXISTING WALLS AND TO FACE OF NEW STUD WALL FRAMING, UNLESS OTHERWISE INDICATED.
4. DIMENSIONS NOTED AS 'MINIMUM', 'CLEAR', OR 'HOLD' ARE TO FACE OF PARTITION FINISH. MAINTAIN DIMENSIONS NOTED.
5. PARTITIONS NOT DIMENSIONED ARE GENERALLY LOCATED BY ONE OF THE FOLLOWING CRITERIA:
   A. CENTERLINE: CENTER OF PARTITION ALIGNS WITH THE CENTER OF GRIDLINE OR OBJECT CENTERLINE (SUCH AS A COLUMN OR MULLION). CENTER THE OVERALL PARTITION WIDTH RATHER THAN STUD WIDTH ON THE LINE.
   B. ALIGN: LOCATE PARTITION FLUSH WITH FACE OF GYPSUM BOARD, OR OTHER SURFACE INDICATED.
6. THE CONTRACTOR SHALL SURVEY FLOOR ELEVATIONS TO DETERMINE SCOPE OF FLOOR LEVELING AND REMEDIAL REPAIR WORK. THE CONTRACTOR SHALL INCLUDE IN HIS SCOPE OF WORK ALL COSTS THAT ARE ASSOCIATED WITH FLOOR LEVELING AND ASSOCIATED REMEDIAL REPAIR WORK.
7. WHERE MOUNTING HEIGHTS ARE NOT INDICATED, INSTALL INDIVIDUAL COMPONENTS AT STANDARD MOUNTING HEIGHTS RECOGNIZED WITHIN THE INDUSTRY FOR THE PARTICULAR APPLICATION INDICATED AND TO CURRENT ADA/ACCESSIBILITY STANDARDS. REFER QUESTIONABLE MOUNTING HEIGHT DECISIONS TO THE ARCHITECT FOR FINAL DECISION.
8. LOCATE ACCESS PANELS AS INDICATED ON DRAWINGS. FOR ACCESS PANELS NOT SHOWN BUT REQUIRED BY PROVISIONS OF THE CONTRACT DOCUMENTS, LOCATED IN ACCORDANCE WITH APPLICABLE CODES AFTER REVIEW WITH THE ARCHITECT. LOCATE EQUIPMENT AND VALVES TO MINIMIZE NEED FOR ACCESS PANELS. SUBMIT PROPOSED LOCATIONS TO THE ARCHITECT FOR REVIEW AND ACCEPTANCE PRIOR TO INSTALLATION.

CONSTRUCTION

1. OPENINGS IN A RATED WALL, FLOOR, CEILING AND ROOF ASSEMBLIES SHALL BE SEALED WITH A FIRE RESISTANT AND SMOKE TIGHT JOINT SYSTEMS MEETING OR EXCEEDING THE REQUIRED FIRE RESISTIVE RATINGS.
2. EXPOSED WASTE AND HOT WATER PIPING BELOW HANDICAPPED ACCESSIBLE COUNTERTOPS SHALL BE WRAPPED IN A NEAT, WORKMANLIKE MANNER PER ALL APPLICABLE CODES. WRAPPING MATERIAL AND COLOR TO BE SELECTED BY ARCHITECT.
3. ALL GYPSUM BOARD WALLS TO RECEIVE TILE OR FRP FINISHES SHALL HAVE TILE BACKER BOARD. ALL OTHER WALLS IN TOILET ROOM AND KITCHENS TO BE WATER-RESISTANT GYPSUM BOARD. ALL GYPSUM BOARD CEILINGS PROVIDED IN FOOD SERVICE AREAS AND TOILET ROOMS SHALL BE WATER-RESISTANT GYPSUM BOARD.
4. PARTITION TYPES AND FIRE RESISTIVE RATINGS INDICATED ARE TO BE CONTINUOUS FOR THE LENGTH AND HEIGHT OF A PARTITION.
5. LEVEL FLOORS SO THAT THEY DO NOT EXCEED A ½" VARIANCE IN A 10'-0" RADIUS.
6. DO NOT HANG (SUPPORT) ANY ITEMS FROM METAL ROOF DECK. IT IS ACCEPTABLE TO ATTACH, I.E. CEILING SYSTEM WIRE HANGERS FROM JOISTS AND/ OR BEAMS.
7. ISOLATE DISSIMILAR METALS TO PREVENT GALVANIC CORROSION.
8. DO NOT INSTALL OUTLET OR J-BOXES BACK-TO-BACK ON OPPOSITE SIDES OF THE WALL. BOXES MUST BE SEPARATED BY A STUD (24" MIN).
9. ALL EXTERIOR STEEL HANDRAILS, GUARDRAILS, AND BOLLARDS SHALL BE GALVANIZED AND PAINTED, UNLESS OTHERWISE NOTED.
10. PAINT ALL EXTERIOR EXPOSED STEEL, AS WELL AS INTERIOR EXPOSED COLUMNS, WITH HIGH PERFORMANCE COATINGS. REMOVE ALL SURFACE RUST AND RE-PRIME AS NECESSARY PRIOR TO PAINTING. REFER TO PROJECT MANUAL.
11. ACCESSORIES SUCH AS GRAB BARS, TOWEL BARS, PAPER DISPENSERS AND SOAP DISHES INSTALLED WITHIN 2' OF A URINAL, WATER CLOSET, SINK OR LAVATORY SHALL BE MOISTURE SEALED.
12. COORDINATE LOCATION OF SEALANT AND COMPATIBILITY OF SEALANTS WITH ADJACENT WORK, INCLUDING MATERIALS AND OTHER CONTIGUOUS SEALANTS.
13. SEALANTS EXPOSED TO VIEW SHALL BE CUSTOM COLOR AS SELECTED BY THE ARCHITECT.
14. GANG MULTIPLE SWITCHES TOGETHER INTO ONE BOX WITH A SINGLE COVER PLATE WHENEVER POSSIBLE. MULTIPLE SWITCHES, WHICH CANNOT BE GANGED TOGETHER IN THE SAME BOX, SHALL BE LOCATED S CLOSER TOGETHER AS POSSIBLE AND MOUNTED AT THE SAME HEIGHT.
15. CAULK FLOOR AND WALL OUTLETS WITH AN ACOUSTIC SEALANT.
16. CAULK AT JUNCTURE OF INTERIOR FACES OF DOOR FRAMES, VIEW WINDOW FRAMES, EXTERIOR WINDOW FRAMES, AND CABINET WORK WITH ADJACENT MATERIALS.
17. FIELD MEASURE AND CONFIRM DIMENSIONS FOR OWNER PROVIDED EQUIPMENT AND FURNISHINGS. COORDINATE WITH THE OWNER ON DELIVERY AND INSTALLATION OF OFCI EQUIPMENT. MINIMUM REQUIRED OPENINGS AND ACCESSIBLE ROUTES TO THE INSTALLATION AREA SHALL BE COORDINATED WITH THE SUPPLIER.
18. COORDINATE EXACT SIZE AND PLACEMENT OF EQUIPMENT BASE AND HOUSEKEEPING PADS WITH EQUIPMENT TO BE PROVIDED.
19. WHERE NEW GYPSUM BOARD PARTITIONS ARE A CONTINUATION OF AN EXISTING PARTITION OR COLUMN ENCASEMENT, THE FACE OF THE NEW GYPSUM BOARD SHALL BE ALIGNED WITH THE FACE OF THE EXISTING SURFACE. WHERE A ONE HOUR PARTITION IS SHOWN AS A CONTINUATION OF A TWO-HOUR PARTITION OR COLUMN ENCASEMENT, THE FACE OF THE GYPSUM BOARD SHALL BE OFFSET AS REQUIRED TO PROVIDE FACE ALIGNMENT OF GYPSUM BOARD ON BOTH SIDES.

ACCESSIBILITY

1. EXIT DOORS SHALL SWING IN THE DIRECTION OF EGRESS TRAVEL WHEN SERVING 50 OR MORE OCCUPANTS.
2. ALL DOORS USED IN CONJUNCTION WITH EXITS SHALL BE SO ARRANGED AS TO READILY OPEN FROM THE SIDE FROM WHICH EGRESS IS TO BE MADE WITHOUT THE USE OF A KEY OR SPECIAL KNOWLEDGE.
3. FINAL LOCATIONS OF ALL LIFE SAFETY DEVICES AND FIXTURES ARE SUBJECT TO APPROVAL BY THE BUREAU OF THE FIRE PREVENTION.
4. REFER TO ELECTRICAL FOR LOCATION AND QUANTITY OF SMOKE DETECTORS, STROBES AND EXIT LIGHTS.
5. PROJECT SHALL COMPLY WITH CHAPTER 11 OF THE INTERNATIONAL BUILDING CODE AND ICC/ANSI A117.1 - 2009.
6. FORWARD/FRONT APPROACH AND SIDE/PARALLEL APPROACH REACH RANGE FOR ALL CONTROLS AND OPERATING MECHANISMS TO BE WITHIN REACH RANGE PER *ICC/ANSI A 117.1-2009 CHAPTER 3.308 AND 3.309* (IE: 15" MIN. TO 48" MAX. AFF).
7. PROVIDE PROPER MANEUVERING CLEARANCE AT DOOR PER *ICC/ANSI A117.1-2009 CHAPTER 4.402.2.3*.
8. ALL NEW OR ALTERED DOORS TO HAVE LEVER-OPERATED HARDWARE PER *ICC/ANSI A117.1-2009 CHAPTER 4.404.2.6*, HAVE A MAXIMUM OPENING FORCE OF 5 LBF, PER *ICC/ANSI A 117.1-2009 CHAPTER 4.404.2.8*.
9. ALL DOORS MUST HAVE A 32" CLEAR DOOR OPENING MEASURED FROM THE FACE OF THE DOOR WHEN IT IS OPENED 90% TO THE DOOR STOP PER *IBC CHAPTER 10.1010.1.1 & ICC/ANSI A117.1-2009 CHAPTER 4.404.2.2*.
10. CARPET PILE THICKNESS NOT TO EXCEED 1/2" PER *ICC/ANSI A 117.1-2009 CHAPTER 3.302.2*. PLEASE ALSO NOTE: CARPET PILE THICKNESS IS FROM THE TOP OF PILE TO THE BACKING, CUSHION, OR PAD PER *ICC/ANSI A 117.1-2009 FIG 302.2 & 302.2 COMMENTARY*.
11. ALL RECEPTION AND OR TRANSACTION COUNTERS TO HAVE PORTION SET AT 36" MAX. AFF IN HEIGHT AND 36" MIN. IN LENGTH PER *ICC/ANSI A 117.1-2009 CHAPTER 9.904.3* THE ACCESSIBLE PORTION OF THE COUNTER SHALL EXTEND THE SAME DEPTH AS THE STANDARD PORTION.
12. FLOOR SURFACES SHALL BE FIRM STABLE AND SLIP RESISTANT PER *ICC/ANSI A 117.1-2009 CHAPTER 3.302.1*.
13. ALL NEW, ALTERED, RELOCATED OR REPLACED FIRE ALARM OR EMERGENCY WARNING SYSTEM TO COMPLY FULLY WITH *ICC/ANSI A 117.1-2009 CHAPTER 7.702 & NFPA 72*. ALL VISUAL ALARMS TO BE SYNCHRONIZED THROUGHOUT.
14. PROVIDE ACCESSIBLE HI-LO DRINKING FOUNTAIN PER *ICC/ANSI A 117.1-2009 CHAPTER 6.602*. ACCESSIBLE HEIGHT DRINKING FOUNTAIN TO BE 36" TO 43" AFF TO SPOUT. THERE MUST BE AN ACCESSIBLE ROUTE TO THE ACCESSIBLE DRINKING FOUNTAIN AND PROVIDE A CLEAR FLOOR SPACE POSITIONED FOR A FORWARD APPROACH. KNEE AND TOE SPACE PER *ICC/ANSI A 117.1-2009 CHAPTER 3.305* SHALL BE PROVIDED. 2'-6" BY 4'-0" CLEAR FLOOR SPACE FOR FORWARD APPROACH. PARALLEL APPROACH CENTERED ON DRINKING FOUNTAIN IS PERMITTED FOR EXISTING BUILDINGS. SPOUT LOCATION AT PARALLEL APPROACH MUST BE LOCATED 3 1/2" FROM FRONT EDGE OF UNIT. SPOUT LOCATION AT FORWARD APPROACH MAY BE LOCATED 5" FROM FRONT EDGE OF UNIT PER *ICC/ANSI A 117.1-2009 CHAPTER 6.602.5*. DRINKING FOUNTAINS SHALL BE LOCATED IN AN ALCOVE OR PROVIDE 27" AFF ADJACENT BARRIERS PER *ICC/ANSI A 117.1-2009 CHAPTER 3.307* PROVISIONS FOR PROTRUDING OBJECTS.
15. MAINTAIN 27" CLEAR (MINIMUM) UNDER ALL NEW WORK SURFACES PER *ICC/ANSI A 117.1-2009 CHAPTER 3.306.3*.
16. OPEN OFFICE FURNITURE SYSTEMS SHALL MAINTAIN A 36" CLEAR PATH OF TRAVEL TO THE WORKSTATIONS PER *ICC/ANSI A 117.1-2009 CHAPTER 4.403.5*.
17. NEW FIXED AND BUILT-IN SEATING, TABLES, AND WORK SURFACES SHALL FULLY COMPLY WITH *ICC/ANSI A 117.1-2009 CHAPTER 9.903.2-4* AND SHALL PROVIDE 30" WIDTH MIN., NO SHARP OR ABRASIVE SURFACES UNDER THE EXPOSED PORTIONS, AND SHALL BE 28" MIN. AND 34" MAX. HEIGHT.
18. ANY REQUIRED SIGNAGE IN CONTRACT SHALL BE INSTALLED AS REQUIRED PER *ICC/ANSI A117.1-2009 CHAPTER 7.703* FOR ALL SIGNAGE REQUIREMENTS. SEE *ICC/ANSI A117.1-2009 CHAPTER 7.703.3.11* FOR LOCATION OF PERMANENT ROOM AND SPACE SIGNAGE REQUIREMENTS.

MHM

McCarty Holsaple McCarty
550 W. Main St., Suite 300
Knoxville, TN 37902
t 865.544.2000
www.mhminc.com

Project Information:

24023

OAK RIDGE HIGH SCHOOL SOFTBALL

15 WILBERFORCE AVE
OAK RIDGE, TN 37830

OAK RIDGE SCHOOLS

AARON MILLER — REGISTERED ARCHITECT — 102516 — STATE OF TENNESSEE — 08/05/24

Consultant:

#	ISSUED BY:	DATE

Issue Date:	AUG 05, 2024
PIC	A. MILLER
PM	A. MILLER
PA	G. TAYLOR
Drawn By:	G. TAYLOR
Checked By:	A. MILLER

Sheet Information:

A-001

ARCHITECTURAL NOTES, SYMBOLS AND LEGEND

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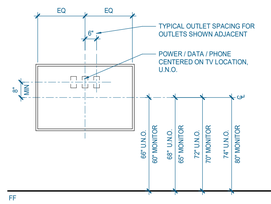
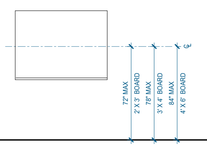
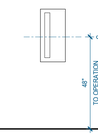
GENERAL MOUNTING HEIGHTS



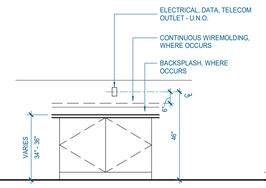
TYPICAL TV MONITOR -
VARIOUS SIZES



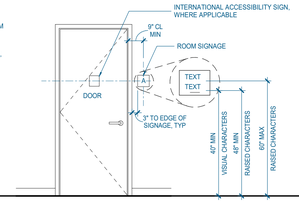
VISUAL DISPLAY BOARD -
VARIOUS SIZES



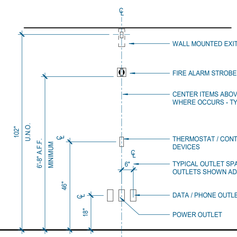
FIRE EXTINGUISHER CAB / FIRE HOSE CAB.



ELEVATION @ TYPICAL COUNTER TOP
ELECTRICAL DEVICES ABOVE WIREMOLD AT CLOSED CABINETS

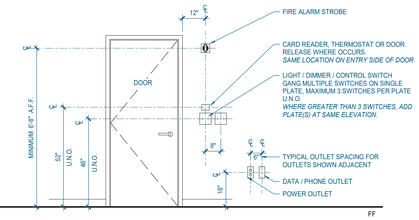


TYPICAL ROOM SIGNAGE
NOTE: ALL SIGNS SHALL HAVE A CONTRAST OF 70% MIN. BASED ON THE LIGHT REFLECTANCE VALUE.



WALL/CORRIDOR CONDITION

WALL HOSTED DEVICE NOTES:
WALL OUTLETS AND DEVICES ARE TO ALIGN VERTICALLY AS INDICATED IN MOUNTING DIAGRAM.

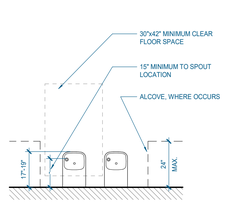


TYPICAL MOUNTING HEIGHTS @ DOOR

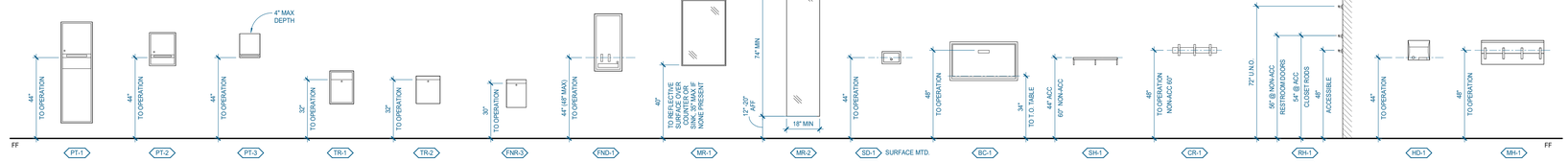
MOUNTING HEIGHTS NOTES

1. COORDINATE WITH APPLICABLE DIMENSIONS AND DETAILS ON OTHER SHEETS.
2. ALL DIMENSIONS ARE IN INCHES - UNLESS OTHERWISE NOTED.
3. NOTES AND DETAILS ARE TYPICALLY APPLICABLE TO SIMILAR ITEMS ELSEWHERE ON THE SHEET.
4. WALL OUTLETS AND DEVICES ARE TO ALIGN VERTICALLY AS INDICATED IN MOUNTING DIAGRAM.
5. GANG MULTIPLE SWITCHES TOGETHER INTO ONE BOX WITH A SINGLE COVER PLATE WHENEVER POSSIBLE. MULTIPLE SWITCHES, WHICH CANNOT BE GANGED TOGETHER IN THE SAME BOX, SHALL BE LOCATED S CLOSER TOGETHER AS POSSIBLE AND MOUNTED AT THE SAME HEIGHT.
6. ACCESSORIES SUCH AS GRAB BARS, TOWEL BARS, PAPER DISPENSERS AND SOAP DISHES INSTALLED WITHIN 2' OF A URINAL, WATER CLOSET, SINK OR LAVATORY SHALL BE MOISTURE SEALED.
7. CONTRACTOR TO COORDINATE THE LOCATION OF ALL DEVICES WITH ARCHITECT/DESIGNER.
8. ITEMS SHOWN ON THIS SHEET ARE TYPICAL. COORDINATE WITH ACTUAL FIXTURES OR DEVICES USED.
9. ALL ITEMS SHOWN MAY NOT BE USED IN THIS PROJECT.
10. ALL GRAPHICS AND TEXT ON THIS PAGE DO NOT SUPERSEDE CURRENT ACCESSIBILITY CODE AND REGULATIONS. GRAPHICS MAY NOT REPRESENT FINAL PRODUCT SELECTION EXACTLY; GRAPHICS SHOWN FOR INTENT ONLY.
11. REFERENCE ANSI A117 703.3.11 FOR TACTILE SIGN LOCATION REQUIREMENTS.
12. ALL FIXTURES AND ACCESSORY CHARACTERISTICS & DIMENSIONAL CLEARANCES MUST BE COMPLIANT WITH ICC/ANSI A117.1-2009

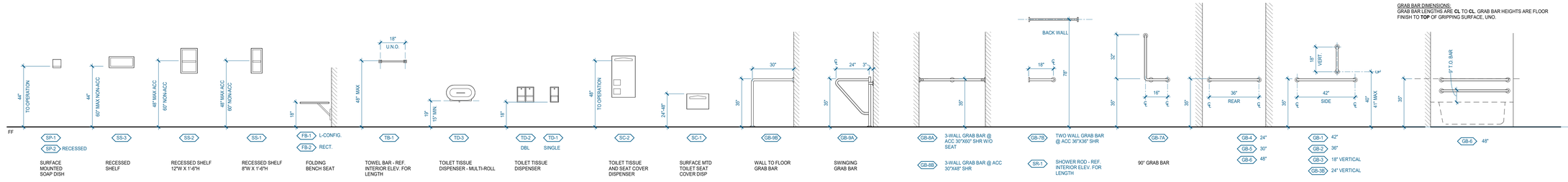
RESTROOM ACCESSORIES AND WATER COOLER TYPE LEGEND



TYPICAL STANDING AND ACCESSIBLE ELECTRIC WATER COOLER



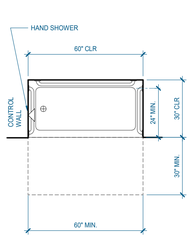
REACH RANGE (RR) TO OPERATION
HIGH OBSTRUCTED FORWARD REACH RANGE: ≤ 48" AFF WHERE < 20" COUNTER DEPTH
OBSTRUCTED FORWARD REACH RANGE: ≤ 44" AFF WHERE 20"-25" COUNTER DEPTH
HIGH OBSTRUCTED SIDE REACH RANGE: ≤ 48" AFF WHERE < 10"D/34"H COUNTER DEPTH
OBSTRUCTED SIDE REACH RANGE: ≤ 46" AFF WHERE 10"-24"D/34"H COUNTER DEPTH
UNOBSTRUCTED FORWARD & SIDE REACH RANGE: 15"- 48" AFF WHERE NO COUNTERTOP



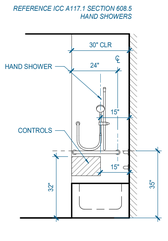
GRAB BAR DIMENSIONS:
GRAB BAR LENGTHS ARE **CL** TO **CL**. GRAB BAR HEIGHTS ARE FLOOR FINISH TO **TOP** OF GRIPPING SURFACE, UNO.

SHOWER/LAVATORY TYPES & MOUNTING HEIGHTS

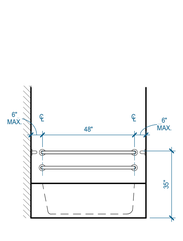
NOTE: REF. INTERIOR ELEVATIONS FOR FINISH PATTERN LAYOUT



PLAN VIEW
NOTE: 48" CLEARANCE @ PERPENDICULAR APPROACH

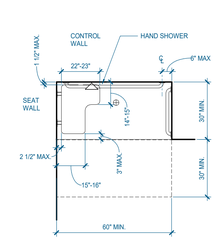


SIDE VIEW



BACK VIEW

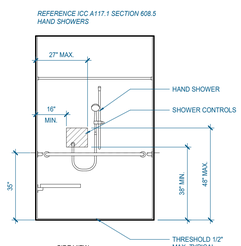
STANDARD ACC BATH TUB COMPARTMENT WITH SEAT IN TUB LAYOUT - UFAS



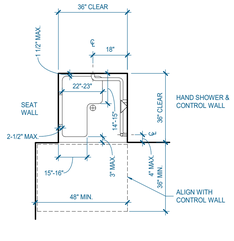
PLAN VIEW

SC-2

STANDARD ROLL-IN TYPE SHOWER COMPARTMENT



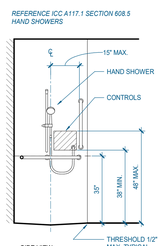
SIDE VIEW



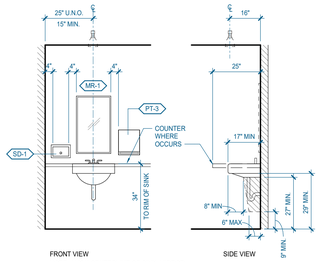
PLAN VIEW

SC-1

TRANSFER TYPE SHOWER COMPARTMENT



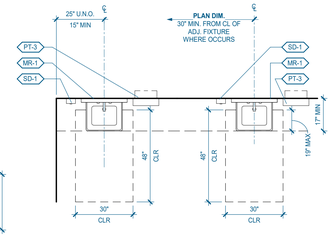
SIDE VIEW



FRONT VIEW
NOTE: ALIGN CENTERLINE OF SINK, MIRROR AND LIGHT ABOVE, IF PRESENT - TYP. U.N.O.

SIDE VIEW

ACCESSIBLE LAVATORY CLEARANCES

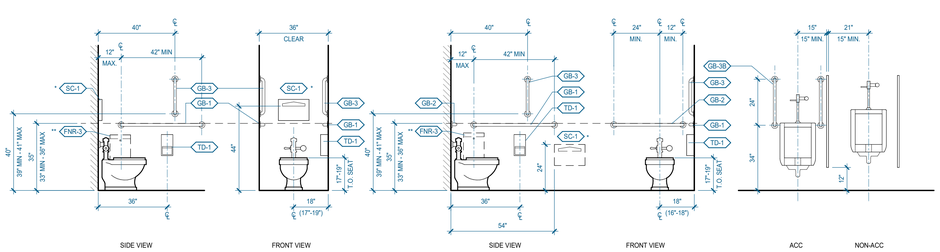


PLAN VIEW - ADJACENT WALL CONDITION

PLAN VIEW - NON-ADJACENT WALL CONDITION

RESTROOM FIXTURE MOUNTING HEIGHTS

* WHEN SPECIFIED
** IN WOMEN'S WC & ONLY IF SPECIFIED



SIDE VIEW — FRONT VIEW

TYPICAL AMBULATORY TOILET

SIDE VIEW — FRONT VIEW

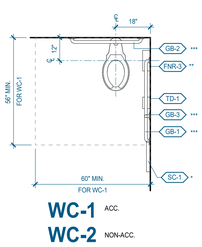
TYPICAL ACCESSIBLE TOILET

ACC — NON-ACC

URINAL WITH 15" DEEP PARTITION, WHERE OCCURS

TOILET COMPARTMENT TYPE LEGEND

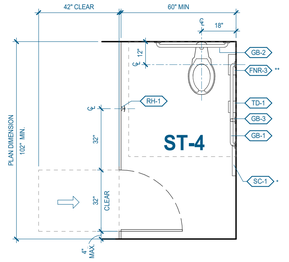
* WHEN SPECIFIED
** IN WOMEN'S WC & ONLY IF SPECIFIED



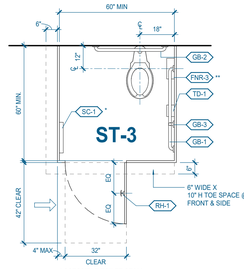
WC-1 ACC.
WC-2 NON-ACC.

ACCESSIBLE WATER CLOSET

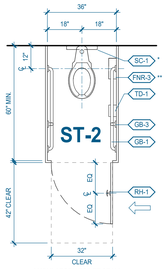
*** GRAB BARS AT WC-1 ONLY



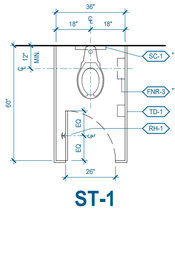
ACCESSIBLE TOILET STALL (END OF ROW)



ACCESSIBLE TOILET STALL



AMBULATORY TOILET STALL



NON HC TOILET STALL

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MHM

McCarty Holsaple McCarty
550 W. Main St., Suite 300
Knoxville, TN 37902
t 865.544.2000
www.mhminc.com

Project Information:

24023

OAK RIDGE HIGH SCHOOL SOFTBALL

15 WILBERFORCE AVE
OAK RIDGE, TN 37830

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AARON MILLER — REGISTERED ARCHITECT — No. 102515 — STATE OF TENNESSEE — 08/06/24

Consultant:

#	ISSUED BY:	DATE

Issue Date:	AUG 05, 2024
PIC	A. MILLER
PM	A. MILLER
PA	G. TAYLOR
Drawn By:	G. MORRIS
Checked By:	A. MILLER

Sheet Information:

A-002

MOUNTING HEIGHT DIAGRAMS

PARTITION TYPE GENERAL NOTES

NOTE: PARTITION DESIGNATIONS OMITTED OR SKIPPED IS INTENTIONAL

1. REFER TO FLOOR PLAN SERIES FOR LOCATION OF PARTITION TYPES. ALL PARTITIONS ARE TYPE **A30** UNLESS NOTED OTHERWISE. NOT ALL PARTITION TYPES SHOWN ARE UTILIZED.
2. REFER TO FINISH PLAN & SCHEDULE FOR BASES AND FINAL FINISHES NOT SHOWN ON PARTITION TYPE DETAILS.
3. PARTITION TYPES IN CHARTS REFER TO BASE OF WALL ONLY. SEE SUPPLEMENTARY DETAILS ON THE FOLLOWING SHEETS FOR SPECIFIC HEAD AND JAMB CONDITIONS. FOR RATED PARTITIONS REFER TO RATED HEAD CONDITIONS AND **UL HW #** SPECIFIED.
4. PROVIDE DOUBLE STUD FRAMING AROUND ALL JAMBS AND HEADERS OF DOOR FRAMES, CASED OPENINGS, AND STOREFRONT SYSTEMS.
5. ALL NON-BEARING PARTITIONS SHALL BE CONSTRUCTED TO LIMIT DEFLECTION TO L/240 WITH UNIFORM 5 PSF LOADING. PROVIDE ADDITIONAL BRACING, FULLY OR BRACED AT 48" O.C., AS REQUIRED AT ALL NON-COMPOSITE PARTITIONS TO MEET PERFORMANCE CRITERIA, UNLESS NOTED OTHERWISE. CONTRACTOR SHALL VERIFY ALL STUD GAUGE AND SPACING NEEDED TO MEET SPECIFIED LATERAL LOADS AND DEFLECTION CRITERIA.
6. PROVIDE NON-COMBUSTIBLE STIFFENERS, BRACING, BACKING PLATES AND BLOCKING REQUIRED FOR SECURE INSTALLATION OF TOILET PARTITIONS, DOORS AND DOOR HARDWARE INCLUDING WALL-MOUNTED DOOR STOPS, HANDRAILS, WALL-MOUNTED SHELVES, WALL MOUNTED TV MONITORS, VISUAL DISPLAY BOARDS, MISCELLANEOUS WALL-MOUNTED EQUIPMENT, AND SUSPENDED MECHANICAL AND ELECTRICAL EQUIPMENT. WHEN BLOCKING REQUIRED IN A PARTITION, USE A MINIMUM .033" (20 GA) STUD.
7. ISOLATE NON-LOAD BEARING FRAMING FROM STRUCTURAL ELEMENTS TO PREVENT THE TRANSFER OF LOAD TO PARTITION FRAMING. STOP STUDS 3/4" BELOW CEILING RUNNER (TOP TRACK) TO ALLOW FOR VERTICAL EXPANSION. SET TOP TRACK 1" BELOW DEFLECTION CHANNEL. DO NOT ATTACH STUDS TO TOP TRACK. DO NOT ATTACH GYPSUM BOARD TO THE DEFLECTION TRACK.
8. WATER RESISTANT GYPSUM BOARD AND/OR TILE BACKER BOARD WALL PANELS SHALL BE USED ON PARTITION ASSEMBLIES AT 'WET' OR 'TILED' LOCATIONS SCHEDULED IN THE ROOM FINISH SCHEDULE.
9. DO NOT INSTALL OUTLET OR J-BOXES BACK-TO-BACK ON OPPOSITE SIDES OF THE WALL. BOXES MUST BE SEPARATED BY A STUD (24" MIN).
10. TAPE AND APPLY JOINT COMPOUND TO ALL INTERIOR CORNERS AND JOINTS OF GYPSUM BOARD, UNLESS NOTED OTHERWISE FOR MOVEMENT CONTROL.
11. CONTROL JOINTS SHOULD BE SPACED NO FURTHER THAN (24) LINEAR FEET O.C. WHERE CONTROL JOINTS ARE REQUIRED BASED UPON SPECIFIED FREQUENCY, AND ARE NOT SHOWN ON INTERIOR ELEVATIONS, LOCATE VERTICAL CONTROL JOINTS ON EACH SIDE OF A DOOR FRAME.
12. INSTALL METAL CASING / TRIM AND APPLY JOINT COMPOUND TO ALL EXPOSED CORNERS OF GYPSUM BOARD UNLESS NOTE OTHERWISE.
13. INSTALL METAL REVEALS WITH CONCEALED FASTENERS PER MANUFACTURERS INSTRUCTIONS.
14. REFER TO STRUCTURAL DRAWINGS & SPECIFICATION FOR ALL MTL FRAMING LOAD AND THICKNESS REQUIREMENTS
15. WHERE PARTITION TYPE IS INTERRUPTED BY ANY OPENINGS (DOOR OR WINDOW) CONSTRUCTION ABOVE OR BELOW SHALL BE THE SAME AS THE DESIGNATED PARTITION TYPE ADJACENT TO OPENING OCCURRENCE.
16. ALL NON LOAD-BEARING STUD FRAMING SHALL BE 20 GAUGE, UNLESS NOTED OTHERWISE.

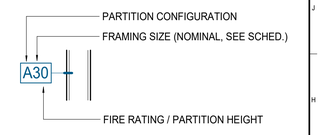
FIRE RATED PARTITIONS

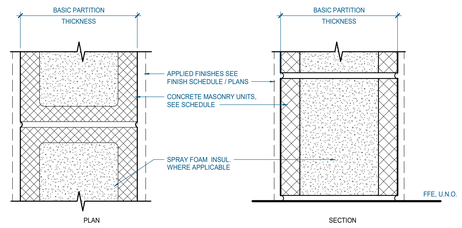
1. REFER TO SUPPLEMENTARY DRAWINGS ON THE FOLLOWING SHEETS FOR ADDITIONAL INFORMATION ON PENETRATIONS THRU RATED PARTITIONS, FIRE RESISTANT JOINT SYSTEMS, SLIP TRACKS AT NON-BEARING PARTITIONS CONNECTION TO STRUCTURE AND GYPSUM DETAILS.
2. RATED PARTITIONS ARE TO BE CONSTRUCTED BEFORE NON-RATED PARTITIONS. ABUT NONRATED PARTITIONS TO RATED PARTITIONS SO THAT THE FACES ARE FLUSH.
3. ALL FIRE-RESISTANCE RATED PARTITIONS SHALL BE CONSTRUCTED FROM TOP OF NON-FINISHED FLOOR CONSTRUCTION TO BOTTOM OF FLOOR CONSTRUCTION ABOVE AND SEALED WITH AN APPROVED FIRE-RESISTIVE SEALANT.
4. PARTITION TYPES AND FIRE RESISTIVE RATINGS INDICATED ARE TO BE CONTINUOUS FOR THE LENGTH AND HEIGHT OF A PARTITION.

ACOUSTICAL (THE FOLLOWING NOTES APPLY TO ALL PARTITIONS DESIGNATED TO HAVE A SOUND TRANSMISSION CLASS RATING ON THE PARTITION CHARTS.)

1. ALL ACOUSTICALLY CLASSED PARTITIONS SHALL BE CONSTRUCTED IN ACCORDANCE TO THE REFERENCED TEST.
2. STAGGER AND SEAL ALL JOINTS ON MULTIPLE GYPSUM BOARD LAYER PARTITIONS.
3. SEAL PARTITIONS AIR TIGHT AT FLOORS, SIDES, AND CEILINGS ON BOTH SIDES WITH NON-HARDENING ACOUSTICAL SEALANT IN ACCORDANCE TO REF. TEST.
4. ALL BATTS AND BLANKETS IN RATED PARTITIONS MUST BEAR THE REQUIRED UL CLASSIFICATION MARKING AS TO FIRE-RESISTANCE. REFER TO CODE COMPLIANCE DETAILS IN A-040 SERIES.
5. AVOID COMPRESSING ACOUSTICAL BATT INSULATION AT BLOCKING AND RECESSED ITEMS IN ACOUSTICALLY RATED WALLS.
6. REFER TO PARTITION DETAILS FOR PARTITION TYPES WITH A DESIGNATED STC RATING.
7. SEAL ALL WALL INTERSECTIONS AND CONTROL JOINTS AT ACOUSTICALLY CLASSED PARTITIONS IN ACCORDANCE WITH DETAIL 12/A-8102.
8. SEAL ALL CONDUIT, STRUCTURAL, DUCT AND LARGE PIPE PENETRATIONS.
9. ALL BOXES REQUIRED TO BE ACOUSTICALLY SEALED SHALL BE SEALED PRIOR TO CLOSING IN PARTITIONS AND INSTALLING DEVICES AND COVER PLATES. VERIFY COMPLIANCE WITH STC #.
10. AT ALL PARTITIONS INSTALL WALL BOARDS TO MAINTAIN 1/8" MIN, 1/4" MAX JOINT BETWEEN BOTTOM EDGE OF BOARD AND TOP OF SLAB / FLOOR. FILL JOINT WITH CONTINUOUS BEAD OF ACOUSTIC SEALANT.

INTERIOR PARTITION TYPE PLAN SYMBOL





NON-LOAD BEARING CMU PARTITION

C		PARTITION TYPE TAG	C4_	C6_	C8_	C10_	C12_	HEAD DETAIL
	PARTITION HEIGHT	**A** - NON-RATED TO 12" ABOVE CEILING	C4A	C6A	C8A	C10.A	C12A	NEED DTL
		0 - NON-RATED TO STRUCTURE ABOVE	C40	C60	C80	C10.0	C12.0	SIM 5 / A-011
		1 - 1-HR RATED TO STRUCTURE ABOVE		C61	C81	C10.1	C12.1	5 / A-011
		2 - 2-HR RATED TO STRUCTURE ABOVE		C62	C82	C10.2	C12.2	5 / A-011
		BASIC PARTITION THICKNESS	3 5/8"	5 5/8"	7 5/8"	9 5/8"	11 5/8"	
		ACOUSTICAL RATING (STC)	40	45	54 (NOTE 2)	58 (NOTE 2)	60 (NOTE 2)	
		ACOUSTICAL TEST NUMBER	OCBA	CCI INDUST	NOTE 1	NOTE 1	NOTE 1	
		FIRE TEST NUMBER (WHERE APPLIES)	N/A	UL DESIGN U906	UL DESIGN U905	UL DESIGN U905	UL DESIGN U905	

NOTES:
1. STC IS PREDICTED USING THE "INSUL" COMPUTER PROGRAM AND THE TEST REF.
2. FILL CORE SPACE IN CMU WITH SPRAY FOAM INSULATION.
3. REFER TO UL DESIGN FOR ALLOWABLE COMPRESSIVE STRESS IN CMU
4. REFER TO UL DESIGN FOR ADDITIONAL CMU CRITERIA.
5. STC VALUES ONLY APPLICABLE FOR PARTITION HEIGHT TYPES 0,1 & 2
6. FIGURES SHOWN ARE FOR NORMAL WEIGHT, HOLLOW CORE, CONCRETE MASONRY UNITS.

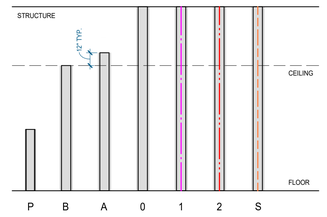
PARTITION TAG LEGEND

FRAMING SIZE CHART (SEE PARTITION CHARTS)

XXX	FRAMING SIZE (**MTL**)	XXX	FRAMING SIZE (**CMU**)
0	HAT OR 'Z' FURRING	**4**	3 5/8" CONCRETE MASONRY UNIT
1	1 5/8" NON LOAD-BEARING MTL STUD	**6**	5 5/8" CONCRETE MASONRY UNIT
2	2 1/2" NON LOAD-BEARING MTL STUD	**8**	7 5/8" CONCRETE MASONRY UNIT
3	3 5/8" NON LOAD-BEARING MTL STUD	**10**	9 5/8" CONCRETE MASONRY UNIT
4	4" NON LOAD-BEARING MTL STUD	**12**	11 5/8" CONCRETE MASONRY UNIT
6	6" NON LOAD-BEARING MTL STUD		
8	8" NON LOAD-BEARING MTL STUD		

FIRE RATING / PARTITION HEIGHT DESIGNATION

XXX	HEIGHT/RATING DESCRIPTION
A	NON-RATED - EXTEND STUDS TO UNDERSIDE OF STRUCTURE ABOVE. EXTEND GYPSUM OR BACKER BD & ACOUSTICAL INSULATION TO 6" ABOVE CEILING.
B	NON RATED PARTITION - TO UNDERSIDE OF CEILING
0	NON RATED - TO UNDERSIDE OF STRUCTURE ABOVE
1	(1) HOUR FIRE-RATED
2	(2) HOUR FIRE-RATED
S	SMOKE-RESISTANT PARTITION
P	PARTIAL HEIGHT PARTITION (SEE PLAN & ELEVATIONS FOR PARTITION HEIGHT)



MHM

McCarty Holsaple McCarty
550 W. Main St., Suite 300
Knoxville, TN 37902
t 865.544.2000
www.mhminc.com

Project Information:

24023

OAK RIDGE HIGH SCHOOL SOFTBALL

15 WILBERFORCE AVE
OAK RIDGE, TN 37830

OAK RIDGE SCHOOLS

AARON MILLER — REGISTERED ARCHITECT — 05/08/24 — No. 102517 — STATE OF TENNESSEE

Consultant:

#	ISSUED BY:	DATE

Issue Date:	AUG 05, 2024
PIC	A. MILLER
PM	A. MILLER
PA	G. TAYLOR
Drawn By:	
Checked By:	A. MILLER

Sheet Information:

A-003

PARTITION TYPE SCHEDULE & DETAILS

8/6/2024 9:56:08 AM

DOOR SCHEDULE

ASSEMBLY		LEAF INFORMATION								FRAME INFORMATION			HARDWARE INFORMATION	DETAILS			
		SIZE															
DOOR NO	FIRE RATING	W	HT	THK	TYPE	LEAF QTY	MATL	FINISH	GLAZING	TYPE	MATL	FINISH	SET NO.	HEAD	JAMB	SILL	KEYED NOTES
SB01	-	3' - 0"	7' - 2"	1 3/4"	F	1	HM	PTD	-	F1	HM	PTD	1	F19/A-004	A19/A-004	A24/A-004	
SB02		8' - 0"	4' - 0"	PER MFR	OH		AL-1	CLAN	-	OH	AL-1	CLAN	PER MFR	A24/A-122	P24/A-122	A06/A-122	
SB03	-	3' - 0"	7' - 2"	1 3/4"	F	1	HM	PTD	-	F1	HM	PTD	2	F15/A-004	A15/A-004	A09/A-122	

HARDWARE SET NO. 01
- EACH TO HAVE:
- (3) BUTT HINGES - BB 1279-4.5"x4.5" (HAG 652)
- (1) ENTRANCE LEVER - BY OWNER.
- (1) CYLINDER - BY OWNER.
- (1) CLOSER - DC6200
- (1) KICKPLATE - 1905-8"x2" LDW (HAG 630)
- (1) SWEEP - 35EV (NGP 628)
- (1) PERIMETER WEATHERSTRIP - 127NA (NGP - 628)
- (1) THERESHOLD - 425 x FULL OPENING WIDTH (NGP - MIL)

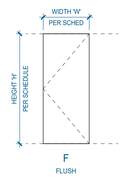
HARDWARE SET NO. 02
- EACH TO HAVE:
- (3) BUTT HINGES - BB 1191-4.5"x4.5" (HAG 626)
- (1) ENTRANCE LEVER - BY OWNER.
- (1) CYLINDER - BY OWNER.
- (1) CLOSER - DC6200
- (1) KICKPLATE - 1905-8"x2" LDW 9 HAG 630)
- (1) SWEEP - 35EV (NGP 628)
- (1) PERIMETER WEATHERSTRIP - 127NA (NGP - 628)
- (1) THERESHOLD - 425 x FULL OPENING WIDTH (NGP - MIL)

FINISH ABBREVIATIONS		FRAME FUNCTION...	
AL-x	ANODIZED ALUMINUM	RB	RABBETED
AL-x	BLACK ANODIZED ALUMINUM	DE	DOUBLE EGRESS
HC:WD	HOLLOW CORE WOOD VENEER	CA	CASED
SC:WD	SOLID CORE WOOD VENEER	DA	DOUBLE ACTING
HM	HOLLOW METAL	OP	OFFSET PIVOT
PLAM	PLASTIC LAMINATE FACED DOOR		
PT-x	PAINTED FINISH		
ST-x	STAINED FINISH		
SS	STAINLESS STEEL FINISH		

DOORS AND FRAMES GENERAL NOTES

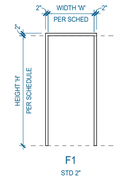
1. REFER TO **A-004** FOR DOOR HEAD JAMB AND SILL DETAILS.
2. ALL DOORS IN SMOKE RESISTANT PARTITIONS TO HAVE POSITIVE LATCHING.
3. FIRE-RATED GLAZING IN DOORS SHALL MEET THE FIRE RATING REQUIREMENT OF THE DOORS TO WHICH THEY ARE INSTALLED.
4. ALL DOORS TO HAVE HEADERS UNLESS STEEL CHANNELS ARE INDICATED IN THE REMARKS COLUMN OF THE DOOR SCHEDULE OR UNLESS OTHERWISE INDICATED BY HEAD DETAIL.
5. ALL DOORS TO BE 1 3/4" THICK U.N.O.

LEAF TYPE LEGEND



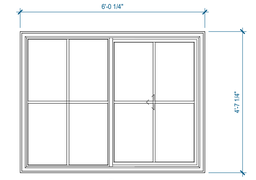
F
FLUSH

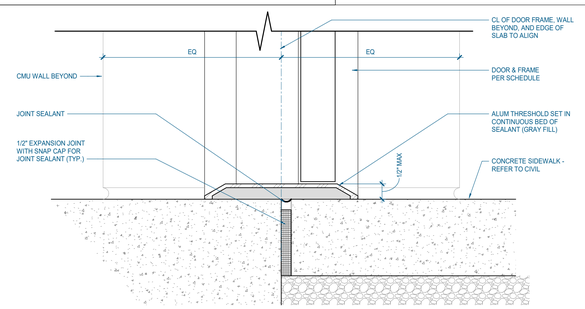
FRAMES TYPE LEGEND



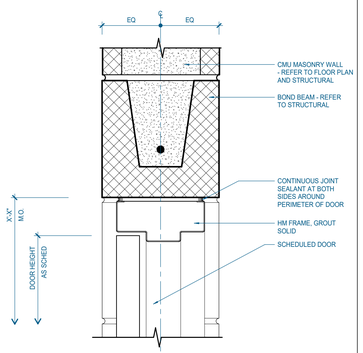
F1
STD 2"

WINDOW LEGEND

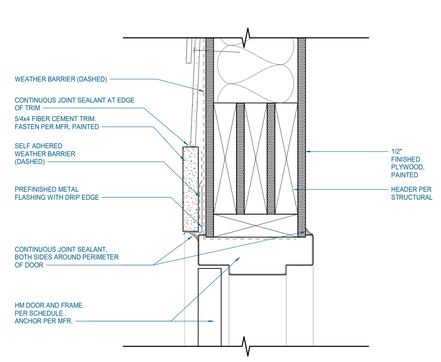




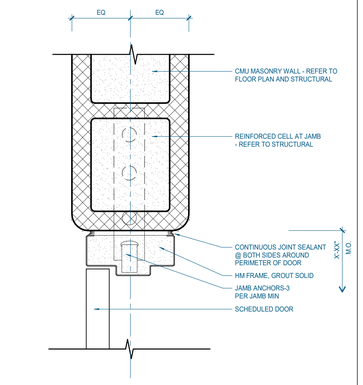
L12 TYPICAL EXTERIOR THRESHOLD DETAIL
6" = 1'-0" | A-004



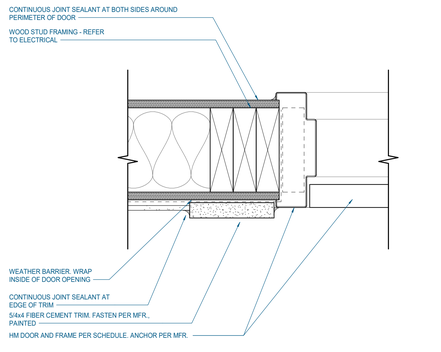
F14 TYPICAL DOOR HEAD DETAIL - MASONRY
3" = 1'-0" | A-004



F10 TYPICAL DOOR HEAD DETAIL - WOOD STUD WALL
3" = 1'-0" | A-004



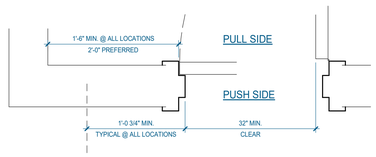
A14 TYPICAL DOOR JAMB DETAIL - MASONRY
3" = 1'-0" | A-004



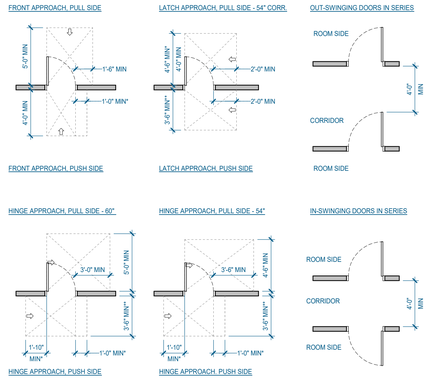
A10 TYPICAL DOOR JAMB DETAIL - WOOD STUD WALL
3" = 1'-0" | A-004

TYPICAL ACCESSIBILITY REQUIREMENTS

NOTE: ALL DOORS SHALL MEET ADA ACCESSIBILITY REQUIREMENTS



TYPICAL ACCESSIBILITY REQUIREMENTS



NOTE:
1. ALL DOORS IN ALCOVES & VESTIBULES SHALL COMPLY WITH CLEARANCES FOR FRONT APPROACHES.
2. * IF BOTH CLOSER AND LATCH ARE PROVIDED
3. ** 48 MIN. IF BOTH CLOSER AND LATCH PROVIDED.

MHM
McCarty Holsaple McCarty
550 W. Main St., Suite 300
Knoxville, TN 37902
t 865.544.2000
www.mhminc.com

Project Information:

24023

OAK RIDGE HIGH SCHOOL SOFTBALL
15 WILBERFORCE AVE
OAK RIDGE, TN 37830

OAK RIDGE SCHOOLS

Consultant:

#	ISSUED BY:	DATE

Issue Date:	AUG 05, 2024
PIC	A. MILLER
PM	A. MILLER
PA	G. TAYLOR
Drawn By:	G. MORRIS
Checked By:	A. MILLER

Sheet Information:

A-004

DOOR OPENING SCHEDULE AND DETAILS

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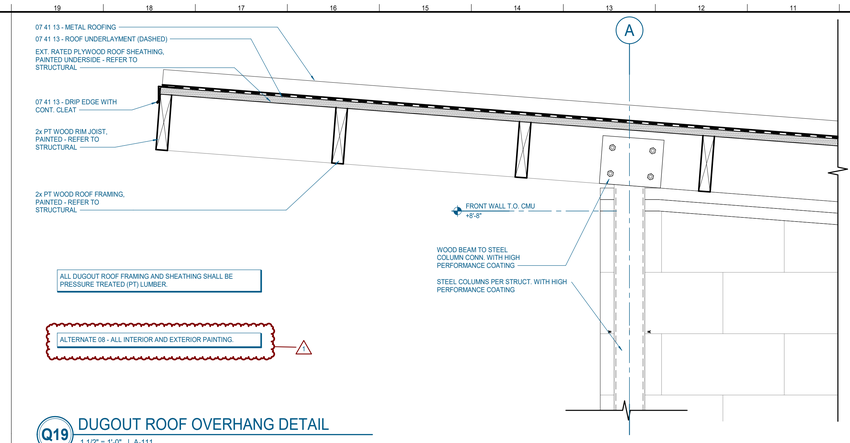
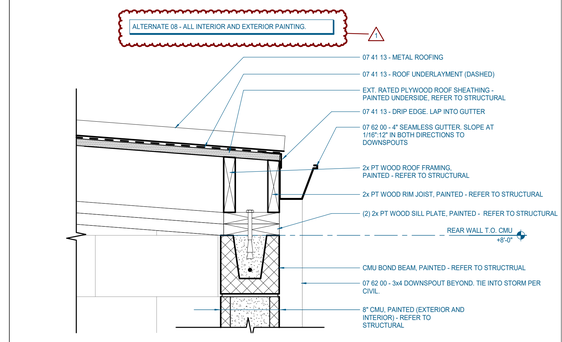


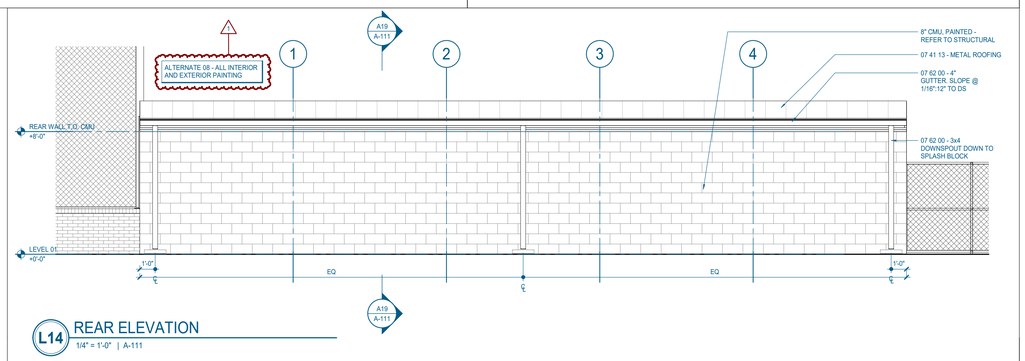
Q19 DUGOUT ROOF OVERHANG DETAIL

1 1/2" = 1'-0" | A-111



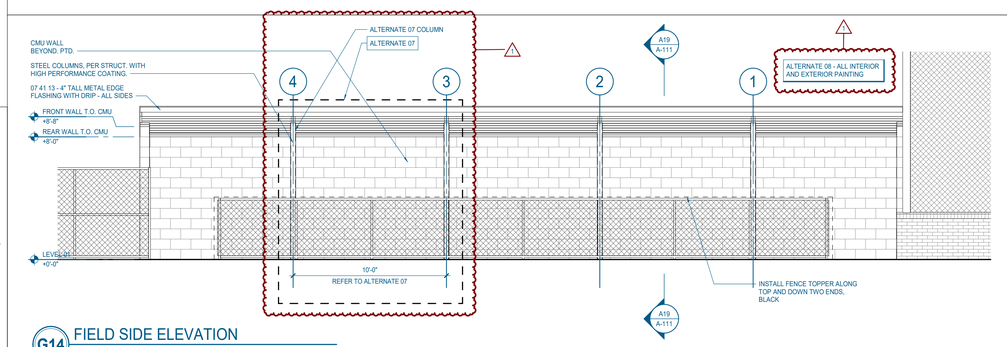
Q09 DUGOUT ROOF AND GUTTER DETAIL

1 1/2" = 1'-0" | A-111



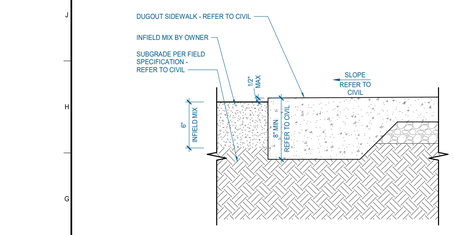
L14 REAR ELEVATION

1/4" = 1'-0" | A-111



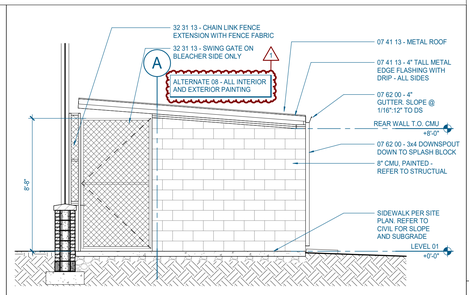
G14 FIELD SIDE ELEVATION

1/4" = 1'-0" | A-111



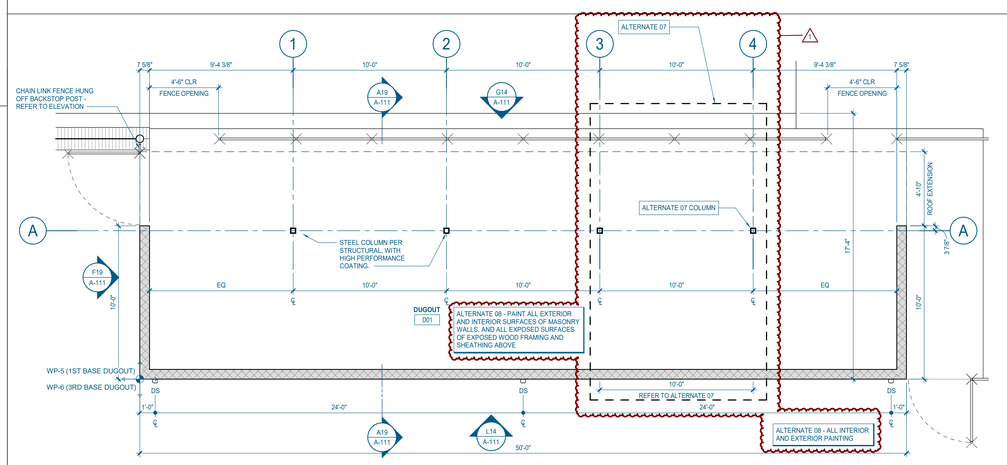
F24 EDGE OF SLAB DETAIL @ INFIELD

1 1/2" = 1'-0" | A-111



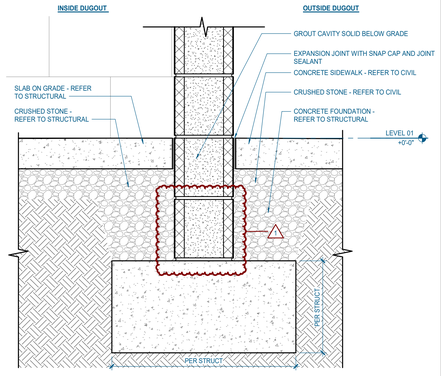
F19 END ELEVATION (OPP. SIM.)

1/4" = 1'-0" | A-111



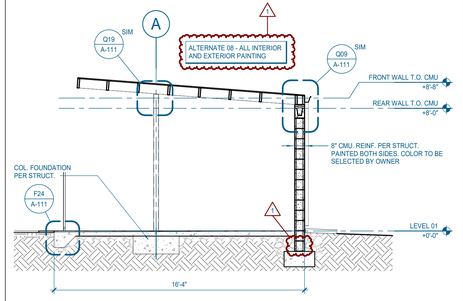
A14 DUGOUT FLOOR PLAN

1/4" = 1'-0" | A-111



A24 TYPICAL FOUNDATION DETAIL

1 1/2" = 1'-0" | A-111



A19 SECTION THRU DUGOUT

1/4" = 1'-0" | A-111

FLOOR PLAN GENERAL NOTES

1. PARTITION TYPES ARE SCHEDULED IN THE A-000 SERIES. REFER TO G-100 SERIES LIFE SAFETY PLANS' FOR GRAPHIC EXTENT OF FIRE RATED PARTITIONS.
2. TYPICAL DIMENSIONS SHOWN ON THE FLOOR PLANS FOR NEW CONSTRUCTION ARE TO THE FACE OF STUD OR MASONRY WALLS, UNLESS NOTED OTHERWISE. DIMENSIONS NOTED AS 'MINIMUM', 'CLEAR', OR 'HOLD' ARE TO FACE OF PARTITION FINISH. MAINTAIN DIMENSIONS NOTED.
3. ALL DUGOUT ROOF FRAMING AND SHEATHING SHALL BE PRESSURE TREATED (PT) LUMBER.
   A. ALTERNATE 08 - ALL EXPOSED WOOD FRAMING TO BE PAINTED. COLOR TO BE SELECTED BY OWNER.

FLOOR PLAN LEGEND

NEW

NON RATED - PARTITION

DOOR OPENING AND REFERENCE TAG W/ TYP. CLEARANCE DIMS. (RE: A600'S FOR DOOR SCHEDULE) (TE___' DENOTES EXISTING DOOR)

XXX — PARTITION TYPE MARK

XX — FLOOR PLAN KEYED NOTE MARK

XX — OPENING TYPE MARK

CJ — CONSTRUCTION JOINT
CJ - CONTROL JOINT
EJ - EXPANSION JOINT

OBJECTS OVERHEAD

CENTERLINE OF OBJECT

MHM

McCarty Holsaple McCarty
550 W. Main St., Suite 300
Knoxville, TN 37902
t 865.544.2000
www.mhminc.com

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24023

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OAK RIDGE SCHOOLS

AARON MILLER — REGISTERED ARCHITECT — No. 102525 — STATE OF TENNESSEE — 09/23/24

Consultant:

#	ISSUED BY:	DATE
1	BIDDING	09/23/2024

Issue Date:	AUG 05, 2024
PIC	A. MILLER
PM	A. MILLER
PA	G. TAYLOR
Drawn By:	G. TAYLOR
Checked By:	A. MILLER

Sheet Information:

A-111

DUGOUT - PLANS, ELEVATIONS, & DETAILS

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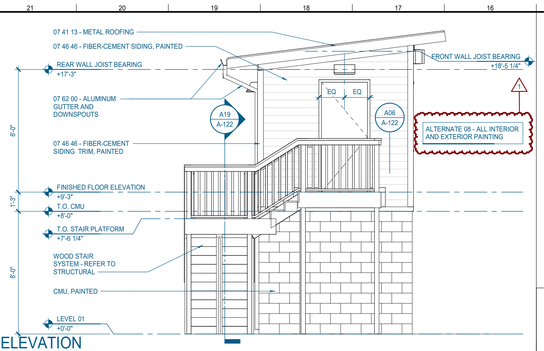
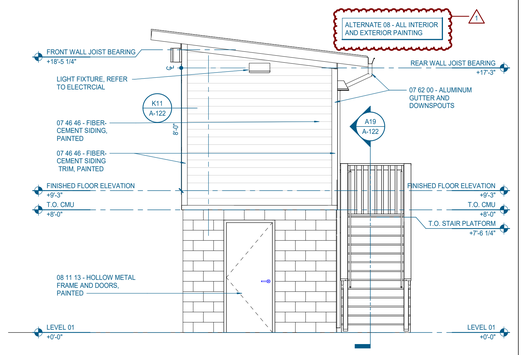


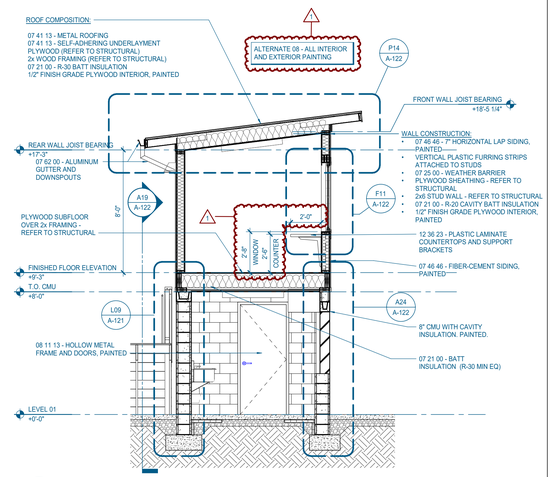
R24 EAST ELEVATION

1/4" = 1'-0" | A-121



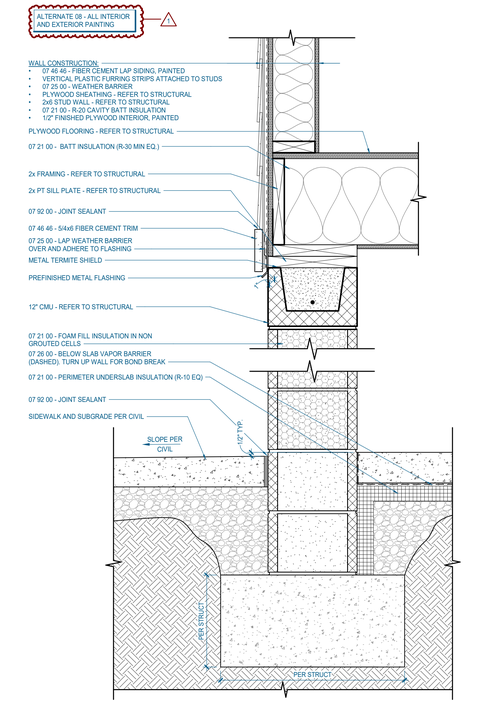
L22 WEST ELEVATION

1/4" = 1'-0" | A-121



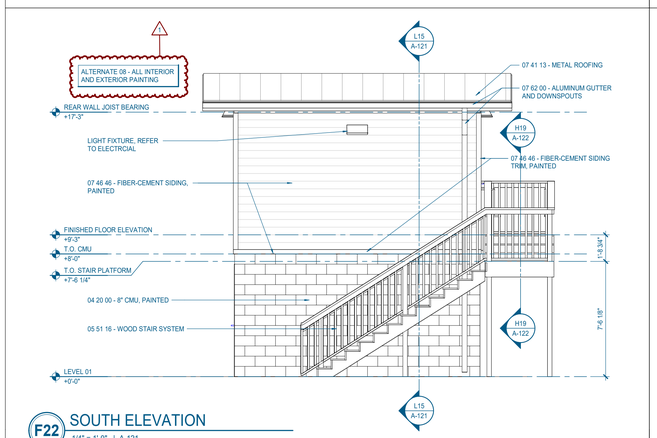
L15 BUILDING SECTION

1/4" = 1'-0" | A-121



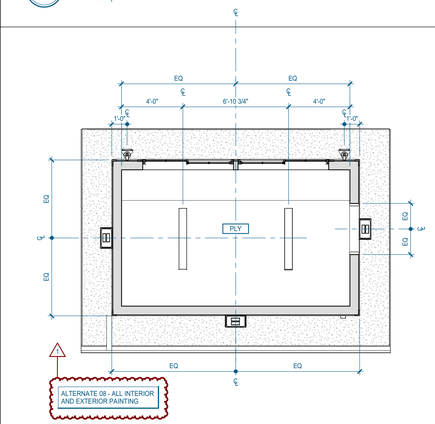
L09 TYP. FOUNDATION DETAIL - SCORE BOOTH

1 1/2" = 1'-0" | A-121



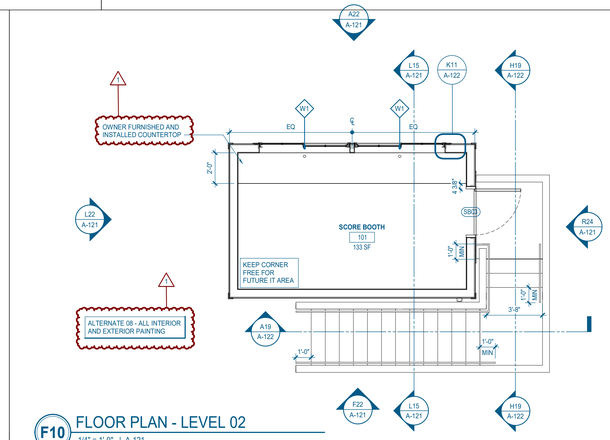
F22 SOUTH ELEVATION

1/4" = 1'-0" | A-121



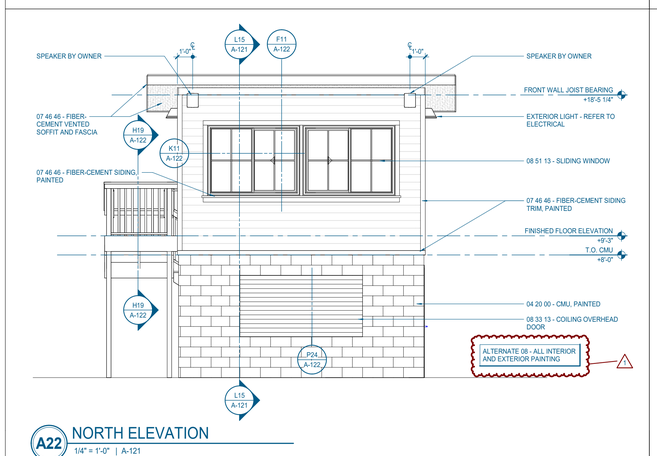
F15 REFLECTED CEILING PLAN - LEVEL 02

1/4" = 1'-0" | A-121



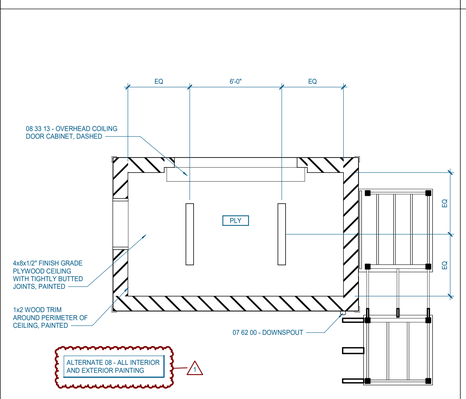
F10 FLOOR PLAN - LEVEL 02

1/4" = 1'-0" | A-121



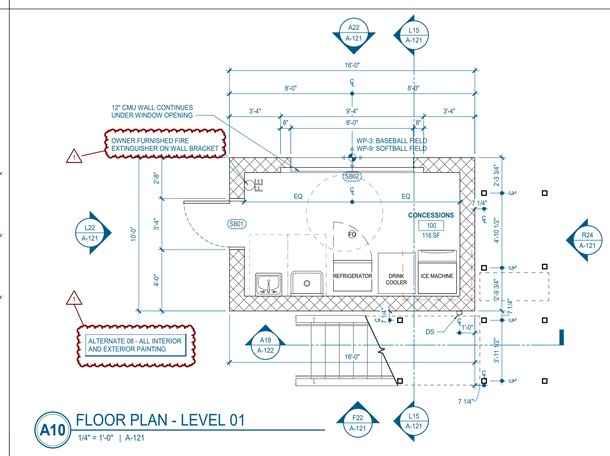
A22 NORTH ELEVATION

1/4" = 1'-0" | A-121



A15 REFLECTED CEILING PLAN - LEVEL 01

1/4" = 1'-0" | A-121



A10 FLOOR PLAN - LEVEL 01

1/4" = 1'-0" | A-121

RCP GENERAL NOTES

1. REFER TO ELECTRICAL DRAWINGS FOR THE LOCATIONS OF CEILING MOUNTED SMOKE DETECTORS, SPEAKERS, EXIT SIGNAGE, FIRE ALARM DEVICES, EMERGENCY LIGHTING, ETC.
2. CENTER ALL CEILING MOUNTED LIGHT FIXTURES, LIFE SAFETY DEVICES, SPEAKERS, SPRINKLERS AND OTHER ELEMENTS IN THE CENTER OF THE ACOUSTIC TILE. IN BOTH DIRECTIONS AND BE CENTERED WITHIN GYPSUM BOARD SOFFITS, UNLESS NOTED OTHERWISE.
3. COORDINATE INSTALLATION OF DIFFUSERS, SPEAKERS, SPRINKLER HEADS, AND ACCESS PANELS WITH LIGHTING LAYOUT. REPORT ANY CONFLICTS TO THE ARCHITECT PRIOR TO INSTALLATION.
4. LIGHTING FIXTURES ARE DIMENSIONED TO CENTER OF FIXTURE, UNLESS NOTED OTHERWISE.
5. IF LOCATION DIMENSIONS ARE NOT INDICATED, FINAL POSITION OF ANY/ALL EXPOSED ELEMENTS AND DEVICES SHALL BE COORDINATED WITH ARCHITECT.
6. LAY DIRECTIONAL PATTERN OF CEILING TILE AS GRAPHICALLY INDICATED ON PLAN, UNLESS NOTED OTHERWISE.
7. LOCATE ACCESS PANELS AS INDICATED ON THE DRAWINGS. THE CONTRACTOR SHALL VERIFY THAT ACCESS PANELS OF TYPE SPECIFIED ARE INSTALLED IN NON-GRID TYPE CEILINGS WHERE SERVICE OR ADJUSTMENT TO MECHANICAL, PLUMBING, OR ELECTRICAL ITEMS MAY BE REQUIRED. IF NOT INDICATED IN THE DRAWINGS, LOCATE IN ACCORDANCE WITH APPLICABLE CODES. COORDINATE W/ ARCHITECT PRIOR TO INSTALL. ALL ACCESS PANELS SHALL BE PAINTED TO MATCH THE COLOR OF THE CEILING.
8. VERIFY THAT ALL ABOVE-CEILING ELEMENTS FIT IN PLENUM AS INDICATED BEFORE PROCEEDING WITH FRAMING CEILING. THE CONTRACTOR SHALL REPORT ANY OMISSIONS OR INCONSISTENCIES TO THE ARCHITECT.
9. CEILING SUPPORT SYSTEM ARE NOT DESIGNED OR INTENDED TO SUPPORT THE WEIGHT OF ADDITIONAL EQUIPMENT, CABLE, CONDUIT, LIGHTS, MECHANICAL EQUIPMENT OR OTHER CONSTRUCTION. SUPPORT THESE ITEMS INDEPENDENTLY FROM THE STRUCTURE ABOVE.
10. ALL DEVICES & DEVICE COVERPLATE LOCATED IN GYPSUM BOARD OR ACT CEILINGS TO BE WHITE.
11. ALL POWER CORDS AND CABLE SUPPORTS FOR PENDANT HUNG LIGHT FIXTURES SHALL BE PLUMB, STRAIGHT, AND TIGHT.
12. THE CONTRACTOR SHALL COMPARE THIS REFLECTED CEILING PLAN WITH ELECTRICAL LIGHTING PLANS, MECHANICAL SUPPLY, RETURN, AND EXHAUST PLANS. THE CONTRACTOR SHALL REPORT ANY OMISSIONS OR INCONSISTENCIES TO THE ARCHITECT.
13. ALL SINGLE LIGHT FIXTURES IN A GIVEN SPACE SHALL BE CENTERED ON THE ROOM OR SPACE. (IE JAN CLOSETS, ELECTRICAL CLOSETS, ETC.)
14. ALL GYPSUM BOARD SOFFITS AND CEILING HEIGHTS INDICATED SHALL BE FURRED/SET FROM BOTTOM FACE OF GYPSUM BOARD ABOVE FINISH FLOOR.
15. SUSPENDED CEILING SYSTEMS MUST BE INSTALLED TO COMPLY WITH ASTM C636 AND ASTM E580 SEISMIC CATEGORY D, RISK CATEGORY 11.
16. FOR FURTHER DETAIL & DIMENSIONS SEE FLOOR PLANS AND CEILING DETAILS.
17. PROVIDE ACOUSTICAL BATTS ON TOP OF ALL RESTROOM CEILINGS.

FLOOR PLAN GENERAL NOTES

1. REFER TO SHEET A-001 FOR ADDITIONAL GENERAL NOTES.
2. ALL NEW PARTITIONS SHALL BE TYPE A60, UNO; REFER TO PARTITION SCHEDULE FOR MORE INFORMATION.
3. REFER TO PARTITION TYPE FOR LOCATION OF SOUND ATTENUATION BLANKETS.
4. PARTITION TYPES ARE SCHEDULED IN THE A-000 SERIES. REFER TO G-100 SERIES LIFE SAFETY PLANS" FOR GRAPHIC EXTENT OF FIRE RATED PARTITIONS.
5. TYPICAL DIMENSIONS SHOWN ON THE FLOOR PLANS FOR NEW CONSTRUCTION ARE TO THE FACE OF STUD OR MASONRY WALLS, UNLESS OTHERWISE NOTED. DIMENSIONS NOTED AS 'MINIMUM', 'CLEAR, OR 'HOLD' ARE TO FACE OF PARTITION FINISH. MAINTAIN DIMENSIONS NOTED.
6. PROVIDE MINIMUM 1'-0" CLEAR FLOOR SPACE AT THE PUSH SIDE OF EVERY DOOR WITH A CLOSER; PROVIDE MINIMUM 1'-6" CLEAR AT THE PULL SIDE OF EVERY DOOR, UNLESS NOTED OR DIMENSIONED OTHERWISE.
7. LOCATE DOORS 0'-4" FROM FACE OF INTERSECTING **STUD** PARTITION TO INSIDE EDGE OF DOOR FRAME, UNLESS NOTED OTHERWISE.
8. THE ROUGH OPENING OF A NEW DOOR GRAPHICALLY SHOWN IN THE CENTER OF A WALL UNDIMENSIONED SHOULD BE CENTERED ON THE WALL, UNLESS NOTED OTHERWISE.
9. REFER TO A-002 FOR TYPICAL MOUNTING HEIGHTS.
10. VERIFY LOCATION OF MARKERBOARDS, TACKBOARDS, AND MONITORS PRIOR TO INSTALLATION.
11. FIELD MEASURE AND CONFIRM DIMENSIONS FOR EQUIPMENT, FURNISHINGS & ARCHITECTURAL WOODWORK (MILLWORK).
12. REFER TO DOOR SCHEDULE FOR DOOR FRAME MATERIAL & FINISHES AND ALL HARDWARE COMBINATIONS. REFER TO PROJECT MANUAL.
13. COORDINATE WITH OWNER WHERE BLOCKING IS NEEDED IN WALLS FOR MOUNTING AND INSTALLATION OF OWNER PROVIDED EQUIPMENT
14. FURNITURE, A/V EQUIPMENT, AND ACCESSORIES BY OWNER.

RCP LEGEND

- SUSPENDED 2' X 2' ACOUSTICAL CEILING SYSTEM
- GYP — GYPSUM BOARD CEILING

CEILING TYPE TAG

- XXX.X — CEILING MATERIAL
- X' - X" — CEILING HEIGHT

MECHANICAL SYMBOLS

- RETURN AIR GRILLE — REFER TO MECHANICAL DRAWINGS FOR ADDITIONAL INFORMATION
- SUPPLY AIR CEILING DIFFUSER — REFER TO MECHANICAL DRAWINGS FOR ADDITIONAL INFORMATION
- EXHAUST FAN - REFER TO MECHANICAL DRAWINGS
- CEILING HEATER - REFER TO MECHANICAL DRAWINGS

LIGHT FIXTURE SYMBOLS

- 2x4 FIXTURE - REFER TO ELECTRICAL
- RECESSED LINEAR DOWNLIGHT - REFER TO ELECTRICAL
- HIGH BAY LIGHT - REFER TO ELECTRICAL
- SHOWER LIGHT - REFER TO ELECTRICAL

FLOOR PLAN LEGEND

- NON RATED - PARTITION
- DOOR OPENING AND REFERENCE TAG W/ TYP. CLEARANCE DIMS. (RE: A600'S FOR DOOR SCHEDULE) (E___ DENOTES EXISTING DOOR)
- ITEMS TO BE BUILT IN MILLWORK, REF. INTERIOR ELEVATIONS
- XXX — PARTITION TYPE MARK
- XX — FLOOR PLAN KEYED NOTE MARK
- XX — OPENING TYPE MARK
- CJ — CONSTRUCTION JOINT / CJ - CONTROL JOINT / EJ - EXPANSION JOINT
- OBJECTS OVERHEAD
- CENTERLINE OF OBJECT
- OWNER FURNISHED ITEM

MHM

McCarty Holsaple McCarty
550 W. Main St., Suite 300
Knoxville, TN 37902
t 865.544.2000
www.mhminc.com

Project Information:

24023

OAK RIDGE HIGH SCHOOL SOFTBALL

15 WILBERFORCE AVE
OAK RIDGE, TN 37830

OAK RIDGE SCHOOLS

AARON MILLER — REGISTERED ARCHITECT — No. 102575 — STATE OF TENNESSEE — 09/23/24

Consultant:

#	ISSUED BY:	DATE
1	BIDDING	09/23/2024

Issue Date:	AUG 05, 2024
PIC	A. MILLER
PM	A. MILLER
PA	G. TAYLOR
Drawn By:	G. TAYLOR
Checked By:	A. MILLER

Sheet Information:

A-121

SCORE BOOTH - PLANS, ELEVATIONS, AND SECTIONS

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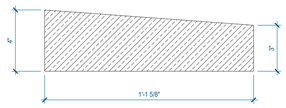
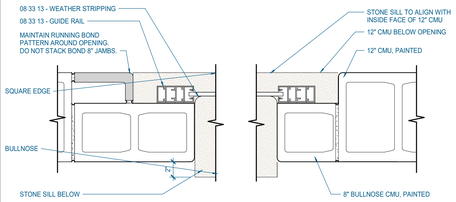
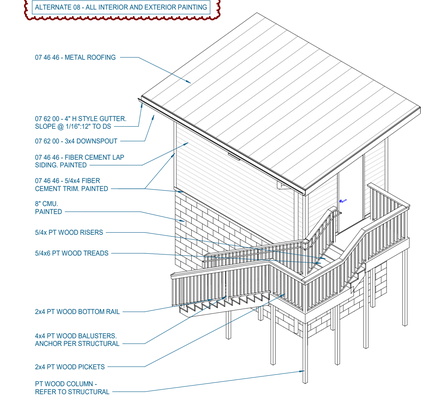


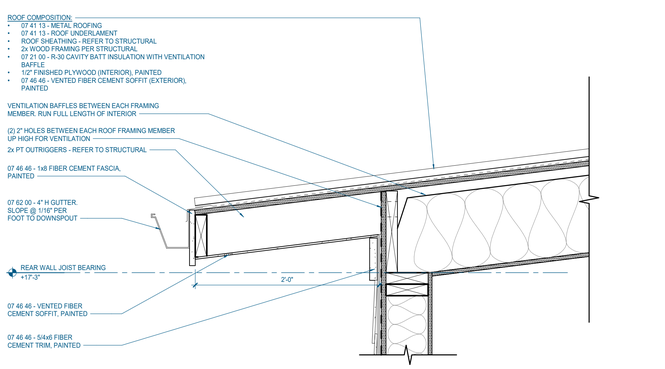
S24 STONE SILL PROFILE
3" = 1'-0" | A-122



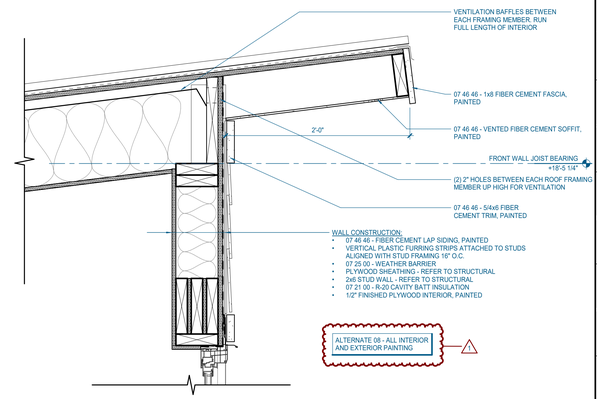
P24 OVERHEAD COILING DOOR - JAMB
1 1/2" = 1'-0" | A-122

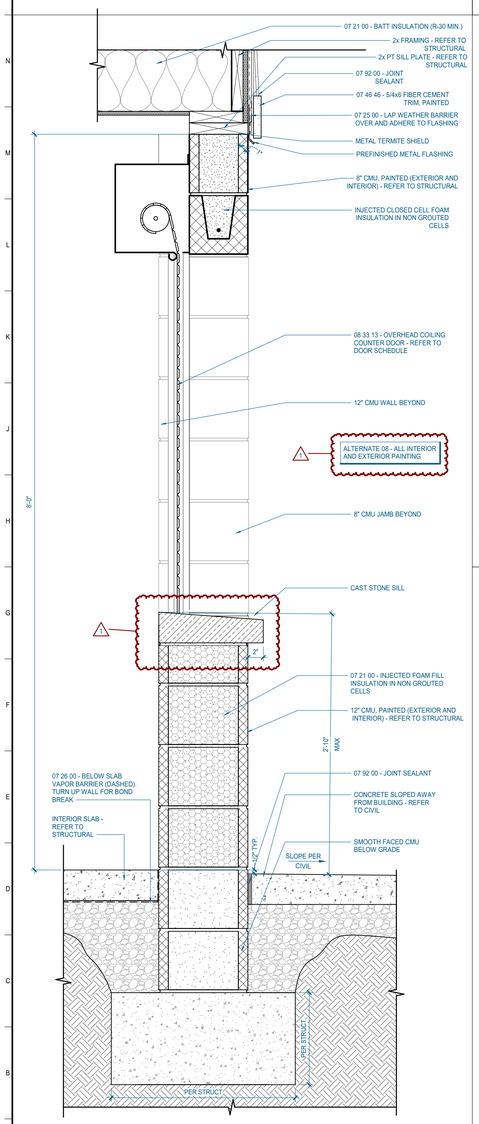


P19 STAIR AXON
| A-122

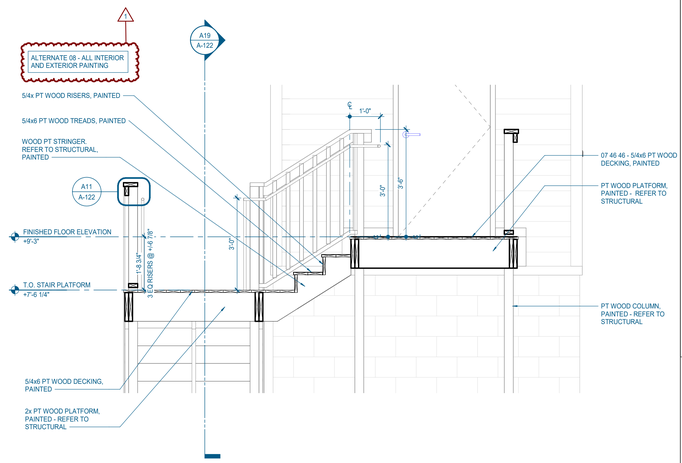


P14 ROOF SECTION DETAILS
1 1/2" = 1'-0" | A-122

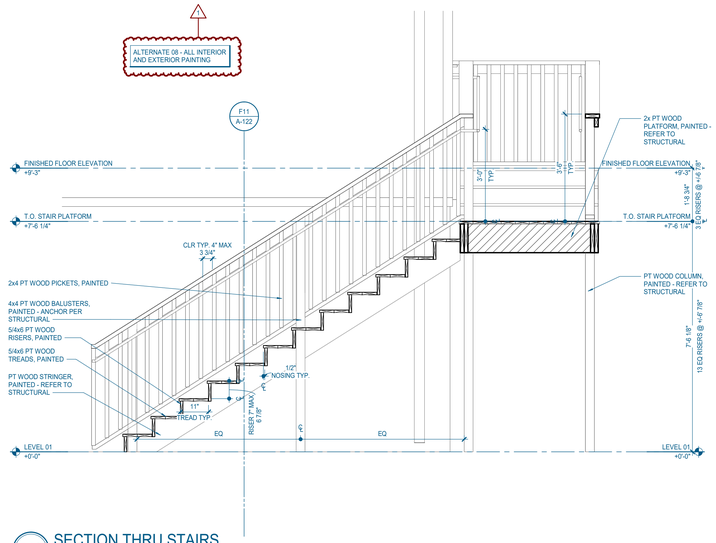




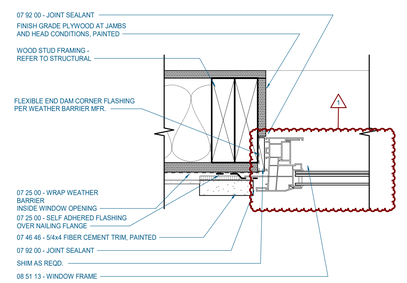
A24 SECTION DETAIL - OVERHEAD DOOR
1 1/2" = 1'-0" | A-122



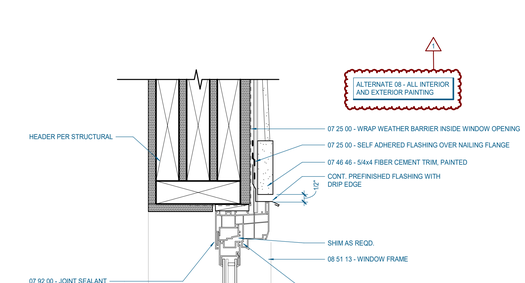
H19 SECTION THRU STAIRS - UPPER RUN
1/2" = 1'-0" | A-122

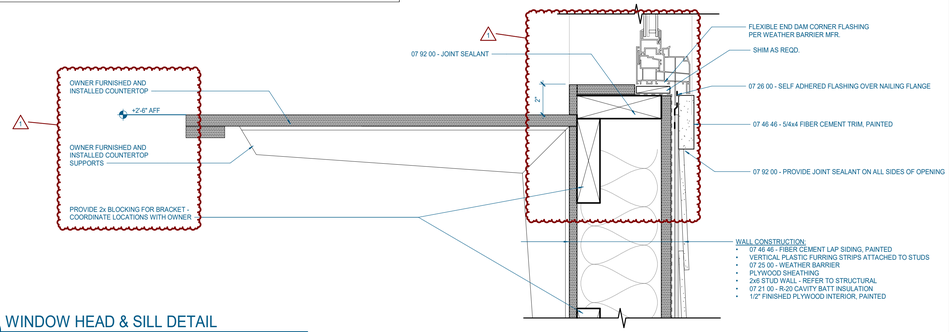


A19 SECTION THRU STAIRS
1/2" = 1'-0" | A-122

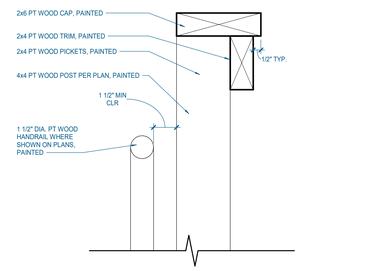


K11 WINDOW JAMB DETAILS
3" = 1'-0" | A-122

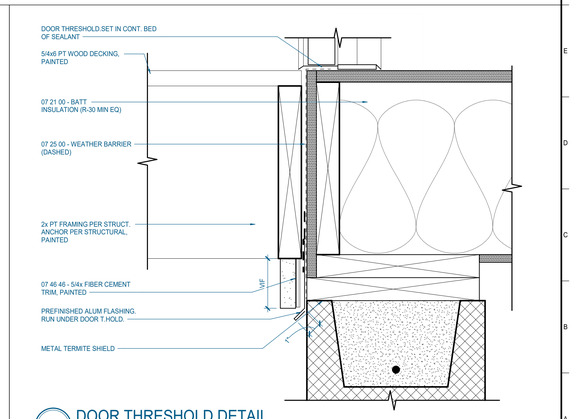




F11 WINDOW HEAD & SILL DETAIL
3" = 1'-0" | A-122



A11 TYP. GUARDRAIL CAP DETAIL
3" = 1'-0" | A-122



A06 DOOR THRESHOLD DETAIL
3" = 1'-0" | A-122

MHM

McCarty Holsaple McCarty
550 W. Main St., Suite 300
Knoxville, TN 37902
t 865.544.2000
www.mhminc.com

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A-122

SCORE BOOTH - DETAILS

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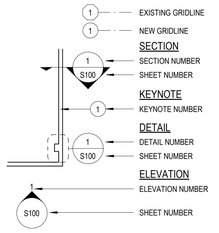
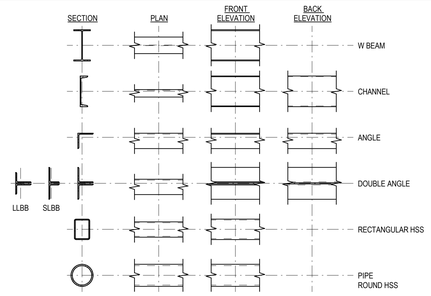
ABBREVIATIONS

ACI	AMERICAN CONCRETE INSTITUTE
ADDL	ADDITIONAL
ADH	ADHESIVE
ADJ	ADJACENT, ADJUNCT
ADJT	ADJUSTABLE
AFF	ABOVE FINISHED FLOOR
AGG	AGGREGATE
AHU	AIR HANDLING UNIT
AISC	AMERICAN INSTITUTE OF STEEL CONSTRUCTION
ALT	ALTERNATE
ALUM	ALUMINUM
ANC	ANCHOR
ANSI	AMERICAN NATIONAL STANDARDS INSTITUTE
APPD	APPROVED
APPROX	APPROXIMATE
ARCH	ARCHITECT(URAL)
AVG	AVERAGE
AWS	AMERICAN WELDING SOCIETY
LOC(S)	ANCHOR BOLT
B/__	BOTTOM OF __
B/CONC	BOTTOM OF CONCRETE
B/STL	BOTTOM OF STEEL
BD	BOARD
BEL	BELOW
BF	BRACED FRAME
BITUM	BITUMINOUS
BL	BUILDING LINE
BLDG	BUILDING
BLK(G)	BLOCK(ING)
BM	BEAM
BPL	BEARING PLATE
BRCG	BRACING
BRDG	BRIDGING
BRG	BEARING
BRK	BRICK
BS	BOTH SIDES
BT	BENT
BTM	BOTTOM
BTWN	BETWEEN
BW	BOTH WAYS
C	STEEL CHANNEL
CALC	CALCULATION
CDF	CONTROLLED DENSITY FILL
CEM	CEMENT
CFT	CUBIC FOOT
CIP	CAST IN PLACE CONCRETE
CJ	CONTROL JOINT
CL	CENTER LINE
CLR	CLEAR(ANCE) / CLEAR
CM	CENTIMETER(S)
CMU	CONCRETE MASONRY UNIT
COL	COLUMN
COM	COMMON
CONC	CONCRETE
COND	CONDITION
CONN	CONNECTION
CONST	CONSTRUCTION
CONST JT	CONSTRUCTION JOINT
CONT	CONTINUE(OUS)
CONTR	CONTRACT(OR)
CSK	COUNTERSINK, COUNTERSUNK
CTC	CENTER TO CENTER
CTLVR	CANTILEVER
CTR	CENTER
CY	CUBIC YARDS
CYL	CYLINDER
d	PENNY (AS IN NAIL, Id)
DBA	DEFORMED BAR ANCHOR
DBL	DOUBLE
DC	DEMAND CRITICAL WELD
DCON	DRAG CONNECTION
DD	DESIGN DEVELOPMENT
DEG	DEGREE
DEMO	DEMOLISH
DEP	DEPRESSED
DEPR	DEPRESSION
DET	DETAIL
DIA	DIAMETER
DIM	DIMENSION
DL	DEAD LOAD
DN	DOWN
DO	DITTO
DTA	DOVETAIL ANCHOR
DTS	DOVETAIL ANCHOR SLOT
DVPMT	DEVELOPMENT
DWG	DRAWING
DWLS	DOWELS
(E)	EXISTING
E	EAST
EA	EACH
EB	EXPANSION BOLT
EF	EACH FACE
EIFS	EXTERIOR INSULATION FINISH SYSTEM
EJ	EXPANSION JOINT
ELEC	ELECTRIC(AL)
ELEV	ELEVATION
EO	EDGE OF
EOC	EDGE OF CONCRETE
EOM	EDGE OF MASONRY
EOP	EDGE OF PAVEMENT
EOS	EDGE OF SLAB
EPY	EPOXY COATING
EQ	EQUAL
EQUIV	EQUIVALENT
EST	ESTIMATE(D)
EXP	EXPANSION
EXT	EXTERIOR
F	FAHRENHEIT
FAS	FASTEN(ER)
FB	FLAT BAR
FBO	FURNISHED BY OTHERS
FDN	FOUNDATION
FFE	FINISHED FLOOR ELEVATION
FFL	FINISH FLOOR LINE
FIG	FIGURE
FIN	FINISH(ED)
FLG	FLANGE
FLR	FLOOR
FND	FOUNDATION
FO	FACE OF
FOC	FACE OF CONCRETE
FOF	FACE OF FINISH
FOM	FACE OF MASONRY
FOS	FACE OF STUDS
FS	FAR SIDE
FT	FEET
FTG	FOOTING
FV	FIELD VERIFY
GA	GAUGE OR GAGE
GAL	GALLON(S)
GALV	GALVANIZED
GC	GENERAL CONTRACT(OR)
GEN	GENERAL
GF	GROUND FACE
GLB	GLUE LAMINATED BEAM
GND	GROUND
GOV	GOVERNEMENT
GR	GRADE(ING)
GRTG	GRATING
GT	GROUT
GVL	GRAVEL
GYP	GYPSUM
H.D.	HEAVY DUTY
HC	HOLLOW CORE
HD	HEAD
HDR	HEADER
HDW	HARDWARE
HGT	HEIGHT
HJT	HEAD JOINT
HK	HOOK(S)
HORIZ	HORIZONTAL
HP	STEEL HP SHAPE
HS	HIGH STRENGTH
HT	HEIGHT
HWD	HARDWOOD
ICF	INSULATED CORE FORM, INSULATING CONCRETE FORM
ID	INSIDE DIAMETER
IFC	ISSUE FOR CONSTRUCTION
IN	INCH
INCL	INCLUDE(D)(ING)
INFO	INFORMATION
INT	INTERIOR
INTM	INTERMEDIATE
INV	INVERT(ED)
JST	JOIST
JT	JOINT
K	KIP (1000 POUNDS)
KD	KILN-DRIED
KLF	KIPS PER LINEAR FOOT
KO	KNOCKOUT
KSF	KIPS PER SQUARE FOOT
KSI	KIPS PER SQUARE INCH
L	STEEL ANGLE
LAM	LAMINATE(D)
LAND	LANDSCAPE
LB	LAG BOLT
LBR	LUMBER
LBS	POUNDS
LF	LINEAL FOOT
LG	LONG
LIN	LINEAR
LL	LIVE LOAD
LL	DOUBLE STEEL ANGLE
LLH	LONG LEGS HORIZONTAL
LLV	LONG LEGS VERTICAL
LNTL	LINTEL
LOC(S)	LOCATION(S) OR LOCATE
LONG	LONGITUDINAL
LS	LAP SPLICE
LSL	LAMINATED STRAND LUMBER
LT GA	LIGHT GAGE
LTWT	LIGHT WEIGHT
LVL	LAMINATED VENEER LUMBER
LWC	LIGHT WEIGHT CONCRETE
M	METER(S)
MAS	MASONRY
MATL	MATERIAL(S)
MAX	MAXIMUM
MB	MACHINE BOLTS
MBR	MEMBER
MC	MISC STEEL CHANNEL
MCJ	MASONRY CONTROL JOINT
MECH	MECHANICAL
MED	MEDIUM
MEP	MECHANICAL, ELECTRIAL, PLUMBING
MFR	MANUFACTURER
MIN	MINIMUM
MISC	MISCELLANEOUS
MM	MILLIMETER(S)
MO	MASONRY OPENING
MOD	MODIFIED
MONO	MONOLITHIC
MOV	MOVABLE
MTD	MOUNT(ED)(ING)
MTL	METAL
N	NORTH
NIC	NOT IN CONTRACT
NO	NUMBER
NOM	NOMINAL
NREQD	NOT REQUIRED
NS	NEAR SIDE
NTS	NOT TO SCALE
OC	ON CENTER
OCEW	ON CENTER EACH WAY
OD	OUTSIDE DIAMETER
OH	OVERHEAD
OJ	OPEN WEB JOIST
OPH	OPPOSITE HAND
OPNG	OPENING
OPP	OPPOSITE
OSB	ORIENTED STRAND BOARD
OTS	OPEN TO STRUCTURE
P-T	POST-TENSIOND
PAR	PARALLEL
PCC	PRECAST CONCRETE
PCF	POUNDS PER CUBIC FOOT
PED	PEDESTAL
PERF	PERFORATE(D)
PERI	PERIMETER
PERP	PERPENDICULAR
PF	PRE-FINISHED
PI	POINT OF INTERSECTION
PL	PLATE
PLBG	PLUMBING
PLF	POUNDS PER LINEAR FOOT
PLG	PILING
PLYWD	PLYWOOD
PNL	PANEL
PNT	PENETRANT TESTING
PREFAB	PREFABRICATE(D)
PREFIN	PREFINISHED
PRF	PREFORMED
PROJ	PROJECT
PSC	PRESTRESSED CONCRETE
PSF	POUNDS PER SQUARE FOOT
PSI	POUNDS PER SQUARE INCH
PSL	PARALLEL STRAND LUMBER
PT	PRESSURE TREATED
PTC	POST-TENSIONED CONCRETE
PVC	POLYVINYLCHLORIDE
QTY	QUANTITY
R#	REVISION, REVISED
RAD	RADIUS
RCP	REFLECTED CEILING PLAN
REF	REFERENCE
REINF	REINFORCE(D)
REQD	REQUIRED
REQT	REQUIREMENT(S)
REV	REVISION(S), REVISED
RFG	ROOFING
RGH	ROUGH
RND	ROUND
RO	ROUGH OPENING
ROW	RIGHT OF WAY
RS	RIGHT SIDE
S	SOUTH
SCHED	SCHEDULE
SD	SCHEMATIC DESIGN
SDI	STEEL DECK INSTITUTE
SDS	SELF DRILLED SCREW
SGN	STRUCTURAL GENERAL NOTES
SHT	SHEET
SHTG	SHEATHING
SIM	SIMILAR
SJI	STEEL JOIST INSTITUTE
SOG	SLAB ON GRADE
SOH	SIMILAR, OPPOSITE HAND
SPEC	SPECIFICATION(S)
SQ	SQUARE
SSTL	STAINLESS STEEL
STD	STANDARD
STL	STEEL
STRUCT	STRUCTURE(AL)
SW	SHEAR WALL
T&G	TONGUE & GROOVE
T/__	TOP OF __
TEMP	TEMPORARY
THK	THICK(NESS)
TO	TOP OF
TOC	TOP OF CONCRETE
TOL	TOLERANCE
TOM	TOP OF MASONRY
TOP	TOP OF PLATE
TOPO	TOPOGRAPHY
TOS	TOP OF STEEL
TOSL	TOP OF SLAB
TOT	TOP OF TRUSS
TOW	TOP OF WALL
TRANS	TRANSVERSE
TYP	TYPICAL
UNO	UNLESS NOTED OTHERWISE
UT	ULTRASONIC TESTING
VERT	VERTICAL
VNR	VENEER
VOL	VOLUME
W	WEST
W	STEEL WIDE FLANGE BEAM
W/	WITH
W/O	WITHOUT
WD	WOOD
WD BLK	WOOD BLOCKING
WID	WIDTH
WM	WIRE MESH
WP	WORK POINT
WS	WATER STOP
WT	WEIGHT
WTS	WELDED THREADED STUD
WTW	WALL-TO-WALL
WWF	WELDED WIRE FABRIC
WWM	WELDED WIRE MESH
XS	EXTRA STRONG
XXS	DOUBLE EXTRA STRONG

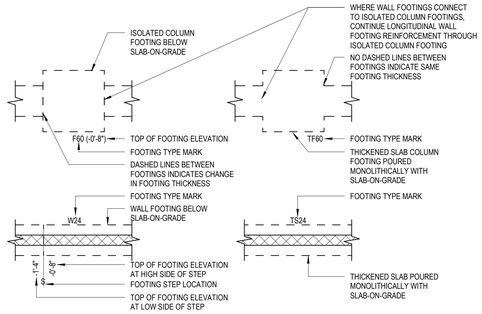
MISCELLANEOUS PLAN SYMBOLS



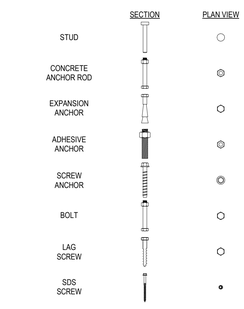
STEEL SHAPE SYMBOLS



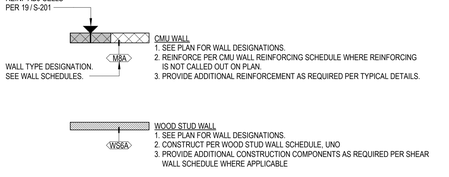
FOOTING SYMBOLS & SCHEDULE MARKS



WOOD SYMBOLS



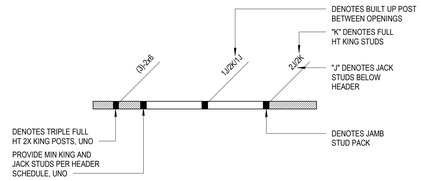
STRUCTURAL WALL TYPES



CONNECTOR SYMBOLS

NOTES:
1. NUMBERING ON SHEETS FOLLOWS LAYOUT ABOVE.
2. NUMBERING MAY NOT BE SEQUENTIAL ON SHEETS.

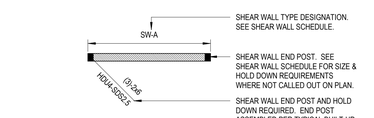
WOOD STUD WALL KEY



TYPICAL SHEET LAYOUT

STRUCTURAL SHEET LIST	
SHEET NUMBER	SHEET NAME
S-001	ABBREVIATIONS, SYMBOLS, AND LEGENDS
S-002	STRUCTURAL GENERAL NOTES
S-003	STRUCTURAL GENERAL NOTES
S-004	SPECIAL INSPECTIONS
S-101	FRAMING PLANS - BACKSTOP
S-102	FRAMING PLANS - DUG OUT
S-103	FRAMING PLANS - SCORER BOOTH
S-104	FRAMING PLANS - SCOREBOARD
S-201	TYPICAL DETAILS - CONCRETE & MASONRY
S-202	TYPICAL DETAILS - WOOD & STEEL

WOOD SHEAR WALL KEY



NOTES:
1. SEE PLAN FOR WALL EXTENTS. TYPICALLY, WALLS BEGIN/END AT BUILDING CORNERS, WALL INTERSECTIONS, AND/OR EDGES OF WALL OPENINGS
2. CONSTRUCT PER TYPICAL STRUCTURAL WOOD STUD WALL ELEVATION DETAIL, UNO
3. PROVIDE ADDITIONAL CONSTRUCTION COMPONENTS AS REQUIRED PER SHEAR WALL SCHEDULE
4. AT ELEVATED FLOORS, HOLD DOWNS AND END POSTS ARE REQUIRED ABOVE AND BELOW FLOOR. SEE TYPICAL DETAIL.
5. SHEAR WALL END POST STUDS ARE FULL HT KING STUDS IN ADDITION TO REQUIRED JACK STUDS.

STRUCTURAL SHEET LIST

MHM

McCarty Holsaple McCarty
550 W. Main St., Suite 300
Knoxville, TN 37902
t 865.544.2000
www.mhminc.com

Project Information:

24023

OAK RIDGE HIGH SCHOOL SOFTBALL

15 WILBERFORCE AVE
OAK RIDGE, TN 37830

OAK RIDGE SCHOOLS

Seal:

Project Status

Consultant:

HAINES STRUCTURAL GROUP
800 S. GAY STREET, STE. 1700 KNOXVILLE, TN 37929
(865) 329-9920 | WWW.HAINES-SG.COM
project no. 24035

#	ISSUED BY:	DATE

Issue Date:	AUG 05, 2024
PIC	R. HAINES
PM	C. BROWN
PA	C. BROWN
Drawn By:	K. SHERRILL
Checked By:	T. WHELAN

Sheet Information:

S-001

ABBREVIATIONS, SYMBOLS, AND LEGENDS

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USE OF DRAWINGS

TYPICAL DETAILS: ALL TYPICAL DETAILS AND NOTES SHOWN IN THE DRAWINGS SHALL APPLY UNLESS NOTED OTHERWISE. TYPICAL DETAILS MAY NOT NECESSARILY BE INDICATED ON THE PLANS BUT SHALL STILL APPLY AS SHOWN OR DESCRIBED IN THE DETAILS. WHERE TYPICAL DETAILS ARE NOTED ON THE DRAWINGS, THE SPECIFIED TYPICAL DETAIL SHALL BE USED. WHERE NO DETAIL IS NOTED, IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO CHOOSE THE APPROPRIATE TYPICAL DETAIL FROM THOSE PROVIDED. THE CONTRACTOR SHALL SUBMIT ALL PROPOSED ALTERNATE TYPICAL DETAILS TO THOSE PROVIDED WITH RELATED CALCULATIONS TO THE ENGINEER FOR APPROVAL PRIOR TO SHOP DRAWING PRODUCTION AND FIELD USE.

STRUCTURAL GENERAL NOTES: NOTES ON THE STRUCTURAL GENERAL NOTES SHEET ARE APPLICABLE UNLESS SPECIFICALLY NOTED OTHERWISE ON THE DRAWINGS.

USE OF DRAWINGS AND COORDINATION: USE STRUCTURAL DRAWINGS IN CONJUNCTION WITH ARCHITECTURAL, CIVIL, MECHANICAL AND OTHER DRAWINGS FOR BIDDING AND CONSTRUCTION. SEE ARCHITECTURAL, MECHANICAL, ELECTRICAL, AND PLUMBING DRAWINGS FOR EMBEDS, OPENINGS, SLEEVES, ETC NOT SHOWN ON THE STRUCTURAL DRAWINGS. COORDINATE WORK AND VERIFY DIMENSIONS AND CONDITIONS FOR COMPATIBILITY BETWEEN TRADES AND EQUIPMENT PURCHASED. NOTIFY OWNER'S REPRESENTATIVE OF DISCREPANCIES PRIOR TO CONSTRUCTION.

DRAWING SCALE: NOTED DIMENSIONS TAKE PRECEDENCE OVER SCALED DIMENSIONS - DO NOT SCALE DRAWINGS.

DIMENSION VERIFICATION: DIMENSIONS NOTED PLUS OR MINUS (+/-) OR AS 'FIELD VERIFY' INDICATE UN-VERIFIED DIMENSIONS THAT REQUIRE CONFIRMATION OR DETERMINATION BY THE CONTRACTOR PRIOR TO FABRICATION AND CONSTRUCTION. NOTIFY OWNER'S REPRESENTATIVE IMMEDIATELY OF CONFLICTS OR VARIATIONS FROM INDICATED DIMENSIONS.

NOTE CONFLICTS: IF ANY STRUCTURAL NOTES ARE IN CONFLICT WITH EACH OTHER, ARCHITECTURAL, OTHER DRAWINGS, OR THE SPECIFICATIONS, USE THE MOST STRINGENT REQUIREMENT FOR BIDDING AND CONSTRUCTING THE WORK.

EXISTING CONDITIONS: INFORMATION SHOWN ON THE DRAWINGS RELATED TO EXISTING CONDITIONS REPRESENTS THE PRESENT KNOWLEDGE, BUT WITHOUT GUARANTEE OF ACCURACY. VERIFY ALL EXISTING DIMENSIONS, MEMBER SIZES, AND CONDITIONS IN THE FIELD PRIOR TO COMMENCING ANY WORK. IMMEDIATELY REPORT CONDITIONS THAT CONFLICT WITH THE CONTRACT DOCUMENTS TO THE ENGINEER OF RECORD. DO NOT DEVIATE FROM THE CONTRACT DOCUMENTS WITHOUT WRITTEN DIRECTION FROM THE ENGINEER OF RECORD.

DESIGN BY OTHERS: ANY ENGINEERING DESIGN PROVIDED BY OTHERS AND SUBMITTED FOR REVIEW SHALL BEAR THE SEAL OF AN ENGINEER REGISTERED IN THE STATE OF THE PROJECT AND BE ACCOMPANIED BY SUBSTANTIATING CALCULATIONS.

MEANS AND METHODS

MEANS AND METHODS: HAINES STRUCTURAL GROUP, INC. OR ANY OF ITS EMPLOYEES SHALL NOT HAVE CONTROL OR BE RESPONSIBLE FOR CONSTRUCTION MEANS AND METHODS, TECHNIQUES, PROCEDURES, SEQUENCES, ACTS OR OMISSIONS OF THE CONTRACTOR OR ANY OTHER PERSONS PERFORMING THE WORK, OR FOR THE FAILURE OF ANY OF INDIVIDUAL OR COMPANY TO SAFELY CARRY OUT THE WORK IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.

STABILITY: THE CONTRACTOR SHALL PROVIDE NECESSARY BRACING AND SHORING AS REQUIRED UNTIL THE BUILDING'S STRUCTURAL SYSTEMS HAVE BEEN COMPLETED. THE STRUCTURE SHALL NOT BE CONSIDERED STABLE UNTIL ALL STRUCTURAL ELEMENTS HAVE BEEN CONSTRUCTED IN ACCORDANCE WITH THE CONTRACT DOCUMENTS. THE CONTRACTOR SHALL RETAIN A QUALIFIED LICENSED STRUCTURAL ENGINEER WHO SHALL DETERMINE WHERE TEMPORARY SHORING/BRACING IS REQUIRED AND PROVIDE ITS DESIGN. PROVIDE THE TEMPORARY BRACING AS REQUIRED TO STABILIZE THE STRUCTURE AND ITS COMPONENTS UNTIL ALL FINAL CONNECTIONS HAVE BEEN COMPLETED ACCORDING TO THE CONTRACT DOCUMENTS.

JOBSITE SAFETY: THE CONTRACTOR IS SOLELY RESPONSIBLE FOR PROVIDING A SAFE PLACE TO WORK AND FOR MEETING THE REQUIREMENTS OF ALL APPLICABLE JURISDICTIONS. EXECUTE WORK IN A MANNER THAT PROVIDES FOR THE SAFETY OF PERSONS AND ADJACENT PROPERTY AGAINST INJURY AND DAMAGE DUE TO FALLING DEBRIS AND OTHER HAZARDS IN CONNECTION WITH CONSTRUCTING THE WORK.

CONSTRUCTION LOADING: THE CONTRACTOR IS RESPONSIBLE FOR PROTECTING THE STRUCTURE DURING CONSTRUCTION. WHERE CONSTRUCTION SEQUENCING AND STAGING ARE LIKELY TO CREATE OVERLOADING, THE CONTRACTOR SHALL RETAIN A QUALIFIED STRUCTURAL ENGINEER TO DETERMINE HOW TO TEMPORARILY SHORE AND SUPPORT THE OVERLOADED ELEMENTS IN A MANNER THAT DOES NOT EXCEED THE STRESS LIMITS OF THE ELEMENTS AND THE SUPPORTING FOUNDATION AS DEFINED BY THE APPLICABLE BUILDING CODES.

GEOTECHNICAL

ASSUMED SOIL DESIGN PARAMETERS: A GEOTECHNICAL REPORT HAS NOT BEEN PROVIDED TO THE ENGINEER. THE FOUNDATION SYSTEM HAS BEEN DESIGNED USING THE FOLLOWING ASSUMED SOIL PARAMETERS. THE CONTRACTOR SHALL EMPLOY A TESTING LABORATORY TO VERIFY AND INSPECT THE FOLLOWING DESIGN PARAMETERS. A GEOTECHNICAL ENGINEER LICENSED IN THE PROJECT STATE EMPLOYED BY THE TESTING LABORATORY SHALL REVIEW AND VERIFY THE FOLLOWING DESIGN PARAMETERS TO ENSURE THAT ANTICIPATED TOTAL SETTLEMENT WILL NOT EXCEED ONE INCH. SHOULD ACTUAL CONDITIONS BE DETERMINED TO DEVIATE FROM THE VALUES SPECIFIED, THE TESTING LABORATORY AND THE CONTRACTOR SHALL NOTIFY ARCHITECT AND ENGINEER BEFORE CONSTRUCTION OF THE SHALLOW FOUNDATION SYSTEM

ALLOWABLE BEARING PRESSURE: 2,000 PSF
FROST DEPTH: 18 INCHES
BUILDING PAD:
SUBGRADE MODULUS: 125 PCI
COEFFICIENT OF FRICTION: 0.35
FOUNDATION/RETAINING WALL:
WEIGHT OF BACKFILL MATERIAL: 110 PCF
AT REST PRESSURE: 75 PSF/FT
ACTIVE PRESSURE: 35 PSF/FT
PASSIVE PRESSURE: 330 PSF/FT
COEFFICIENT OF FRICTION: 0.35

GEOTECH APPROVAL: THE GEOTECHNICAL ENGINEER SHALL OBSERVE AND APPROVE PREPARED SOIL BEARING SURFACES PRIOR TO PLACEMENT OF REINFORCING STEEL AND CASTING OF FOOTING. THE GEOTECHNICAL ENGINEER OR AN APPROVED TESTING LAB SHALL OBSERVE SOIL COMPACTION WORK.

SUBGRADE PREP: SUBGRADE PREPARATION INCLUDING DRAINAGE, EXCAVATION, COMPACTION, AND FILLING REQUIREMENTS SHALL CONFORM STRICTLY TO THE CONTRACT DOCUMENTS, AND AS DIRECTED BY THE GEOTECHNICAL ENGINEER.

UTILITIES: DETERMINE THE LOCATION OF ALL NEW/EXISTING UNDERGROUND UTILITIES IN AND ADJACENT TO THE AREA OF WORK PRIOR TO COMMENCING EXCAVATION. COORDINATE UTILITY LOCATIONS WITH FOUNDATIONS AS REQUIRED.

EXISTING STRUCTURES: CONTRACTOR SHALL CONFIRM THE ASBUILT LOCATION OF ANY POTENTIAL NEW OR EXISTING STRUCTURES OR OBJECTS WITHIN THE ZONE OF EXCAVATION INCLUDING WORK PERFORMED AS A PORTION OF THIS PROJECT BEFORE EXCAVATING OR INSTALLING FOUNDATION ELEMENTS. NOTIFY THE STRUCTURAL ENGINEER BEFORE PROCEEDING WITH ANY EXCAVATIONS OR OTHER SITE WORK, IF THE EXCAVATION WILL CUT BELOW AN ADJACENT STRUCTURE'S BOTTOM OF FOOTING ELEVATION OR IF AN ADJACENT STRUCTURE IS UPSLOPE FROM THE PLANNED SITE WORK.

BACKFILL: BACKFILL FOOTINGS AND RETAINING WALLS WITH FREE DRAINING GRANULAR FILL. PROVIDE A SUBSURFACE DRAINAGE SYSTEM FOR FOUNDATION AND RETAINING WALLS BASED ON THE GEOTECHNICAL REPORT RECOMMENDATIONS. DO NOT BACKFILL BEHIND WALLS BEFORE ADJACENT SUPPORTING ELEMENTS ARE COMPLETE AND CURED. ALTERNATIVELY, PROVIDE DESIGN AND CONSTRUCTION OF TEMPORARY BRACING THAT PROTECTS THE WALL AGAINST OVERSTRESS OR MOVEMENT.

WEEP HOLES: PROVIDE 2" DIAMETER WEEP HOLES AT 6'-0" OC MAXIMUM IN EXTERIOR RETAINING WALLS. PROVIDE FILTER FABRIC OR STAINLESS STEEL WIRE MESH OVER THE WEEP HOLE TO RETAIN THE BACKFILL MATERIAL.

SLAB-ON-GRADE BASE: AGGREGATE BASE (GRANULAR FILL) BELOW CONCRETE SLAB-ON-GRADE SHALL CONSIST OF MATERIAL AS RECOMMENDED BY THE GEOTECHNICAL ENGINEER AND BASED ON LOCAL AVAILABILITY.

FOOTINGS: FOOTINGS SHALL BEAR ON SOLID UNDISTURBED EARTH (CONTROLLED, COMPACTED STRUCTURAL FILL OR BOTH) AT LEAST FROST DEPTH BELOW LOWEST ADJACENT FINISHED GRADE. FOOTING DEPTHS/ELEVATIONS SHOWN ON PLANS AND DETAILS ARE MINIMUM. ESTABLISH THE ACTUAL BOTTOM-OF-FOOTING ELEVATIONS IN THE FIELD, BASED UPON THE GEOTECHNICAL ENGINEER'S ON-SITE OBSERVATIONS AND ADDITIONAL TESTING, IF REQUIRED, THAT WILL ACHIEVE THE ALLOWABLE DESIGN BEARING PRESSURE. NOTIFY ENGINEER OF ANY NECESSARY DEVIATIONS FROM THE FOOTING ELEVATIONS SHOWN ON THE DRAWINGS PRIOR TO CONSTRUCTING THE FOOTINGS.

CONCRETE PLACEMENT: FOUNDATION CONCRETE SHALL BE PLACED THE SAME DAY THE EXCAVATION IS MADE WHEN FEASIBLE. WHERE FOUNDATION EXCAVATIONS MUST REMAIN OPEN OR EXPOSED, SPECIAL CARE SHOULD BE TAKEN TO PROTECT THE EXPOSED SOILS FROM BEING DISTURBED, SATURATED, OR DRIED OUT PRIOR TO THE PLACEMENT OF SELECT FILL OR CONCRETE WITH A MUD MAT OF LEAN (250 PSI) CONCRETE OR AS APPROVED BY THE GEOTECHNICAL ENGINEER.

FORMS: THE EXTERIOR VERTICAL FACE OF ALL EXPOSED SLAB TURNDOWNS SHALL BE FORMED. THE SIDES OF FOOTINGS MAY BE EARTH FORMED AS LONG AS THE SOIL WILL MAINTAIN A VERTICAL FACE. ALL FOUNDATION STEM WALLS AND RETAINING WALLS SHALL BE FORMED ON BOTH SIDES OF THE WALL.

EXCAVATION: THE CONTRACTOR IS SOLELY RESPONSIBLE FOR EXCAVATION PROCEDURES INCLUDING LAGGING, SHORING, UNDERPINNING AND PROTECTION OF EXISTING CONSTRUCTION. COMPLY WITH ALL APPLICABLE OSHA REGULATIONS.

COMPACTION: MECHANICALLY COMPACT EXCAVATION BACKFILL IN LAYERS. PROVIDE THE FOLLOWING MINIMUM COMPACTION IN ACCORDANCE WITH THE ASTM D1557 TEST METHOD:
TRENCH AND WALL BACKFILL: 90% MAXIMUM DRY DENSITY
FILL BENEATH SLAB-ON-GRADE: 95% MAXIMUM DRY DENSITY
FILL BENEATH FOOTINGS: 95% MAXIMUM DRY DENSITY

DESIGN AND CONSTRUCTION CRITERIA

GOVERNING BUILDING CODE: ALL DESIGN AND CONSTRUCTION SHALL CONFORM TO THE REQUIREMENTS OF THE 2018 INTERNATIONAL BUILDING CODE (IBC).

PRIMARY REFERENCE STANDARDS: THE PUBLICATIONS LISTED BELOW ARE THE MATERIAL SPECIFIC GOVERNING CODES AND STANDARDS USED REFERENCED BY THEIR BASIC DESIGNATION. IN THE CASE OF CONFLICTING REQUIREMENTS, THE BUILDING CODE SHALL GOVERN. ADDITIONAL MATERIAL SPECIFIC DESIGN STANDARDS ARE ALSO LISTED UNDER THE RESPECTIVE MATERIAL SECTION OF THESE GENERAL NOTES. FOR ALL STANDARDS, USE THE VERSION REFERENCED BY THE GOVERNING BUILDING CODE. IF NOT REFERENCED BY GOVERNING BUILDING CODE, USE THE LATEST EDITION.

ACI 318-14	AMERICAN CONCRETE INSTITUTE BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE
TMS 402/602	THE MASONRY SOCIETY BUILDING CODE REQUIREMENTS AND SPECIFICATIONS FOR MASONRY STRUCTURES
AISC 360-16	AMERICAN INSTITUTE OF STEEL CONSTRUCTION SPECIFICATION FOR STRUCTURAL STEEL BUILDINGS
NDS-2018	AMERICAN FOREST AND PAPER ASSOCIATION, NATIONAL DESIGN SPECIFICATION FOR WOOD CONSTRUCTION WITH 2015 SUPPLEMENT
ASCE 7-16	AMERICAN SOCIETY OF CIVIL ENGINEERS MINIMUM DESIGN LOADS FOR BUILDINGS AND OTHER STRUCTURES
ASTM	AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM INTERNATIONAL)
ICC	INTERNATIONAL CODE COUNCIL, INTERNATIONAL CODE COUNCIL - EVALUATION SERVICES (ICC-ES)

MATERIAL PROPERTIES: MATERIAL PROPERTIES LISTED IN THE CONSTRUCTION DOCUMENTS ARE BASED UPON MATERIALS CURRENTLY AVAILABLE FOR CONSTRUCTION AND MAY NOT CORRESPOND WITH TABLES PROVIDED IN THE CODES AND SPECIFICATIONS LISTED HEREIN. WHERE POSSIBLE, THESE CODES HAVE BEEN USED IN THEIR ENTIRETY. WHERE THESE CODES REFERENCE OBSOLETE INFORMATION, INFORMATION BASED UPON CURRENT INDUSTRY STANDARDS HAS BEEN SUBSTITUTED AS NECESSARY.

PROJECT STATE: THE PROJECT IS TO BE CONSTRUCTED IN THE STATE OF TENNESSEE.

DESIGN AND CONSTRUCTION CRITERIA CONT.

DESIGN LOADS: BUILDING DESIGN LOADS HAVE BEEN DETERMINED IN ACCORDANCE WITH THE BUILDING CODE AND ASCE 7 AS FOLLOWS:

ROOF DEAD LOADS:
ROOFING 2 PSF
5/8" PLYWOOD SHEATHING 2 PSF
WOOD JOISTS 2.5 PSF
INSULATION ALLOWANCE 6 PSF
EQUIPMENT ACTUAL WEIGHT
SCORER BOOTH DESIGN DL= 13 PSF
DUGOUT DESIGN DL = 6 PSF

ELEVATED FLOOR DEAD LOADS:
3/4" PLYWOOD SHEATHING 2.5 PSF
WOOD JOISTS 3.5 PSF
EQUIPMENT ACTUAL WEIGHT
INSULATION ALLOWANCE 1.5 PSF
TOTAL DESIGN DL= 8 PSF

LIVE LOADS:
ROOF 20 PSF
SCORER BOOTH 40 PSF

SNOW LOAD:
GROUND SNOW LOAD: Pg - 10 PSF
SNOW DRIFT LOADS PER ASCE 7, SECTION 7.7.

WIND LOADS:
ANALYSIS PROCEDURE: METHOD 2 – ANALYTICAL PROCEDURE
DESIGN WIND SPEED: Vult - 104 MPH
Vasd - 80.6 MPH
RISK CATEGORY: II
EXPOSURE CATEGORY: C, ALL FACES
DIRECTIONALITY FACTOR, Kd: 0.85
TOPOGRAPHIC FACTOR, Kzt: 1.00
INTERNAL PRESSURE COEFFICIENT: ± 0.18
COMPONENTS & CLADDING WIND PRESSURES, SEE DIAGRAMS

SEISMIC LOAD:
ANALYSIS PROCEDURE: EQUIVALENT LATERAL FORCE PROCEDURE
MAPPED SPECTRAL RESPONSE ACCELERATIONS:
Ss – 0.521
S1 – 0.124
SITE CLASS: D (CODE DEFAULT)
RISK CATEGORY: II
DESIGN SPECTRAL RESPONSE ACCELERATIONS:
Sds – 0.481
Sd1 – 0.194
SEISMIC DESIGN CATEGORY: C

SCORER BOOTH
SEISMIC LOAD RESISTING SYSTEM: VERTICAL COMBINATION OF LIGHT-FRAMED (WOOD) WALLS SHEATHED WITH WOOD STRUCTURAL PANELS RATED FOR SHEAR RESISTANCE OVER ORDINARY MASONRY SHEAR WALLS (BEARING)
RESPONSE MODIFICATION FACTOR: R = 6.5 / 2.0
OVER-STRENGTH FACTOR: Ωo = 2.5 / 2.50
DEFLECTION AMPLIFICATION FACTOR: Cd = 4 / 1.75
SEISMIC IMPORTANCE FACTOR: Ie = 1.0
SEISMIC RESPONSE COEFFICIENT: Cs - 0.074 / 0.240

DUGOUTS
SEISMIC LOAD RESISTING SYSTEM: ORDINARY MASONRY SHEAR WALLS (BEARING)
RESPONSE MODIFICATION FACTOR: R = 2.0
OVER-STRENGTH FACTOR: Ωo = 2.5
DEFLECTION AMPLIFICATION FACTOR: Cd = 1.75
SEISMIC IMPORTANCE FACTOR: Ie = 1.0
SEISMIC RESPONSE COEFFICIENT: Cs - 0.240

ROOF DRAINAGE: THE ROOF FRAMING SYSTEM HAS BEEN DESIGNED WITH THE ASSUMPTION THAT A DRAINAGE SYSTEM ADEQUATE TO PREVENT PONDING WILL BE PROVIDED.

SLAB-ON-GRADE: SLABS-ON-GRADE ARE NOT DESIGNED FOR CONCENTRATED LOADS SUCH AS THOSE FROM FORKLIFTS OR STORAGE RACKS.

SITE VISITS: THE STRUCTURAL ENGINEER WILL OBSERVE THE CONSTRUCTION ONLY AS REQUESTED BY THE ARCHITECT AS SPECIFIED IN THE ARCHITECT-ENGINEER AGREEMENT FOR THE PROJECT. STRUCTURAL OBSERVATIONS REQUIRED BY THE PROJECT SPECIFICATIONS OR THE BUILDING CODE, MUST BE PERFORMED BY A STRUCTURAL OBSERVER APPROVED BY THE ARCHITECT.

HANDRAILS: DESIGN LOADS FOR HANDRAILS SHALL BE AS FOLLOWS:
A. 200 LB CONCENTRATED LOAD APPLIED AT ANY POINT AND IN ANY DIRECTION.
B. 50 PLF APPLIED IN ANY DIRECTION.
THESE LOADS ARE NOT TO BE APPLIED SIMULTANEOUSLY, BUT EACH SHALL BE APPLIED TO PRODUCE MAXIMUM STRESSES IN EACH OF THE RESPECTIVE HANDRAIL COMPONENTS.

GUARDRAILS: DESIGN LOADS FOR GUARDRAILS SHALL BE AS FOLLOWS:
1. 200 LB CONCENTRATED LOAD APPLIED AT ANY POINT AND IN ANY DIRECTION AT THE TOP OF THE GUARDRAIL.
2. 50 PLF APPLIED HORIZONTALLY AND A SIMULTANEOUS LOAD OF 100 PLF APPLIED VERTICALLY DOWNWARD AT THE TOP OF THE GUARDRAIL.
3. 200 LB CONCENTRATED HORIZONTAL LOAD APPLIED ON A 1 FT SQUARE AREA AT ANY POINT IN THE SYSTEM. THESE LOADS ARE NOT TO BE APPLIED SIMULTANEOUSLY, BUT EACH SHALL BE APPLIED TO PRODUCE MAXIMUM STRESSES IN EACH OF THE RESPECTIVE HANDRAIL COMPONENTS.

MECHANICAL: COORDINATE THE LOCATIONS OF ROOF, FLOOR AND WALL OPENINGS WITH THE TRADES REQUIRING THEM. OPENINGS LARGER THAN 24" X 24" SHALL BE COORDINATED WITH THE STRUCTURAL ENGINEER TO DETERMINE POTENTIAL IMPACTS ON THE FRAMING. ANY EQUIPMENT WEIGHING MORE THAN 300 LBS SHALL BE COORDINATED WITH THE STRUCTURAL ENGINEER TO DETERMINE POTENTIAL IMPACTS ON THE FRAMING.

SUBMITTALS

SHOP DRAWINGS: SUBMIT SHOP DRAWINGS FOR REVIEW AND ACCEPTANCE BY THE OWNER'S REPRESENTATIVE AND ENGINEER-OF-RECORD PRIOR TO ANY FABRICATION OR CONSTRUCTION. DIMENSION AND QUANTITY VERIFICATION ARE THE CONTRACTOR'S RESPONSIBILITIES AND ARE NOT REVIEWED BY THE ENGINEER OF RECORD. THE CONTRACTOR SHALL REVIEW AND STAMP DRAWINGS PRIOR TO REVIEW BY THE ENGINEER OF RECORD. IF DEVIATIONS, DISCREPANCIES, OR CONFLICTS BETWEEN SHOP DRAWING SUBMITTALS AND THE CONTRACT DOCUMENTS ARE DISCOVERED, EITHER PRIOR TO OR AFTER THE ENGINEER PROCESSES THE SHOP DRAWING SUBMITTALS, THE DESIGN DRAWINGS AND SPECIFICATIONS SHALL CONTROL AND SHALL BE FOLLOWED.

DEVIATION FROM CONTRACT DOCUMENTS: CHANGES TO THE CONTRACT DOCUMENTS SHALL BE CLOUDED ON SHOP DRAWINGS OR REQUESTED IN WRITING. THE CONTRACTOR IS LIABLE FOR ANY DEVIATIONS UNLESS REVIEWED AND ACKNOWLEDGED BY THE ENGINEER OF RECORD IN WRITING.

DRAWING PREPARATION: COPIES OF STRUCTURAL DRAWINGS (PLANS AND/OR DETAILS) WILL NOT BE ACCEPTED BY HSG AS SHOP DRAWINGS. ALL SHOP DRAWINGS MUST BE REPRODUCED BY THE RESPECTIVE SUPPLIERS AND DETAILED AS NECESSARY.

SUBMITTAL REVIEW TIME: REFER TO SECTION 01 33 00 - SUBMITTAL PROCEDURES FOR REVIEW REQUIREMENTS.

REQUIRED SUBMITTALS:
REQUIRED SUBMITTALS INCLUDE, BUT ARE NOT LIMITED TO, THE FOLLOWING:

BIDDER-DESIGNED SUBMITTALS
CONCRETE MIX DESIGNS
CONCRETE REINFORCEMENT
MASONRY GROUT, BLOCK AND REINFORCEMENT
STRUCTURAL STEEL

BIDDER-DESIGNED SUBMITTALS: CALCULATIONS AND SHOP DRAWINGS FOR ELEMENTS DESIGNED BY THE CONTRACTOR OR VENDORS SHALL BEAR THE SEAL AND SIGNATURE OF A PROFESSIONAL ENGINEER, RETAINED BY THE CONTRACTOR AND REGISTERED IN THE PROJECT STATE. SUBMIT THESE DOCUMENTS FOR REVIEW AND ACCEPTANCE BY THE ENGINEER AND OWNER'S REPRESENTATIVE PRIOR TO FABRICATION. INCLUDE ALL DESIGN LOAD AND REACTIONS ON OTHER STRUCTURES ON THE DRAWINGS. CALCULATIONS SHALL BE SUBMITTED FOR INFORMATION ONLY AND WILL NOT BE REVIEWED OR RETURNED. REVIEW BY THE STRUCTURAL ENGINEER OF RECORD SHALL NOT IMPLY ANY RESPONSIBILITY FOR THE ACTUAL DESIGN OF BIDDER-DESIGNED SYSTEMS OR COMPONENTS. BIDDER-DESIGNED SUBMITTALS INCLUDE THE FOLLOWING CONTRACTOR/VENDOR DESIGNED ELEMENTS.

PRE-ENGINEERED BLEACHER SYSTEMS
PRE-ENGINEERED BACKSTOP SYSTEMS
PRE-ENGINEERED SCOREBOARD
FENCING
ATHLETIC FIELD LIGHTING AND POSTS

SUBMITTAL ACCEPTANCE: FOLLOWING ACCEPTANCE BY THE ARCHITECT AND ENGINEER AND PRIOR TO FABRICATION, ADDITIONAL TIME FOR REVIEW AND ACCEPTANCE OF SUBMITTAL BY THE BUILDING OFFICIAL IS REQUIRED AND SHALL BE IDENTIFIED AND ALLOWED FOR IN THE CONTRACTOR'S SCHEDULE.

SUBSTITUTIONS: SUBMIT SUBSTITUTION REQUESTS PER THE PROCEDURES IN THE SPECIFICATIONS WITH APPLICABLE ICC REPORTS TO THE ARCHITECT AND STRUCTURAL ENGINEER FOR REVIEW AND APPROVAL PRIOR TO DETAILING, FABRICATION AND ERECTION. ADDITIONAL ENGINEERING CALCULATIONS AND DETAILS, PROVIDED BY A STRUCTURAL ENGINEER LICENSED IN THE PROJECT STATE, MAY BE REQUIRED OF THE CONTRACTOR FOR SUBSTITUTIONS THAT ARE NOT SIMILAR TO THE SPECIFIED PRODUCTS AND CONFIGURATION.

CONCRETE

REFERENCE STANDARDS:
ACI AMERICAN CONCRETE INSTITUTE, BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE, ACI 318

AWS AMERICAN WELDING SOCIETY, STRUCTURAL WELDING CODE – REINFORCING STEEL, AWS D1.4

GENERAL: CONCRETE SHALL BE MIXED, PROPORTIONED, CONVEYED, AND PLACED IN ACCORDANCE WITH IBC SECTION 1905 AND ACI 301.

SLAB-ON-GRADE: SEE TYPICAL SLAB ON GRADE DETAILS FOR ALL REQUIREMENTS FOR SLABS-ON-GRADE.

MIX DESIGNS: THE CONCRETE MIX TABLE SHOWN BELOW SHALL APPLY TO ALL CONCRETE MIX DESIGNS USED ON THIS PROJECT. MIX DESIGN SUBMITTALS SHALL BE IDENTIFIED FOR INTENDED STRUCTURAL USE AND SUBMITTED TO THE OWNER'S REPRESENTATIVE AND STRUCTURAL ENGINEER FOR REVIEW TWO WEEKS PRIOR TO PLACING ANY CONCRETE.

MIX PROPORTIONING: ALL CONCRETE MIX DESIGNS SHALL BE PROPORTIONED IN ACCORDANCE WITH SECTION 5.3 (FIELD EXPERIENCE AND/OR TRIAL MIXTURES) OF ACI 318. SUBMIT MIX DESIGN FOR EACH CLASS OF CONCRETE. IF A STANDARD DEVIATION ANALYSIS IS USED, THE CONCRETE SHALL ACHIEVE AN AVERAGE STRENGTH IN ACCORDANCE WITH TABLE 5.3.2.2 OF ACI 318. SUBMITTALS MADE WHICH DO NOT CONFORM TO ACI 318 SECTION 5.3 SHALL BE REJECTED.

CONCRETE MIX DESIGNS

CONCRETE USAGE	f'c (PSI) 28 DAY, MIN	SLUMP	ENTRAINED AIR (MAX)	W/C RATIO (MAX)	MAXIMUM AGGREGATE SIZE	FLY ASH CONTENT	EXPOSURE CLASS
FOOTINGS	3,000	6"	5% (+/- 1.5%)	0.50	1"	15-25%	F0
INTERIOR SLABS ON GRADE	4,000	4"	NONE	0.50	1"	15-20%	F0
EXTERIOR SLABS ON GRADE	4,000	4"	5% (+/- 1.5%)	0.50	1"	15-20%	F2

REFER TO CIVIL FOR SITE RELATED CONCRETE PAVING FOR SIDEWALKS AND DRIVES.

CEMENT CONTENT: SCHEDULE CEMENT CONTENT IS THE MINIMUM TOTAL CEMENTITIOUS MATERIALS CONTENT INCLUDING PORTLAND CEMENT AND FLY ASH.

FLY ASH: FLY ASH SHALL CONFORM TO ASTM C618, TYPE F. PERCENTAGE SCHEDULED IS BY WEIGHT OF TOTAL CEMENTITIOUS MATERIAL INCLUDING ASTM C150, C595, C845, AND C1157 CEMENT. DO NOT USE FLY ASH IF CONTENT WITHIN THE PERCENTAGES SHOWN CANNOT BE ACHIEVED.

ADMIXTURES: WATER-REDUCING ADMIXTURES CONFORMING TO ASTM C494 MAY BE INCORPORATED IN THE CONCRETE MIX DESIGNS AND BE USED IN STRICT ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS. CALCIUM CHLORIDE OR OTHER WATER-SOLUBLE CHLORIDE ADMIXTURES SHALL NOT BE USED.

AIR CONTENT: AN AIR-ENTRAINING AGENT CONFORMING TO ASTM C260 SHALL BE USED IN ALL CONCRETE MIXES FOR WORK THAT IS EXPOSED TO WEATHER. WHERE ENTRAINED AIR IS NOT SCHEDULED, DO NOT ALLOW THE AIR CONTENT OF SLABS TO EXCEED 3% NATURALLY. THE AMOUNT OF ENTRAINED AIR SHALL BE MEASURED IN THE FIELD AT THE DISCHARGE END OF THE PLACING HOSE.

SLUMP: SCHEDULED SLUMP IS THE MAXIMUM ALLOWED AND SHALL BE ACHIEVED PRIOR TO ADDING ANY WATER REDUCING ADMIXTURES OR PLASTICIZERS.

LABORATORY TESTING: LABORATORY TESTING WILL BE REQUIRED IN ACCORDANCE WITH ASTM C31. PERFORM COMPRESSION TEST PER ASTM C39; AIR CONTENT TEST PER ASTM C138 (GRAVIMETRIC METHOD), ASTM C173 (VOLUMETRIC METHOD), OR ASTM C231 (PRESSURE METHOD); SLUMP TEST PER ASTM C143.

LABORATORY SHALL TEST THE NUMBER OF CYLINDERS SPECIFIED BELOW FOR EACH 100 CUBIC YARDS OR FRACTION THEREOF:
2 AT 7 DAYS FOR INFORMATION
2 AT 28 DAYS FOR ACCEPTANCE

SLEEVES: SLEEVES FOR PIPING OR DUCTS, EXCEPT AS DETAILED ON THE STRUCTURAL DRAWINGS, SHALL NOT BE PLACED IN JOISTS, BEAMS, GIRDERS, OR IN SLABS ADJACENT TO A COLUMN (WITHIN A DISTANCE EQUAL TO THE SLAB THICKNESS) UNLESS APPROVED BY THE ENGINEER. PLUMBING, MECHANICAL, & ELECTRICAL CONTRACTORS SHALL SUBMIT SIZES AND LOCATIONS OF ALL PENETRATIONS IN STRUCTURAL SLABS FOR THE STRUCTURAL ENGINEER'S APPROVAL BEFORE THE SLAB IS PLACED. ALL PIPE PENETRATIONS THROUGH SLABS SHALL BE SLEEVED IN CONFORMANCE WITH ACI 318, SECTION 6.3.

NON-STRUCTURAL EMBEDS: REFER TO DRAWINGS OF OTHER DISCIPLINES AND VENDOR DRAWINGS FOR EMBEDDED ITEMS AND RECESSES NOT SHOWN ON STRUCTURAL DRAWINGS.

CONDUIT: WHEN RUN IN SLABS, ELECTRICAL CONDUIT SHALL BE RUN AT MID-DEPTH OF THE SLAB AND CONDUIT SIZE SHALL NOT EXCEED 33 PERCENT OF THE SLAB DEPTH. NO CONDUIT SHALL BE PLACED IN SLABS WITH ACTUAL CONCRETE THICKNESS LESS THAN 3 INCHES, NOT INCLUDING METAL DECK DEPTH. THERE SHALL BE A MINIMUM OF 3 INCHES OF CLEAR SPACE BETWEEN CONDUITS. ALUMINUM CONDUIT IS PROHIBITED. ADDITIONAL REINFORCEMENT, #3 AT 12" OC, SHALL BE PLACED PERPENDICULAR TO THE CONDUIT ABOVE AND BELOW THE CONDUIT. THE ADDED REINFORCING SHALL EXTEND 1' - 0" BEYOND THE CONDUITS ON BOTH SIDES.

REINFORCING STEEL MATERIALS:

DEFORMED BARS ASTM A615, GRADE 60
SMOOTH WELDED WIRE FABRIC (WWF) ASTM A185 (Fy = 65,000 PSI)

REINFORCING STEEL DETAILING: REINFORCING STEEL SHALL BE DETAILED IN ACCORDANCE WITH ACI 315 – DETAILS AND DETAILING OF CONCRETE REINFORCEMENT.

REINFORCING STEEL PLACEMENT: ALL REINFORCEMENT SHALL BE HELD SECURELY IN POSITION WITH STANDARD ACCESSORIES IN CONFORMANCE WITH CRSI MANUAL OF STANDARD PRACTICE AND ACI 315 DURING CONCRETE PLACEMENT. REINFORCING PLACEMENT SHALL BE APPROVED BY THE ARCHITECT OR THEIR AUTHORIZED REPRESENTATIVE BEFORE CONCRETE IS PLACED.

REBAR SPLICES: LAP REINFORCING BARS AS NOTED ON THE DRAWINGS. WHERE SPLICE LENGTH IS NOT SHOWN, USE TYPE 'Ls' SPLICE PER DEVELOPMENT AND SPLICE LENGTH SCHEDULE. MECHANICAL OR WELDED BUTT SPLICES SHALL BE SUBJECT TO STRUCTURAL ENGINEER'S APPROVAL. MECHANICAL SPLICES, WHERE ALLOWED ON THE PLANS, SHALL DEVELOP 125% OF THE SPECIFIED YIELD STRENGTH OF THE SPLICED BARS IN BOTH TENSION AND COMPRESSION. LAP SPLICES OF BOTTOM BARS SHALL OCCUR AT A SUPPORT. LAP SPLICES OF TOP STEEL SHALL OCCUR AT MID SPAN.

FIELD BENDING: NO BARS PARTIALLY EMBEDDED IN HARDENED CONCRETE SHALL BE FIELD BENT UNLESS SPECIFICALLY DETAILED AS SUCH OR APPROVED BY THE STRUCTURAL ENGINEER.

WELDING: REINFORCING BARS SHALL NOT BE WELDED OR TACK WELDED TO OTHER BARS OR TO PLATES, ANGLES, ETC. UNLESS SPECIFICALLY APPROVED BY THE ENGINEER. WELDING SHALL CONFORM TO THE REQUIREMENTS OF AWS DI.4. WELDING SHALL BE DONE BY AWS CERTIFIED WELDERS QUALIFIED FOR WELDS USING APPROVED ELECTRODES.

CONCRETE PROTECTION: CONCRETE COVER FOR REINFORCING STEEL SHALL BE AS FOLLOWS, UNLESS NOTED OTHERWISE:

CAST AGAINST AND PERMANENTLY
EXPOSED TO EARTH...............................3"

EXPOSED TO EARTH OR WEATHER
#5 OR SMALLER.................................1 1/2"
#6 OR LARGER...................................2"

MISC CONCRETE PADS: COORDINATE CONCRETE EQUIPMENT PAD AND HOUSE KEEPING PAD LOCATIONS AND DIMENSIONS WITH ARCH, MECHANICAL, ELECTRICAL, PLUMBING, AND OWNER REQUIREMENTS.

CONCRETE PLACEMENT: ALL CONCRETE SHALL BE VIBRATED.

MASONRY

REFERENCE STANDARDS:
ACIAMERICAN CONCRETE INSTITUTE, BUILDING CODE REQUIREMENTS FOR MASONRY STRUCTURES, ACI 530

ACIAMERICAN CONCRETE INSTITUTE, SPECIFICATION FOR MASONRY STRUCTURES, ACI 530.1

TYPICAL UNITS: CONCRETE MASONRY UNITS SHALL BE ASTM C90, GRADE N, TYPE I, LIGHTWEIGHT, MOISTURE CONTROLLED UNITS. ASSEMBLIES SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF f'm = 2,000 PSI AT 28 DAYS. CONCRETE MASONRY WALLS SHALL BE REINFORCED PER THE CONSTRUCTION DOCUMENTS. WHERE DETAILS ARE NOT PROVIDED, REINFORCE ACCORDING TO THESE NOTES. STRUCTURAL DESIGN IS IN ACCORDANCE WITH IBC SECTION 2107 "ALLOWABLE STRESS DESIGN". CONCRETE MASONRY UNITS SHALL BE SAMPLED AND TESTED IN ACCORDANCE WITH ASTM C140. ALL LOAD-BEARING BLOCK MASONRY SHALL HAVE A MINIMUM NET AREA UNIT STRENGTH OF 2,000 PSI AT 28 DAYS.

UNIT SHAPES: THE FOLLOWING UNIT SHAPES SHALL BE ACCEPTABLE FOR USE: STRETCHER UNIT, SINGLE CORNER UNIT, OPEN END 'A' UNIT, DOUBLE OPEN END 'H' UNIT, DOUBLE CORNER UNIT, BULL-NOSED UNIT, LINTEL UNIT, AND BOND BEAM UNIT.

FACE/HOLLOW UNITS: BRICK MASONRY UNITS SHALL COMPLY WITH ASTM C216 FOR FACING BRICK OR ASTM C652 FOR HOLLOW BRICK. SEE THE CONSTRUCTION DOCUMENTS FOR TYPES USED ON THE PROJECT. ASSEMBLIES SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF f'm = 2,000 PSI. BRICK UNITS SHALL CONFORM TO THE DIMENSIONS SHOWN ON THE PLANS. BRICK MASONRY WALLS SHALL BE REINFORCED PER THE CONSTRUCTION DOCUMENTS. WHERE DETAILS ARE NOT PROVIDED, REINFORCE ACCORDING TO THESE NOTES. STRUCTURAL DESIGN IS IN ACCORDANCE WITH IBC SECTION 2107 "ALLOWABLE STRESS DESIGN".

MORTAR: MORTAR FOR CONCRETE MASONRY UNITS SHALL BE TYPE M WHERE MASONRY IS IN CONTACT WITH EARTH OR TYPE S OTHERWISE. MORTAR FOR BRICK MASONRY SHALL BE TYPE N. ALL MORTARS SHALL CONFORM TO IBC SECTION 2103.9 AND SHALL BE MORTAR SHALL BE PROPORTIONED TO MEET THE REQUIREMENTS OF ASTM C270 TABLE 1 – PROPORTION SPECIFICATIONS OR TABLE 2 – PROPERTY SPECIFICATIONS. MORTAR SHALL BE TESTED IN THE FIELD IN ACCORDANCE WITH ASTM C780, APPENDIX A-4 MORTAR AGGREGATE RATIO TEST.

BED JOINT: BED JOINT THICKNESS SHALL NOT EXCEED 5/8".

GROUT: MASONRY GROUT SHALL CONFORM TO ARTICLE 2.2 OF ACI 530.1. GROUT MINIMUM COMPRESSIVE STRENGTH SHALL BE 2000 PSI AT 28 DAYS DETERMINED IN ACCORDANCE WITH ASTM C140. GROUT SLUMP SHALL BE BETWEEN 8 INCHES AND 11 INCHES. TEST GROUT STRENGTH IN ACCORDANCE WITH ASTM C1019. ALL CORES CONTAINING VERTICAL BARS, ALL BOND BEAMS, AND ALL LINTELS SHALL BE FILLED WITH GROUT. ALL MASONRY BELOW GRADE SHALL BE GROUTED SOLID. WHERE THE MINIMUM DIMENSION OF ANY CONTINUOUS VERTICAL CELL IS 3 INCHES OR LESS, USE FINE GROUT, OTHERWISE USE COARSE (PEA GRAVEL) GROUT. ALL GROUT SHALL BE CONSOLIDATED AT TIME OF POURING BY VIBRATING AND THEN RECONSOLIDATED AGAIN BY MECHANICAL VIBRATION AFTER SETTLEMENT HAS OCCURRED, BUT BEFORE PLASTICITY IS LOST.

REINFORCEMENT: DEFORMED REINFORCING BARS SHALL BE ASTM A615 GRADE 60. CENTER VERTICAL REINFORCEMENT IN WALLS UNLESS OTHERWISE NOTED. LOCATE BARS SPECIFIED TO BE PLACED EACH FACE 2 3/8" FROM EACH WALL FACE TO THE CENTER OF EACH BAR. VERTICAL REINFORCEMENT SHALL BE HELD IN POSITION USING POSITIONERS AT TOP AND BOTTOM AND AT INTERVALS NOT EXCEEDING 192 BAR DIAMETERS OR 10 FEET, WHICHEVER IS LESS. "WET-STABBING" VERTICAL REINFORCEMENT IS NOT PERMITTED. SEE TYPICAL DETAIL FOR FURTHER REQUIREMENTS.

CELL ALIGNMENT: ALL REINFORCED HOLLOW UNIT MASONRY SHALL BE BUILT TO PRESERVE THE UNOBSTRUCTED VERTICAL CONTINUITY OF THE CELLS TO BE FILLED. VERTICAL CELLS TO BE REINFORCED SHALL HAVE VERTICAL ALIGNMENT SUFFICIENT TO MAINTAIN A CLEAR, UNOBSTRUCTED, CONTINUOUS VERTICAL CELL MEASURING NOT LESS THAN 3 INCHES AND HAVING A CLEAR AREA OF 10 SQUARE INCHES. FACE SHELLS AND CROSS WEBS FORMING SUCH CELLS TO BE FILLED SHALL BE FULL-BEDDED IN MORTAR TO PREVENT LEAKAGE OF THE GROUT. ALL HEAD (OR END) JOINTS SHALL BE SOLIDLY FILLED WITH MORTAR FOR A DISTANCE IN FROM THE FACE OF THE WALL OR UNIT NOT LESS THAN THE THICKNESS OF THE LONGITUDINAL FACE SHELLS.

BOND PATTERN: ALL MASONRY SHALL BE LAID IN RUNNING BOND, UNO.

JOINT REINFORCEMENT: HORIZONTAL JOINT REINFORCEMENT SHALL BE LADDER STYLE UNLESS OTHERWISE NOTED. JOINT REINFORCEMENT SHALL CONFORM TO ASTM A951 AND SHALL BE HOT-DIPPED GALVANIZED PER ASTM A153, CLASS B2 UNLESS OTHERWISE NOTED. VERTICAL SPACING OF HORIZONTAL REINFORCEMENT SHALL NOT EXCEED 16 INCHES. PROVIDE PREFORMED CORNER AND TEE SEGMENTS AT INTERSECTING WALLS. LAP HORIZONTAL JOINT REINFORCEMENT AS NOTED ON THE DRAWINGS. WHERE LAP LENGTH IS NOT SHOWN, LAP JOINT REINFORCEMENT 6". HORIZONTAL JOINT REINFORCEMENT SHALL BE DISCONTINUED AT CONTROL JOINTS. PROVIDE JOINT REINFORCEMENT 8 INCHES ABOVE AND BELOW ALL OPENINGS GREATER THAN 16 INCHES WIDE AND EXTEND 24 INCHES MINIMUM BEYOND EDGE OF OPENING IN EACH DIRECTION.

SPLICE LENGTH: LAP REINFORCING BARS AS NOTED ON THE DRAWINGS. WHERE SPLICE LENGTH IS NOT SHOWN, USE TYPE 'Lb' SPLICE PER DEVELOPMENT AND SPLICE LENGTH SCHEDULE. WHERE SPLICE LENGTH IS NOT SHOWN, LAP 48 BAR DIAMETERS. WHERE MULTIPLE BARS ARE INSTALLED IN A SINGLE CELL OR COURSE, STAGGER BAR LAPS A MINIMUM OF 2'-0".

MASONRY CONT.

BOND BEAMS: BOND BEAMS WITH HORIZONTAL REINFORCING SHALL BE PROVIDED AT ALL FLOOR AND ROOF LINES AND AT THE TOP OF ALL WALLS. PROVIDE A BOND BEAM WITH TWO HORIZONTAL BARS OF SAME SIZE AS TYPICAL HORIZONTAL BARS AT THE TOP AND BOTTOM OF ALL OPENINGS, AND EXTEND THESE BARS 48 BAR DIAMETERS (2'-0" MINIMUM) PAST THE OPENING AT EACH SIDE, OR AS FAR AS POSSIBLE AND HOOK INTO A VERTICALLY REINFORCED CELL. PROVIDE CORNER BARS TO MATCH THE HORIZONTAL WALL REINFORCING AT CORNERS AND WALL INTERSECTIONS. LAP BARS 48 DIAMETERS (2'-0" MINIMUM). HORIZONTAL BOND BEAM REINFORCEMENT AT FLOOR LEVELS, ROOF LEVELS, AND TOPS OF WALLS SHALL BE CONTINUOUS THROUGH CONTROL JOINTS. ALL BOND BEAMS ABOVE OPENINGS WHERE THE BLOCK IS EXPOSED TO VIEW SHALL BE SOLID BOTTOM CMU SHAPES, AND NOT OPEN CELL BLOCKS WHICH ARE FORMED AND GROUTED SOLID.

VERTICAL REINFORCING: PROVIDE TWO VERTICAL BARS OF SAME SIZE AS TYPICAL VERTICAL BARS (#5, MIN) FOR THE FULL HEIGHT OF THE WALL AT EACH SIDE OF OPENINGS, WALL ENDS AND WALL INTERSECTIONS. ALL VERTICAL REINFORCING SHALL EXTEND FROM THE FOUNDATION TO THE TOP OF WALL. PROVIDE DOWELS FROM FOUNDATION OR SUPPORTING STRUCTURE TO MATCH VERTICAL BAR SIZE AND SPACING. "WET STABBING" OF VERTICAL REINFORCING SHALL NOT BE PERMITTED.

CONTROL JOINTS: PROVIDE VERTICAL CONTROL JOINTS IN THE WALLS AT LOCATIONS SHOWN ON THE ARCHITECTURAL DRAWINGS. WHERE NOT SHOWN ON THE ARCHITECTURAL DRAWINGS, PROVIDE VERTICAL CONTROL JOINTS AT A MAXIMUM SPACING OF 25 FEET OR 1.5 TIMES THE WALL HEIGHT, WHICH EVER IS LESS, WITHIN 4 FEET OF BUILDING CORNERS, AT CHANGES IN WALL HEIGHT AND AT CHANGES IN FOUNDATION CONDITIONS. DO NOT LOCATE CONTROL JOINTS WITHIN 16" OF BEAM BEARING PLATES, JOIST BEARING PLATES, OR WALL OPENINGS. SUBMIT JOINT LOCATIONS TO OWNER'S REPRESENTATIVE FOR APPROVAL.

LOW-LIFT GROUTING: LAY UNITS A MAXIMUM OF 4 FEET HIGH BEFORE GROUTING. PLACE GROUT IN A CONTINUOUS PLACEMENT IN GROUT LIFTS NOT EXCEEDING 4 FEET. COMPLETELY GROUT THE FULL HEIGHT OF THE WALL SECTION IN ONE DAY WITH NO INTERRUPTIONS GREATER THAN ONE HOUR.

HIGH-LIFT GROUTING: LAY UNITS A MAXIMUM OF 12 FEET HIGH BEFORE GROUTING. PLACE GROUT IN A CONTINUOUS PLACEMENT IN GROUT LIFTS NOT EXCEEDING 6 FEET. COMPLETELY GROUT THE FULL HEIGHT OF THE WALL SECTION IN ONE DAY WITH NO INTERRUPTIONS GREATER THAN ONE HOUR. PROVIDE CLEANOUTS AT EVERY CELL ALONG THE BOTTOM COURSE OF EACH GROUT LIFT.

WHEN TOTAL GROUT POUR EXCEEDS 5 FEET IN HEIGHT, THE GROUT SHALL BE PLACED IN 5 FOOT LIFTS. OVERALL POUR HEIGHTS SHALL MEET THE REQUIREMENTS OF ACI 530.1, TABLE 7.

CLEANOUTS: CLEANOUT OPENINGS SHALL BE PROVIDED AT THE BOTTOM OF ALL CELLS TO BE FILLED WITH GROUT WHEN THE POUR HEIGHT IS IN EXCESS OF 5 FEET. ANY OVERHANGING MORTAR, OTHER OBSTRUCTION OR DEBRIS SHALL BE REMOVED FROM THE INSIDE OF ALL CELLS TO BE GROUTED. ALL CLEANOUTS SHALL BE SEALED AFTER INSPECTION AND BEFORE GROUTING. ALL CLEANOUTS SHALL BE LOCATED BELOW THE SLAB-ON-GRADE OR FINISHED GRADE SO THAT PATCH OF CLEANOUT IS CONCEALED FROM VIEW.

WEATHER: CONFORM TO ACI 530.1 REQUIREMENTS FOR HOT WEATHER AND COLD WEATHER CONSTRUCTION AND PROTECTION OF NEWLY CONSTRUCTED MASONRY.

INSPECTION: MASONRY FOR THIS STRUCTURE HAS BEEN DESIGNED IN ACCORDANCE WITH THE REFERENCED CODE AS INSPECTED MASONRY WITH A LEVEL B QUALITY ASSURANCE PROGRAM. THE (CONTRACTOR, OWNER) SHALL EMPLOY AN AGENT IN COMPLIANCE WITH CODE CRITERIA TO INSURE THAT THE CODE REQUIREMENTS ARE CARRIED OUT. INSPECTION AND TESTING SHALL CONFORM TO ACI 530.1 SPECIFICATION FOR MASONRY STRUCTURES SECTION 1.5 AND 1.6.

GROUT SHEAR KEY: WHEN GROUTING IS STOPPED FOR ONE HOUR OR LONGER, A HORIZONTAL CONSTRUCTION JOINT SHALL BE FORMED BY STOPPING THE GROUT POUR IN ALL WYTHES AT THE SAME ELEVATION AND WITH THE GROUT STOPPING A MINIMUM OF 1 INCH BUT NOT MORE THAN 2 INCHES BELOW THE TOP OF THE UPPER MOST UNIT GROUTED. AT THE TOP OF MASONRY WALLS, POUR GROUT FLUSH WITH THE TOP OF THE WALL.

BRACING: CONTRACTOR SHALL PROVIDE ADEQUATE BRACING FOR ALL MASONRY WALLS DURING CONSTRUCTION AND UNTIL LATERAL SUPPORTS AND DIAPHRAGMS HAVE BEEN ATTACHED AND GROUT HAS ATTAINED THE SPECIFIED DESIGN STRENGTH. BACK FILLING SHALL NOT OCCUR UNTIL PERMANENT LATERAL RESTRAINTS ARE INSTALLED IN THEIR ENTIRETY.

STEEL

REFERENCE STANDARDS:
AISC AMERICAN INSTITUTE OF STEEL CONSTRUCTION, SPECIFICATION FOR STRUCTURAL STEEL BUILDINGS, AISC 360

AWS AMERICAN WELDING SOCIETY, STRUCTURAL WELDING CODE – STEEL, AWS D1.1 AND STRUCTURAL WELDING CODE – SHEET STEEL, AWS D1.3

RCSC RESEARCH COUNCIL ON STRUCTURAL CONNECTIONS, SPECIFICATION FOR STRUCTURAL JOINTS USING HIGH STRENGTH BOLTS

STRUCTURAL STEEL MATERIALS:

COLUMN BASE PLATES ASTM A572, GRADE 50
HOLLOW STRUCTURAL SECTIONS (HSS)
RECTANGULAR & SQUARE ASTM A500, GRADE C, Fy = 50 KSI
ROUND ASTM A500, GRADE B, Fy = 42 KSI
STEEL PIPE ASTM A53, GRADE B, Fy = 35 KSI
OTHER STEEL SHAPES AND PLATES ASTM A36, Fy = 36 KSI
STRUCTURAL BOLTS ASTM A325 OR A490
COLUMN ANCHOR RODS ASTM F1554, GRADE 36
WOOD CONNECTION BOLTS ASTM A307
WELDING ELECTRODES E70XX

DESIGN METHOD: ALL STRUCTURAL STEEL DESIGN SHALL CONFORM TO THE FOURTEENTH EDITION OF THE AISC STEEL CONSTRUCTION MANUAL LOAD AND RESISTANCE FACTOR DESIGN AND THE SPECIFICATION FOR STRUCTURAL STEEL BUILDINGS.

MISC STEEL: THE CONTRACTOR SHALL BE RESPONSIBLE FOR ERECTION AIDS AND JOINT PREPARATIONS THAT INCLUDE, BUT ARE NOT LIMITED TO, ERECTION ANGLES, LIFT HOLES AND OTHER AIDS, WELDING PROCEDURES, REQUIRED ROOT OPENINGS, ROOT FACE DIMENSIONS, GROOVE ANGLES, BACKING BARS, COPES, SURFACE ROUGHNESS VALUES, AND TAPERS OF UNEQUAL PARTS.

GALVANIZING: STRUCTURAL STEEL AND CONNECTIONS EXPOSED TO WEATHER SHALL BE HOT-DIPPED GALVANIZED AFTER FABRICATION IN COMPLIANCE WITH ASTM A123. GALVANIZE BOLTS AND SIMILAR THREADED FASTENERS EXPOSED TO WEATHER IN ACCORDANCE WITH ASTM A153, CLASS C AND D, AS APPLICABLE. ALL FIELD WELDS EXPOSED TO WEATHER SHALL BE COATED WITH BRUSH APPLIED ZINC-RICH PAINT COMPLYING WITH ASTM A780 (GALVACON OR EQUIVALENT).

PAINTING: STRUCTURAL STEEL SHALL BE PRIMED AND PAINTED, IF NOTED ON THE ARCHITECTURAL DRAWINGS OR SPECIFICATIONS. PRIMER SHALL BE THE FABRICATOR'S STANDARD LEAD AND CHROMATE FREE, NON-ASPHALTIC, RUST-INHIBITING PRIMER. STEEL ANCHORS, TIES AND OTHER MEMBERS EMBEDDED IN CONCRETE OR MASONRY SHALL BE LEFT UNPAINTED. ALL STEEL FRAMING BELOW GRADE SHALL BE FINISHED WITH (2) 10 MIL DRY FILM THICKNESS (DFT) COATS OF BITUMINOUS MASTIC COATING UNLESS DIRECTED OTHERWISE IN THE ARCHITECTURAL DRAWINGS.

HIGH-STRENGTH BOLTS: HIGH-STRENGTH BOLTS SHALL BE INSTALLED, TIGHTENED AND INSPECTED IN ACCORDANCE WITH THE AISC SPECIFICATION FOR STRUCTURAL JOINTS USING HIGH-STRENGTH BOLTS. BOLT HOLES SHALL BE STANDARD SIZE UNLESS NOTED OTHERWISE.

WASHERS: HARDENED WASHERS SHALL BE INSTALLED OVER SHORT SLOTTED OR OVERSIZE HOLES OCCURRING IN THE OUTER PLY OF A CONNECTION. A PLATE WASHER AT LEAST 5/16 INCH THICK WITH STANDARD HOLES SHALL BE INSTALLED OVER LONG SLOTTED HOLES OCCURRING IN AN OUTER PLY OF A CONNECTION.

ANCHOR RODS: PROVIDE HEAVY HEX NUTS AND WASHERS COMPLYING WITH THE REQUIREMENTS OF TABLE 14-2 IN THE AISC STEEL CONSTRUCTION MANUAL UNLESS THICKER AND/OR LARGER WASHERS ARE NOTED ON THE DRAWINGS. HOLE DIAMETER IN WASHERS SHALL BE THE ANCHOR ROD DIAMETER + 1/16 INCH. IN LIEU OF HEADED RODS, THREADED RODS WITH A HEAVY HEX NUT FULLY ENGAGED AND TACK WELDED TO THE EMBEDDED END MAY BE USED.

COLUMN ANCHOR BOLT HOLES SHALL BE OVERSIZED IN ACCORDANCE WITH THE FOLLOWING:
ROD DIAMETERS 3/4 INCH TO 1 INCH - 5/16 INCH OVERSIZE
ROD DIAMETERS 1 INCH TO 2 INCH - 1/2 INCH OVERSIZE
ROD DIAMETERS OVER 2 INCH - 1 INCH OVERSIZE

COLUMN BRACING: BASE PLATE CONNECTIONS ARE NOT DESIGNED TO PROVIDE STABILITY OF COLUMNS DURING ERECTION. COLUMNS SHALL BE TEMPORARILY BRACED BY THE ERECTOR PRIOR TO RELEASE OF THE COLUMN FROM THE HOISTING EQUIPMENT.

GROUT: GROUT USED UNDER COLUMN BASE PLATES SHALL BE CEMENT BASED, NON-SHRINK, NON-METALLIC GROUT. THE GROUT SHALL EXHIBIT NO SHRINKAGE IN ACCORDANCE WITH ASTM C827 AND SHALL HAVE A MINIMUM 28-DAY COMPRESSIVE STRENGTH OF 5000 PSI WHEN TESTED IN ACCORDANCE WITH ASTM C109.

A307 BOLTS: PROVIDE WITH LOCK WASHERS UNDER NUTS OR SELF-LOCKING NUTS. BOLT HOLES SHALL BE STANDARD SIZE UNLESS NOTED OTHERWISE.

WELDING: WELDING SHALL BE IN CONFORMANCE WITH AISC AND AWS STANDARDS AND SHALL BE PERFORMED BY AWS CERTIFIED WELDERS USING ASTM E70 SERIES ELECTRODES FOR SHOP WELDING A36 STEEL, AND E70 SERIES LOW HYDROGEN ELECTRODES FOR ALL WELDING OF HIGH STRENGTH STEELS AND FOR ALL FIELD WELDING.

ONLY PREQUALIFIED WELDS (AS DEFINED BY AWS) SHALL BE USED. WELDS SHOWN ON THE DRAWINGS ARE THE MINIMUM SIZE. INCREASE WELD SIZE TO AWS MINIMUM SIZES BASED ON PLATE THICKNESS. MINIMUM WELD SIZE SHALL BE 3/16 INCH. SHOP DRAWINGS SHALL SHOW ALL WELDING WITH AWS A2.4 SYMBOLS.

WHEN WELDS ARE NOT CALLED-OUT ON DRAWINGS, THEY ARE MINIMUM SIZE CONTINUOUS FILLET WELDS IN ACCORDANCE WITH AWS D1.1. FILLET WELDS NOT SPECIFIED AS TO LENGTH SHALL BE CONTINUOUS.

PROVIDE FILLET WELDS AT ALL CONTACT JOINTS BETWEEN STEEL MEMBERS SUFFICIENT TO DEVELOP THE ALLOWABLE TENSILE STRENGTH OF THE SMALLER MEMBER AT THE JOINT.

BELOW GRADE STEEL: PROTECT ALL STEEL BELOW GRADE BY PAINTING WITH (2)10 MIL, DRY FILM THICKNESS (DFT) COATS OF BITUMINOUS MASTIC COATING.

FABRICATION & ERECTION: FABRICATION AND ERECTION SHALL BE DONE BY STEEL FABRICATORS AND ERECTORS WHO HAVE BEEN CERTIFIED BY THE AISC QUALITY CERTIFICATION PROGRAM, CATEGORY STD (OR MB) (FOR BRIDGES: SBR, CBR) OR HAVE AN INDEPENDENT TESTING LABORATORY APPROVED BY THE ARCHITECT CERTIFY THAT THE FABRICATION PROCEDURES USED IN THIS WORK ARE IN ACCORDANCE WITH AISC SPECIFICATIONS AND THESE REQUIREMENTS. ERECTION SHALL BE DONE BY STEEL ERECTORS WHO HAVE BEEN CERTIFIED BY THE AISC QUALITY CERTIFICATION PROGRAM, CATEGORY CSE (OR ACSE). ALTERNATIVELY, THE STEEL FABRICATOR AND ERECTOR MAY BE APPROVED BY THE ARCHITECT AND ENGINEER OF RECORD.

MECHANICAL AND CHEMICAL ANCHORS

ANCHOR CAPACITY: ANCHOR CAPACITY USED IN DESIGN SHALL BE BASED ON THE TECHNICAL DATA PUBLISHED BY MANUFACTURER OR SUCH OTHER METHOD AS APPROVED BY THE STRUCTURAL ENGINEER OF RECORD.

INSTALLATION: INSTALL ANCHORS PER THE MANUFACTURER INSTRUCTIONS AND IN ACCORDANCE WITH SPACING AND EDGE CLEARANCES INDICATED ON THE DRAWINGS.

POST-INSTALLED DRILLING: HOLES FOR INSTALLING REINFORCING BARS, BOLTS, THREADED RODS AND INSERTS SHALL BE DRILLED USING THE ICC APPROVED DRILLING METHOD FOR THE ANCHOR TO BE INSTALLED. NON-DESTRUCTIVELY LOCATE EXISTING REINFORCING PRIOR TO DRILLING. DO NOT CUT EXISTING REINFORCING.

THREADED RODS: ADHESIVE ANCHORS SHALL USE ASTM A36 THREAD RODS, UNO

INSTALLATION TRAINING: PRIOR TO COMMENCEMENT OF WORK, THE CONTRACTOR SHALL ARRANGE FOR A MANUFACTURER'S FIELD REPRESENTATIVE TO PROVIDE INSTALLATION TRAINING FOR ALL PRODUCTS TO BE USED. ONLY TRAINED INSTALLERS SHALL PERFORM POST INSTALLED ANCHOR INSTALLATION. A RECORD OF TRAINING SHALL BE KEPT ON SITE AND BE MADE AVAILABLE TO THE EOR AS REQUESTED.

OVERHEAD INSTALLATION: ADHESIVE ANCHORS INSTALLED IN HORIZONTAL OR VERTICALLY OVERHEAD ORIENTATIONS THAT SUPPORT SUSTAINED TENSION LOADS SHALL BE DONE BY A CERTIFIED ADHESIVE ANCHOR INSTALLER (AAI) AS CERTIFIED THROUGH ACI/CRSI (ACI 318-11 D.9.2.2). PROOF OF
CURRENT CERTIFICATION SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL PRIOR TO COMMENCEMENT OF INSTALLATION.

MINIMUM CONCRETE AGE: ADHESIVE ANCHORS MUST BE INSTALLED IN CONCRETE AGED A MINIMUM OF 21 DAYS (ACI 318-11 D.2.2).

SPECIAL INSPECTION: PROVIDE SPECIAL INSPECTION FOR ALL MECHANICAL AND ADHESIVE ANCHORS PER THE APPLICABLE BUILDING CODE AND PER THE CURRENT ICC-ES REPORT (IBC 2018 TABLE 1705.3 NOTE B).

ALLOWABLE ANCHORS: THE FOLLOWING TABLE OF ANCHORS REPRESENT THE DEFAULT PRODUCTS USED IN DESIGN. WHERE SPECIFIC PRODUCTS ARE NOT OTHERWISE CALLED OUT IN THE STRUCTURAL DRAWINGS, THIS TABLE SHALL CONTROL.

BASE MATERIAL	ADHESIVE	EXPANSION ANCHOR	SCREW ANCHOR	PAF
HILTI				
CONCRETE	HY 200	KWIK BOLT TZ2	KWIK HUS-EZ	X-C*
CMU (GROUTED)	HY 270	KWIK BOLT TZ2	KWIK HUS-EZ	X-C
CMU (HOLLOW)	HY 270	HLC SLEEVE	KWIK CON II+	X-C
CLAY BRICK (URM)	HY 270	HLC SLEEVE	KWIK CON II+	---
STEEL	---	---	SELF DRILL HWH2 10-16	X-U
* USE X-CP FOR WOOD SILL PLATE TO CONCRETE				
SIMPSON STRONG-TIE				
CONCRETE	SET-3G	STRONG BOLT 2	TITEN HD	PDPA**
CMU (GROUTED)	SET-3G	STRONG BOLT 2	TITEN HD	PDP
CMU (HOLLOW)	SET	---	TITEN HD	PDP
CLAY BRICK (URM)	SET	SLEEVE-ALL	TITEN HD	---
STEEL	---	---	X METAL SCREW #10	PDPA
** USE PHN FOR WOOD SILL PLATE TO CONCRETE				
DEWALT FASTENERS				
CONCRETE	PURE 110+ AC200+GOLD	POWER-STUD+ SD1	SCREW-BOLT+	0.300" DIA HEAD DRIVE PIN***
CMU (GROUTED)	AC100+GOLD	POWER-STUD+ SD1	SCREW-BOLT+	0.300" DIA HEAD DRIVE PIN***
CMU (HOLLOW)	AC100+GOLD	LOK-BOLT AS	ULTRACON+	0.300" DIA HEAD DRIVE PIN***
CLAY BRICK (URM)	AC100+GOLD	LOK-BOLT AS	ULTRACON+	---
STEEL	---	---	---	0.300" DIA HEAD DRIVE PIN***
*** 0.145" DIA SHANK				

NOTE: CLAY BRICK (URM) REFERS TO SOLID UNREINFORCED MASONRY WALLS CONSTRUCTED WITH CLAY BRICK.

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STRUCTURAL GENERAL NOTES

MHM

McCarty Holsaple McCarty
550 W. Main St., Suite 300
Knoxville, TN 37902
t 865.544.2000
www.mhminc.com

Project Information:

24023

OAK RIDGE HIGH SCHOOL SOFTBALL

15 WILBERFORCE AVE
OAK RIDGE, TN 37830

OAK RIDGE SCHOOLS

Seal:

Project Status

CASEY BROWN REGISTERED ENGINEER AGRICULTURE COMMERCE No. 120071 STATE OF TENNESSEE 08/05/24

Consultant:

HAINES STRUCTURAL GROUP
800 S. GAY STREET, STE. 1750 KNOXVILLE, TN 37929
(865) 329-9920 | WWW.HAINES-SG.COM
project no. 24055

#	ISSUED BY:	DATE

Issue Date:	AUG 05, 2024
PIC	R. HAINES
PM	C. BROWN
PA	C. BROWN
Drawn By:	K. SHERRILL
Checked By:	T. WHELAN

Sheet Information:

S-002

STRUCTURAL GENERAL NOTES

WOOD

REFERENCE STANDARDS:
AF&PA AMERICAN FOREST AND PAPER ASSOCIATION, NATIONAL DESIGN SPECIFICATION FOR WOOD CONSTRUCTION WITH 2015 SUPPLEMENT, NDS

AF&PA AMERICAN FOREST AND PAPER ASSOCIATION, SPECIAL DESIGN PROVISIONS FOR WIND AND SEISMIC, SDPWS

MATERIAL PROPERTIES: SAWN LUMBER SHALL BE KILN-DRIED OR MC-19, AND GRADED AND MARKED IN CONFORMANCE WITH THE WEST COAST LUMBER INSPECTION BUREAU - STANDARD GRADING RULES FOR WEST COAST LUMBER NO 17, SOUTHERN PINE INSPECTION BUREAU - STANDARD GRADING RULES FOR SOUTHERN PINE LUMBER, OR SIMILAR APPROVED GRADING AGENCY'S LATEST EDITION STANDARD. ALL DIMENSIONAL WOOD FRAMING USED AS STRUCTURAL ELEMENTS SHALL CONFORM TO DOC PS20-10. FURNISH TO THE FOLLOWING MINIMUM STANDARDS:

WALL STUDS	SPF NO 1/NO 2
WALL PLATES	SYP NO 2
JOISTS (2x MEMBERS)	SYP NO 2
BEAMS AND STRINGERS	SYP NO 2

LIGHT GAGE CONNECTORS: LIGHT GAUGE STEEL CONNECTOR CALLOUTS REFER TO PRODUCTS MANUFACTURED BY SIMPSON STRONG-TIE COMPANY. INSTALL CONNECTORS ACCORDING TO THE MANUFACTURER'S RECOMMENDATIONS AND THE DRAWINGS. CONNECTORS SHALL BE INSTALLED TO OBTAIN THE MAXIMUM LOAD VALUE LISTED IN THE MANUFACTURER'S CATALOG UNO. LIGHT GAUGE STEEL CONNECTORS SHALL HAVE A G90 GALVANIZED FINISH. LIGHT GAUGE STEEL CONNECTORS AND THEIR NAILS IN CONTACT WITH PRESSURE TREATED LUMBER SHALL HAVE A G185 GALVANIZED FINISH OR SHALL BE STAINLESS STEEL. FASTENERS LESS THAN ONE HALF INCH DIAMETER FOR THESE CONNECTORS SHALL BE HOT-DIP OR MECHANICALLY GALVANIZED. CONNECTORS SHALL HAVE FASTENERS OF THE SAME MATERIAL TYPE AND FINISH.

NAILING: NAILING SHALL CONFORM TO THESE DRAWINGS AND THE MINIMUM NAILING REQUIREMENTS AS SET FORTH IN THE BUILDING CODE. IN THE EVENT OF A DISCREPANCY BETWEEN THESE DRAWINGS AND THE BUILDING CODE, THE MORE STRINGENT REQUIREMENT SHALL GOVERN.

FASTENERS IN CONTACT WITH PRESSURE TREATMENT: NAILS, SCREWS, ANCHOR BOLTS, WASHERS, THRU BOLTS, EXPANSION ANCHORS, EPOXY ANCHOR RODS, AND CONCRETE OR MASONRY HEAVY DUTY SCREW ANCHORS IN CONTACT WITH PRESSURE TREATED LUMBER SHALL BE HOT-DIP (ASTM A153 CLASS C) OR MECHANICALLY GALVANIZED (ASTM B695 CLASS 55).

SHEATHING: WOOD STRUCTURAL PANELS SHALL BE APA RATED AND SHALL CONFORM TO PS 1/PS 2 PRODUCT STANDARD DOCUMENTS. PANELS PERMANENTLY EXPOSED TO WEATHER SHALL BE EXTERIOR GRADE. PANELS APPLIED TO WALLS, FLOORS, AND ROOFS SHALL BE EXPOSURE 1 GRADE. PROTECT SHEATHING FROM WATER DAMAGE WHILE STORED AT JOB SITE. SHEATHING SHALL BE AS FOLLOWS UNLESS NOTED OTHERWISE.

ROOF SHEATHING SHALL BE 19/32" WITH PANEL SPAN RATING 40/20.

FLOOR SHEATHING SHALL BE 23/32" TONGUE AND GROOVE STURDI-FLOOR SHEATHING WITH A FLOOR SPAN RATING OF 24" o.c.

WALL SHEATHING SHALL BE 7/16" WITH PANEL SPAN RATING 24/16.

TYPICAL FRAMING DETAILS: WOOD FRAMING DETAILS NOT SHOWN OTHERWISE SHALL BE CONSTRUCTED TO THE MINIMUM STANDARDS OF THE IBC. MINIMUM NAILING SHALL CONFORM TO FASTENING SCHEDULE, IBC TABLE 2304.9.1. ALL NAILS SHALL BE COMMON UNLESS NOTED OTHERWISE. PROVIDE WASHERS UNDER THE HEADS AND NUTS OF ALL BOLTS AND LAG SCREWS BEARING ON WOOD. NAILS USED ON THE EXTERIOR OR SUBJECT TO MOISTURE SHALL BE GALVANIZED OR STAINLESS STEEL.

TABLE I
COMMON NAIL SIZE TABLE

SIZE	DIAMETER	LENGTH
6d	0.113	2"
8d	0.131	2-1/2"
10d	0.148	3"
12d	0.148	3-1/4"
16d	0.162	3-1/2"
20d	0.192	4"

THE TABLE LISTS THE NAILS USED TO ENGINEER THE WOOD FRAMING FOR THE PROJECT. ALL NAILS USED SHALL COMPLY WITH THE DIAMETERS AND LENGTHS NOTED. SPECIAL NAILS WILL BE NOTED IN THE CONSTRUCTION DOCUMENTS.

BOLTS: WOOD CONNECTION BOLTS SHALL CONFORM TO ASTM A307. BOLTS SHALL BE PROVIDED WITH LOCK WASHERS UNDER NUTS OR SELF-LOCKING NUTS. BOLT HOLES SHALL BE STANDARD SIZE UNLESS NOTED OTHERWISE.

MOISTURE CONTENT: PROTECT WOOD FROM WEATHER SUCH THAT MOISTURE CONTENT AT THE TIME GYPSUM WALLBOARD IS APPLIED DOES NOT EXCEED 19%.

PRESSURE TREATMENT: WOOD MEMBERS DIRECTLY EXPOSED TO MOISTURE OR THAT ARE IN CONTACT WITH CONCRETE OR OTHER CEMENTITIOUS MATERIALS SHALL BE PRESSURE TREATED. PRESSURE TREAT LUMBER IN ACCORDANCE WITH THE MANUAL OF RECOMMENDED PRACTICE OF THE AMERICAN WOOD PRESERVERS ASSOCIATION (AWPA). CONTRACTOR'S ALTERNATE WHERE WOOD IS IN CONTACT WITH CONCRETE: PROVIDE TWO LAYERS OF 40# ASPHALT IMPREGNATED BUILDING PAPER BETWEEN UNTREATED LEDGERS, BLOCKING, ETC. AND CONCRETE OR MASONRY SURFACE.

OPENINGS: DETERMINE THE SIZE AND LOCATION OF OPENINGS, INCLUDING THOSE NOT SHOWN ON THE CONTRACT DRAWINGS, REQUIRED BY ALL TRADES. CONFIRM THAT THE TYPICAL AND SPECIAL FRAMING DETAILS SHOWN IN THE CONTRACT DRAWINGS COVER ALL OF THE CONDITIONS DETERMINED. REPORT DISCREPANCIES TO THE STRUCTURAL ENGINEER PRIOR TO CONSTRUCTION.

GENERAL FRAMING:

CONNECTORS: PROVIDE SIMPSON LUS FACE HANGERS OR B TOP FLANGE HANGERS BETWEEN JOISTS AND BEAMS UNLESS OTHERWISE NOTED. PROVIDE SIMPSON HUSC CONCEALED FLANGE HANGERS BETWEEN BEAMS AND COLUMNS OR BUILT-UP POSTS. PROVIDE SIMPSON AB# SERIES AT BASE AND PC# SERIES AT CAPS UNLESS OTHERWISE NOTED. PROVIDE WEB BLOCKING AT WOOD I JOISTS.

WALLS: STUDS SHALL HAVE FULL BEARING ON A 2" NOMINAL OR LARGER PLATE OR SILL WITH A WIDTH TO EQUAL OR EXCEEDING THE STUD WIDTH. TWO STUDS MINIMUM SHALL BE PROVIDED AT THE END OF ALL WALLS. PROVIDE ONE KING STUD AND ONE JACK STUD EACH SIDE OF EA. OPENING, MINIMUM, UNLESS NOTED OTHERWISE. SEE TYPICAL DETAILS FOR ADDITIONAL OPENING REQUIREMENTS. STUD WALLS SHALL HAVE THEIR LOWER WOOD PLATES ATTACHED TO WOOD FRAMING BELOW WITH 16d NAILS AT 12" OC, STAGGERED, OR BOLTED TO CONCRETE WITH 1/2" DIAMETER ANCHOR BOLTS AT 4'-0" OC, MINIMUM TWO ANCHORS PER WALL SEGMENT, MAXIMUM 8" FROM EACH WALL END UNLESS INDICATED OTHERWISE. MEMBERS OF BUILT-UP POSTS SHALL BE NAILED TOGETHER PER THE TYPICAL DETAILS. PROVIDE CONTINUOUS SOLID BLOCKING AT MID-HEIGHT OF ALL STUD WALLS OVER 8'-0" IN HEIGHT (NOT REQUIRED IF WALL IS SHEATHED).

WOOD COLUMNS & BUILT-UP POSTS: SOLID BLOCKING FOR WOOD COLUMNS AND POSTS SHALL BE PROVIDED THROUGH FLOORS TO SUPPORTS BELOW TO MATCH THE LOWER LEVEL POST REQUIREMENTS. SEE TYPICAL DETAIL FOR ATTACHMENT REQUIREMENTS.

EXTERIOR WALLS: EXTERIOR WALLS SHALL BE CONSTRUCTED AS SHEAR WALL TYPE SW6 UNLESS OTHERWISE NOTED. PROVIDE CONTINOUS BLOCKING AT ALL JOINTS AND NAIL SHEATHING TO BLOCKING AT 6" ON CENTER AT ALL EDGES PER THE SHEAR WALL SCHEDULE.

OVERDRIVEN SHEATHING NAILS: CARE SHALL BE TAKEN TO AVOID OVERDRIVING NAILS THROUGH ROOF, FLOOR, AND WALL SHEATHING. NAILS SHALL BE CONSIDERED OVERDRIVEN IF THE HEAD HAS BEEN DRIVEN MORE THAN 1/8" BELOW THE FACE OF THE SHEATHING. IF MORE THAN 25% OF THE NAILS IN A SINGLE SHEET ARE OVERDRIVEN, ADD ONE ADDITIONAL NAIL FOR EVERY TWO OVERDRIVEN NAILS WHERE 6" OR 4" NAIL SPACINGS ARE REQUIRED OR REMOVE AND REPLACE THE FULL SHEET WHERE NAIL SPACINGS LESS THAN 4" ARE REQUIRED..

FLOORS AND ROOF:

JOISTS: TOENAIL JOISTS TO TOP PLATES OF BEARING WALLS WITH TWO 16d NAILS. ATTACH TIMBER JOISTS TO FLUSH HEADERS OR BEAMS WITH SIMPSON METAL JOIST HANGERS IN ACCORDANCE WITH NOTES ABOVE. NAIL BEAMS COMPRISED OF MULTIPLE JOISTS WITH 16d AT 12" OC STAGGERED.

BRIDGING: PROVIDE ONE ROW OF BRIDGING EVERY 8 FEET ALONG SPAN OF JOISTS

JOIST NOTCHES: JOISTS AS USED IN THIS SECTION REFERS TO 2X FRAMING MEMBERS USED AS ROOF RAFTERS OR FLOOR JOISTS. NOTCHES AT JOIST ENDS SHALL NOT EXCEED ONE FOURTH THE DEPTH OF THE JOIST. HOLES BORED FOR PIPE OR CABLE SHALL BE WITHIN THE MIDDLE THIRD OF THE JOIST DEPTH AND THE DIAMETER OF SUCH HOLES SHALL NOT EXCEED ONE THIRD THE DEPTH OF THE JOIST OR 1". WHICHEVER IS GREATER. ALL OTHER REQUIRED HOLES OR NOTCHES MUST BE APPROVED BY STRUCTURAL ENGINEER. THIS SECTION DOES NOT APPLY TO ENGINEERED WOOD MEMBERS: LS, LVL OR PSL. CONTACT ENGINEER PRIOR TO NOTCHING OR DRILLING IN ENGINEERED WOOD MEMBERS.

DOUBLE JOISTS: PROVIDE DOUBLE JOISTS UNDER ALL PARALLEL PARTITIONS THAT EXTEND OVER MORE THAN HALF THE JOIST LENGTH AND AROUND ALL OPENINGS IN FLOORS OR ROOFS. PROVIDE BRIDGING AT 8'-0" OC AND SOLID BLOCKING AT ALL BEARING POINTS.

SHEATHING LAYOUT: LAY ROOF AND FLOOR SHEATHING WITH GRAIN PERPENDICULAR TO SUPPORTS. NAIL ROOF SHEATHING TO SUPPORTS WITH 8d NAILS AT 6" OC AT FRAMED PANEL EDGES AND AT 12" OC TO INTERMEDIATE SUPPORTS. GLUE AND SCREW FLOOR SHEATHING TO SUPPORTS WITH 8 X 2 1/2" LONG WOOD SCREWS AT 6" OC AT FRAMED PANEL EDGES AND AT 12" OC TO INTERMEDIATE SUPPORTS. PROVIDE APPROVED EDGE CLIPS CENTERED BETWEEN FRAMING MEMBERS AT UNBLOCKED ROOF SHEATHING EDGES. FLOOR SHEATHING SHALL HAVE APPROVED TONGUE-AND-GROOVE EDGES. SEE THE DRAWINGS FOR THE LOCATION OF BLOCKED DIAPHRAGMS, IF ANY. WHERE BLOCKED DIAPHRAGMS ARE REQUIRED, PROVIDE FLAT 2x BLOCKING AT UNFRAMED PANEL EDGES AND NAIL WITH EDGE NAILING SPECIFIED. TOENAIL BLOCKING TO SUPPORTS WITH (2)-10d AT EACH END.

HURRICANE CLIPS: PROVIDE SIMPSON H2.5A HURRICANE CLIPS FROM ROOF RAFTERS AND CANTILEVERED RAFTERS TO THE WALL TOP PLATES OR SUPPORTING BEAMS UNLESS ANOTHER HURRICANE CLIP IS NOTED. PROVIDE WEB BLOCKING AT WOOD I JOISTS RECEIVING HURRICANE CLIPS.

SCORER BOOTH
COMPONENTS AND CLADDING DESIGN
ULTIMATE WIND PRESSURES (PSF)

ROOF			
ZONE	10 SF	50 SF	100 SF
1,2 & 3	+16.0	+16.0	+16.0
1	-32.9	-32.9	-32.9
2	-37.2	-36.2	-35.4
2'	-44.9	-43.9	-43.1
3	-46.2	-40.1	-35.4
3'	-63.7	-53.4	-45.7

WALLS			
ZONE	10 SF	100 SF	500 SF
4	+27.7 -30.0	+23.6 -26.0	+20.8 -23.1
4p	N/A	N/A	N/A
5	+27.7 -37.0	+23.6 -28.8	+20.8 -23.1
5p	N/A	N/A	N/A

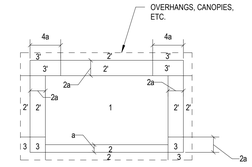
NOTES:
1. TABLE PRESSURES ARE FOR THE SQUARE FOOT TRIBUTARY AREA SHOWN. FOR OTHER TRIBUTARY AREAS, LINEARLY INTERPOLATE BETWEEN VALUES SHOWN ABOVE.
2. POSITIVE PRESSURES ACT TOWARD THE SURFACES. NEGATIVE PRESSURES ACT AWAY FROM THE SURFACES.
3. ROOF UPLIFT PRESSURES LISTED ARE GROSS PRESSURES. A MIN DEAD LOAD OF 9.0 PSF MAY BE APPLIED.
4. θ = ROOF ANGLE FROM HORIZONTAL a = 3.0 FT

DUGOUTS
COMPONENTS AND CLADDING DESIGN
ULTIMATE WIND PRESSURES (PSF)

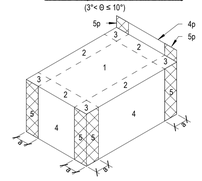
ROOF			
ZONE	10 SF	50 SF	100 SF
1,2 & 3	+20.8	+19.1	+18.3
1	-40.3	-40.3	-40.3
2	-45.2	-43.5	42.8
2'	-52.5	-50.8	-50.1
3	-57.4	-47.1	-42.8
3'	-77.0	-59.9	-52.5

WALLS			
ZONE	10 SF	100 SF	500 SF
4	+35.4 -37.6	+31.5 -33.7	+28.8 -31.0
4p	N/A	N/A	N/A
5	+35.4 -44.2	+31.5 -36.5	+28.8 -31.0
5p	N/A	N/A	N/A

NOTES:
1. TABLE PRESSURES ARE FOR THE SQUARE FOOT TRIBUTARY AREA SHOWN. FOR OTHER TRIBUTARY AREAS, LINEARLY INTERPOLATE BETWEEN VALUES SHOWN ABOVE.
2. POSITIVE PRESSURES ACT TOWARD THE SURFACES. NEGATIVE PRESSURES ACT AWAY FROM THE SURFACES.
3. ROOF UPLIFT PRESSURES LISTED ARE GROSS PRESSURES. A MIN DEAD LOAD OF 9.0 PSF MAY BE APPLIED.
4. θ = ROOF ANGLE FROM HORIZONTAL a = 3.0 FT



ROOF PLAN (GENERIC BUILDING SHOWN)



WALLS (GENERIC BUILDING SHOWN)

STRUCTURAL GENERAL NOTES

McCarty Holsaple McCarty
550 W. Main St., Suite 300
Knoxville, TN 37902
t 865.544.2000
www.mhminc.com

Project Information:

24023

OAK RIDGE HIGH SCHOOL SOFTBALL

15 WILBERFORCE AVE
OAK RIDGE, TN 37830

OAK RIDGE SCHOOLS

Seal:

Project Status

Consultant:

HAINES STRUCTURAL GROUP
444 S. GAY STREET, STE. 1701 KNOXVILLE, TN 37929
(865) 329-5920 | WWW.HAINES-SG.COM
project no. 24033

#	ISSUED BY:	DATE

Issue Date:	AUG 05, 2024
PIC	R. HAINES
PM	C. BROWN
PA	C. BROWN
Drawn By:	K. SHERRILL
Checked By:	T. WHELAN

Sheet Information:

S-003

STRUCTURAL GENERAL NOTES

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STATEMENT OF SPECIAL INSPECTIONS:

1. SPECIAL INSPECTIONS AND STRUCTURAL TESTING SHALL BE PROVIDED BY AN INDEPENDENT AGENCY EMPLOYED BY THE OWNER FOR THE ITEMS IDENTIFIED IN THIS SECTION AND IN OTHER AREAS OF THE APPROVED CONSTRUCTION PLANS AND SPECIFICATIONS, UNLESS WAIVED BY THE BUILDING OFFICIAL (SEE IBC CHAPTER 17).
2. THE INSPECTION AND TESTING AGENT(S) SHALL BE ENGAGED BY THE OWNER'S REPRESENTATIVE OR THE SPECIAL INSPECTOR, AND NOT BY THE CONTRACTOR OR SUBCONTRACTOR WHOSE WORK IS TO BE INSPECTED OR TESTED. ANY CONFLICT OF INTEREST MUST BE DISCLOSED PRIOR TO COMMENCING WORK
3. THE SPECIAL INSPECTOR SHALL BE A QUALIFIED PERSON WHO SHALL DEMONSTRATE COMPETENCE, TO THE SATISFACTION OF THE BUILDING OFFICIAL, FOR INSPECTION OF THE PARTICULAR TYPE OF CONSTRUCTION OR OPERATION REQUIRING INSPECTION.
4. DUTIES AND RESPONSIBILITIES OF THE SPECIAL INSPECTOR:
   A. THE SPECIAL INSPECTOR SHALL REVIEW ALL WORK LISTED BELOW FOR CONFORMANCE WITH THE APPROVED CONSTRUCTION PLANS AND SPECIFICATIONS AND THE 2018 IBC. ALL ITEMS NOT IN COMPLIANCE SHALL BE BROUGHT TO THE IMMEDIATE ATTENTION OF THE CONTRACTOR FOR CORRECTION, AND IF UNCORRECTED, TO THE EOR AND THE BUILDING OFFICIAL.
   B. THE SPECIAL INSPECTOR SHALL FURNISH SPECIAL INSPECTION REPORTS TO THE EOR, CONTRACTOR, OWNER, AND BUILDING OFFICIAL ON A BI-WEEKLY BASIS, OR MORE FREQUENTLY AS REQUIRED BY THE BUILDING OFFICIAL. REPORTS SHALL DESCRIBE ALL INSPECTIONS, TEST PERFORMED, DISCREPANCY NOTICES AND CORRECTIVE ACTIONS TAKEN.
   C. ONCE CORRECTIONS HAVE BEEN MADE BY THE CONTRACTOR, THE SPECIAL INSPECTOR SHALL SUBMIT A FINAL SIGNED REPORT TO THE BUILDING OFFICIAL STATING THAT WORK REQUIRING SPECIAL INSPECTION WAS, TO THE BEST OF THE SPECIAL INSPECTOR'S KNOWLEDGE, IN CONFORMANCE WITH THE APPROVED CONSTRUCTION PLANS AND SPECIFICATIONS AS WELL AS THE APPLICABLE WORKMANSHIP PROVISIONS OF THE 2018 IBC.
5. DUTIES AND RESPONSIBILITIES OF THE CONTRACTOR
   A. THE CONTRACTOR SHALL SUBMIT A WRITTEN STATEMENT OF RESPONSIBILITY TO THE OWNER AND THE BUILDING OFFICIAL PRIOR TO THE COMMENCEMENT OF WORK. IN ACCORDANCE WITH IBC 1704.4, THE STATEMENT OF RESPONSIBILITY SHALL CONTAIN ACKNOWLEDGEMENT OF THE SPECIAL INSPECTOR REQUIREMENTS CONTAINED WITHIN THE "STATEMENT OF SPECIAL INSPECTIONS".
   B. THE CONTRACTOR SHALL NOTIFY THE RESPONSIBLE SPECIAL INSPECTOR THAT WORK IS READY FOR INSPECTION AT LEAST ONE WORKING DAY (24 HOURS MINIMUM) BEFORE SUCH INSPECTION IS REQUIRED.
   C. ALL WORK REQUIRING SPECIAL INSPECTION SHALL REMAIN ACCESSIBLE AND EXPOSED UNTIL IT HAS BEEN OBSERVED BY THE SPECIAL INSPECTOR.
   D. THE SPECIAL INSPECTION PROGRAM DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY TO COMPLY WITH THE CONTRACT DOCUMENTS. JOBSITE SAFETY AND MEANS AND METHODS OF CONSTRUCTION ARE SOLELY THE RESPONSIBILITY OF THE CONTRACTOR.
6. PLEASE SEE THE "SPECIAL INSPECTION SCHEDULE" ON THIS SHEET FOR THE TYPES, EXTENTS, AND FREQUENCY OF SPECIFIC ITEMS REQUIRING SPECIAL INSPECTIONS AND STRUCTURAL TESTS AS PART OF THIS PROJECT.
7. THIS STATEMENT OF SPECIAL INSPECTIONS ENCOMPASSES THE FOLLOWING DISCIPLINES: STRUCTURAL
8. SPECIAL INSPECTIONS FOR SEISMIC RESISTANCE ARE NOT REQUIRED PER IBC 1705.11.
9. SPECIAL INSPECTIONS FOR WIND RESISTANCE ARE NOT REQUIRED PER IBC 1705.10.

PREPARED BY:

NAME: CASEY BROWN, P.E., S.E.

LICENSE #: 120071

SIGNATURE: Casey Brown DATE: 08/05/2024

CASEY BROWN REGISTERED ENGINEER AGRICULTURE OSHA No. 120071 STATE OF TENNESSEE

DESIGN PROFESSIONAL SEAL

OWNER'S AUTHORIZATION:

SIGNATURE: _____ DATE: _____

BUILDING OFFICIAL'S ACCEPTANCE:

SIGNATURE: _____ DATE: _____

IBC TABLE 1705.6: REQUIRED VERIFICATION AND INSPECTION OF SOILS

VERIFICATION AND INSPECTION	CONTINUOUS	PERIODIC
1. VERIFY MATERIALS BELOW SHALLOW FOUNDATIONS ARE ADEQUATE TO ACHIEVE THE DESIGN BEARING CAPACITY.		X
2. VERIFY EXCAVATIONS ARE EXTENDED TO PROPER DEPTH AND HAVE REACHED PROPER MATERIAL.		X
3. PERFORM CLASSIFICATION AND TESTING OF COMPACTED FILL MATERIALS.		X
4. VERIFY USE OF PROPER MATERIALS, DENSITIES AND LIFT THICKNESSES DURING PLACEMENT AND COMPACTION OF COMPACTED FILL.	X	
5. PRIOR TO PLACEMENT OF COMPACTED FILL, OBSERVE SUBGRADE AND VERIFY THAT SITE HAS BEEN PREPARED PROPERLY.		X

IBC TABLE 1705.3: REQUIRED VERIFICATION AND INSPECTION OF CONCRETE CONSTRUCTION

VERIFICATION AND INSPECTION	CONTINUOUS	PERIODIC	REFERENCE STANDARD	IBC REFERENCE
INSPECTION OF REINFORCING STEEL, INCLUDING PRESTRESSING TENDONS, AND PLACEMENT.		X	ACI318: 3.5, 7.1 - 7.7	1910.4
2. INSPECTION OF REINFORCING STEEL WELDING IN ACCORDANCE WITH TABLE 1705.2.2, ITEM 2b.			AWS D1.4 ACI 318: 3.5.2	
3. INSPECTION OF ANCHORS CAST IN CONCRETE.		X	ACI 318: D.9.2	1909.1
4. INSPECTION OF ANCHORS POST INSTALLED IN HARDENED CONCRETE MEMBERS (NOTE a).				
a. ADHESIVE ANCHORS INSTALLED IN HORIZONTALLY OR UPWARDLY INCLINED ORIENTATIONS TO RESIST SUSTAINED TENSION LOADS.	X		ACI 318: D.9.2.4	1909.1
b. MECHANICAL ANCHORS AND ADHESIVE ANCHORS NOT DEFINED IN 4a.		X	ACI 318: D.9.2	1909.1
5. VERIFY USE OF REQUIRED DESIGN MIX.		X	ACI 318: CH 4, 5.2-5.4	1904.2, 1910.2, 1910.3
6. AT THE TIME FRESH CONCRETE IS SAMPLED TO FABRICATE SPECIMENS FOR STRENGTH TESTS, PERFORM SLUMP AND AIR CONTENT TESTS, AND DETERMINE THE TEMPERATURE OF THE CONCRETE.	X		ASTM C172 ASTM C31 ACI 318: 5.6, 5.8	1910.10
7. INSPECTION OF CONCRETE AND SHOTCRETE PLACEMENT FOR PROPER APPLICATION TECHNIQUES.	X		ACI 318: 5.9, 5.10	1910.6, 1910.7, 1910.8
8. INSPECTION FOR MAINTENANCE OF SPECIFIED CURING TEMPERATURE AND TECHNIQUES.		X	ACI 318: 5.11-5.13	1910.9
9. INSPECTION OF PRESTRESSED CONCRETE:				
a. APPLICATION OF PRESTRESSING FORCES.				
b. GROUTING OF BONDED PRESTRESSING TENDONS IN THE SEISMIC-FORCE-RESISTING SYSTEM.				
10. ERECTION OF PRECAST CONCRETE MEMBERS.				
11. VERIFICATION OF IN-SITU CONCRETE STRENGTH, PRIOR TO STRESSING OF TENDONS IN POST-TENSIONED CONCRETE AND PRIOR TO REMOVAL OF SHORES AND FORMS FROM BEAMS AND STRUCTURAL SLABS.				
12. INSPECT FORMWORK FOR SHAPE, LOCATION AND DIMENSIONS OF THE CONCRETE MEMBER BEING FORMED.		X	ACI 318: 6.1.1	

TABLE NOTES:
a. SPECIFIC REQUIREMENTS FOR SPECIAL INSPECTION SHALL BE INCLUDED IN THE RESEARCH REPORT FOR THE ANCHOR ISSUED BY AN APPROVED SOURCE IN ACCORDANCE WITH ACI 355.2 OR OTHER QUALIFICATION PROCEDURES. WHERE SPECIFIC REQUIREMENTS ARE NOT PROVIDED, SPECIAL INSPECTION REQUIREMENTS SHALL BE SPECIFIED BY THE REGISTERED DESIGN PROFESSIONAL AND SHALL BE APPROVED BY THE BUILDING OFFICIAL PRIOR TO THE COMMENCEMENT OF THE WORK.

ACI 530.1, TABLE 4: LEVEL B QUALITY ASSURANCE OF MASONRY CONSTRUCTION

MINIMUM TESTS				
VERIFICATION OF SLUMP FLOW AND VISUAL STABILITY INDEX (VSI) AS DELIVERED TO THE PROJECT SITE IN ACCORDANCE WITH SPECIFICATION ARTICLE 1.5.B.1.b.3 FOR SELF-CONSOLIDATING GROUT.				
VERIFICATION OF f'm AND f'AAC IN ACCORDANCE WITH ARTICLE 1.4 B PRIOR TO CONSTRUCTION, EXCEPT WHERE SPECIFICALLY EXEMPTED BY THIS CODE.				
MINIMUM INSPECTION				
INSPECTION TASK	FREQUENCY		REFERENCE FOR CRITERIA	
	CONTINUOUS	PERIODIC	TMS 402 / ACI 530 / ASCE 5	TMS 602 / ACI 530.1 / ASCE 6
1. VERIFY COMPLIANCE WITH THE APPROVED SUBMITTALS.		X		ART 1.5
2. AS MASONRY CONSTRUCTION BEGINS, VERIFY THAT THE FOLLOWING ARE IN COMPLIANCE:				
a. PROPORTIONS OF SITE-PREPARED MORTAR.		X		ART 2.1, 2.6 A
b. CONSTRUCTION OF MORTAR JOINTS.		X		ART 3.3 B
c. GRADE AND SIZE OF PRESTRESSING TENDONS AND ANCHORAGES.		X		ART 2.4 B, 2.4 H
d. LOCATION OF REINFORCEMENT, CONNECTORS, AND PRESTRESSING TENDONS AND ANCHORAGES.		X		ART 3.4, 3.6 A
e. PRESTRESSING TECHNIQUE.				
f. PROPERTIES OF THIN-BED MORTAR FOR AAC MASONRY.				
3. PRIOR TO GROUTING, VERIFY THAT THE FOLLOWING ARE IN COMPLIANCE:				
a. GROUT SPACE.		X		ART 3.2 D, 3.2 F
b. GRADE, TYPE, AND SIZE OF REINFORCEMENT AND ANCHOR BOLTS, AND PRESTRESSING TENDONS AND ANCHORAGES.		X	SEC 1.16	ART 2.4, 3.4
c. PLACEMENT OF REINFORCEMENT, CONNECTORS, AND PRESTRESSING TENDONS AND ANCHORAGES.		X	SEC 1.16	ART 3.2 E, 3.4, 3.6 A
d. PROPORTIONS OF SITE-PREPARED GROUT AND PRESTRESSING GROUT FOR BONDED TENDONS.		X		ART 2.6 B, 2.4 G.1.b
e. CONSTRUCTION OF MORTAR JOINTS.		X		ART 3.3 B
4. VERIFY DURING CONSTRUCTION:		-		
a. SIZE AND LOCATION OF STRUCTURAL ELEMENTS.		X		ART 3.3 F
b. TYPE, SIZE, AND LOCATION OF ANCHORS, INCLUDING OTHER DETAILS OF ANCHORAGE OF MASONRY TO STRUCTURAL MEMBERS, FRAMES, OR OTHER CONSTRUCTION.		X	SEC 1.16.4.3, 1.17.1	
c. WELDING OF REINFORCEMENT.	X	-	SEC 2.1.7.7.2, 3.3.3.4 (c), 8.3.3.4 (b)	
d. PREPARATION, CONSTRUCTION, AND PROTECTION OF MASONRY DURING COLD WEATHER (TEMPERATURE BELOW 40°F (4.4°C)) OR HOT WEATHER (TEMPERATURE ABOVE 90°F (32.2°C)).		X		ART 1.8 C, 1.8 D
e. PLACEMENT OF GROUT IS IN COMPLIANCE.	X	-		ART 3.5, 3.6 C
5. OBSERVE PREPARATION OF GROUT SPECIMENS, MORTAR SPECIMENS AND / OR PRISMS.		X		ART 1.4 B.2.a.3, 1.4 B.2.b.3, 1.4 B.2.c.3, 1.4 B.3, 1.4 B.4

AISC 360, SECTION N5: REQUIRED QUALITY ASSURANCE OF STRUCTURAL STEEL

VERIFICATION AND INSPECTION	CONTINUOUS	PERIODIC
1. REVIEW MATERIAL TEST REPORTS AND CERTIFICATIONS LISTED IN AISC360, SECTION N3.2. FOR COMPLIANCE WITH THE CONSTRUCTION DOCUMENTS.	X	
2. PRIOR TO CONCRETE PLACEMENT, INSPECTOR SHALL BE ON THE PREMISES DURING PLACEMENT OF ANCHOR RODS AND OTHER EMBEDMENTS THAT SUPPORT STRUCTURAL STEEL. VERIFY COMPLIANCE WITH THE CONSTRUCTION DOCUMENTS.		
a. DIAMETER.		X
b. GRADE.		X
c. TYPE.		X
d. LENGTH.		X
e. EMBEDMENT DEPTH.		X
3. INSPECT THE ERECTED STEEL TO VERIFY COMPLIANCE WITH DETAILS ON THE CONSTRUCTION DOCUMENTS:		
a. BRACES.		X
b. STIFFENERS.		X
c. MEMBER LOCATIONS.		X
d. PROPER APPLICATION OF JOINT DETAILS AT EACH CONNECTION.		X
4. STRUCTURAL STEEL WELDING AND HIGH-STRENGTH BOLTING (SEE ACCOMPANYING TABLES.)		

AISC 360, SECTION N5: REQUIRED QUALITY ASSURANCE OF STRUCTURAL STEEL WELDING

VERIFICATION AND INSPECTION	CONTINUOUS	PERIODIC
INSPECTION TASKS PRIOR TO WELDING (TABLE N5.4-1)		
1. VERIFY WELDING PROCEDURE SPECIFICATIONS (WPS) AND CONSUMABLE CERTIFICATES.	X	
2. VERIFY MATERIALS (TYPE / GRADE).		X
3. VERIFY WELDER IDENTIFICATION SYSTEM.		X
a. THE FABRICATOR OR ERECTOR, AS APPLICABLE, SHALL MAINTAIN A SYSTEM BY WHICH A WELDER WHO HAS WELDED A JOINT OR MEMBER CAN BE IDENTIFIED. STAMPS, IF USED, SHALL BE THE LOW-STRESS TYPE.		
4. VERIFY FIT-UP OF GROOVE WELDS (INCLUDING JOINT GEOMETRY):		
a. JOINT PREPARATION.		X
b. DIMENSIONS (ALIGNMENT, ROOT OPENING, ROOF FACE, BEVEL).		X
c. CLEANLINESS (CONDITION OF STEEL SURFACES).		X
d. TACKING (TACK WELD QUALITY AND LOCATION).		X
e. BACKING TYPE AND FIT (IF APPLICABLE).		X
5 VERIFY CONFIGURATION AND FINISH OF ACCESS HOLES.		X
6. VERIFY FIT-UP OF FILLET WELDS:		
a. DIMENSIONS (ALIGNMENT, GAPS AT ROOT).		X
b. CLEANLINESS (CONDITION OF STEEL SURFACES).		X
c. TACKING (TACK WELD QUALITY AND LOCATION).		X
INSPECTION TASKS DURING WELDING (TABLE N5.4-2)		
1. VERIFY USE OF QUALIFIED WELDERS.		X
2. VERIFY CONTROL AND HANDLING OF WELDING CONSUMABLES.		
a. PACKAGING.		X
b. EXPOSURE CONTROL.		X
3. VERIFY NO WELDING OVER CRACKED TACK WELDS.		X
4. VERIFY ENVIRONMENTAL CONDITIONS.		
a. WIND SPEED WITHIN LIMITS.		X
b. PRECIPITATION AND TEMPERATURE.		X
5. VERIFY WELDING PROCEDURE SPECIFICATIONS FOLLOWED:		
a. SETTINGS ON WELDING EQUIPMENT.		X
b. TRAVEL SPEED.		X
c. SELECTED WELDING MATERIALS.		X
d. SHIELDING GAS TYPE / FLOW RATE.		X
e. PREHEAT APPLIED.		X
f. INTERPASS TEMPERATURE MAINTAINED (MIN / MAX).		X
g. PROPER POSITION (F, V, H, OH).		X
6. VERIFY WELDING TECHNIQUES:		
a. INTERPASS AND FINAL CLEANING.		X
b. EACH PASS WITHIN PROFILE LIMITATIONS.		X
c. EACH PASS MEETS QUALITY REQUIREMENTS.		X
INSPECTION TASKS AFTER WELDING (TABLE N5.4-3)		
1. VERIFY WELDS CLEANED.		X
2. VERIFY SIZE, LENGTH, AND LOCATION OF WELDS.	X	
3. VERIFY WELDS MEET VISUAL ACCEPTANCE CRITERIA:		
a. CRACK PROHIBITION.	X	
b. WELD / BASE-METAL FUSION.	X	
c. CRATER CROSS SECTION.	X	
d. WELD PROFILES.	X	
e. WELD SIZE.	X	
f. UNDERCUT.	X	
g. POROSITY.	X	
4. VERIFY ARC STRIKES.	X	
5. VERIFY k-AREA: WHEN WELDING OF DOUBLER PLATES, CONTINUITY PLATES OR STIFFENERS HAS BEEN PERFORMED IN THE k-AREA, VISUALLY INSPECT THE WEB k-AREA FOR CRACKS WITHIN 3 INCHES OF THE WELD.		
6. VERIFY BACKING REMOVED AND WELD TABS REMOVED (IF REQUIRED).		
7. VERIFY REPAIR ACTIVITIES.		
8. DOCUMENT THE ACCEPTANCE OR REJECTION OF WELDED JOINT OR MEMBER.		
NON-DESTRUCTIVE TESTING OF WELDS (SECTION N5.5)		
1. CJP WELDS (RISK CATEGORY II): PERFORM ULTRASONIC TESTING ON 10% OF CJP GROOVE WELDS IN BUTT, T-, AND CORNER JOINTS SUBJECT TO TRANSVERSELY APPLIED TENSION LOADING IN MATERIALS 5/16" THICK OR GREATER. IF TESTS SHOW UNACCEPTABLE DEFECTS, INCREASE TESTING RATE PER AISC 360 PART N5.5F.		
2. CJP WELDS (RISK CATEGORY III OR IV): PERFORM UT ON CJP GROOVE WELDS IN BUTT, T-, AND CORNER JOINTS SUBJECT TO TRANSVERSELY APPLIED TENSION LOADING IN MATERIALS 5/16" THICK OR GREATER.		
3. ACCESS HOLES: PERFORM MT OR PT ON THERMALLY CUT ACCESS HOLES IN HEAVY SHAPES. 1. FLANGE > 2" (ROLLED SHAPES). 2. WEB > 2", (BUILT-UP SHAPES).		
4. WELDED JOINTS SUBJECT TO FATIGUE: PERFORM RADIOGRAPHIC TESTING OR ULTRASONIC TESTING AT JOINTS IDENTIFIED AS SUBJECT TO FATIGUE.		

SPECIAL INSPECTIONS

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MHM

McCarty Holsaple McCarty
550 W. Main St., Suite 300
Knoxville, TN 37902
t 865.544.2000
www.mhminc.com

Project Information:

24023

OAK RIDGE HIGH SCHOOL SOFTBALL

15 WILBERFORCE AVE
OAK RIDGE, TN 37830

OAK RIDGE SCHOOLS

Seal:

Project Status

CASEY BROWN REGISTERED ENGINEER AGRICULTURE OSHA No. 120071 STATE OF TENNESSEE

Consultant:

HAINES STRUCTURAL GROUP
444 S. GAY STREET, STE. 1710 KNOXVILLE, TN 37919
(865) 329-9920 | WWW.HAINES-SG.COM
project no. 24055

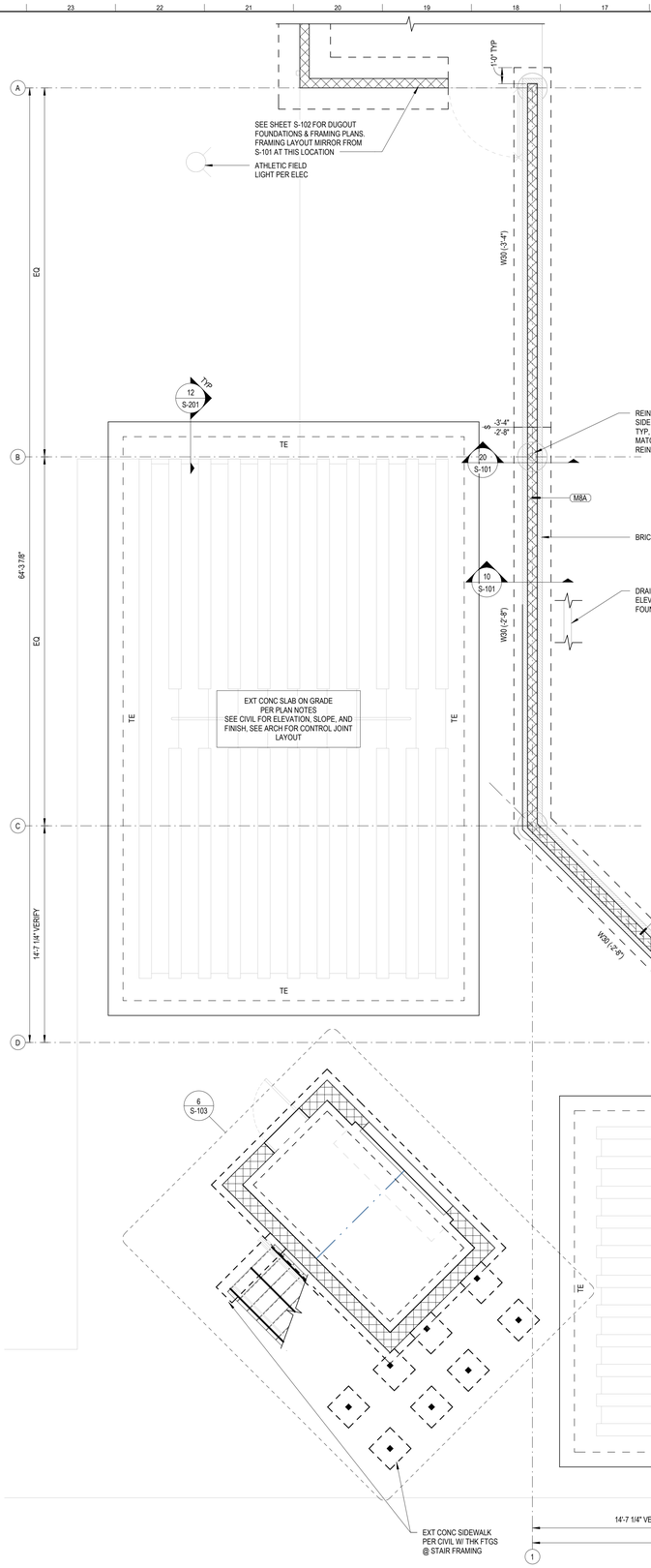
#	ISSUED BY:	DATE

Issue Date:	AUG 05, 2024
PIC	R. HAINES
PM	C. BROWN
PA	C. BROWN
Drawn By:	K. SHERRILL
Checked By:	T. WHELAN

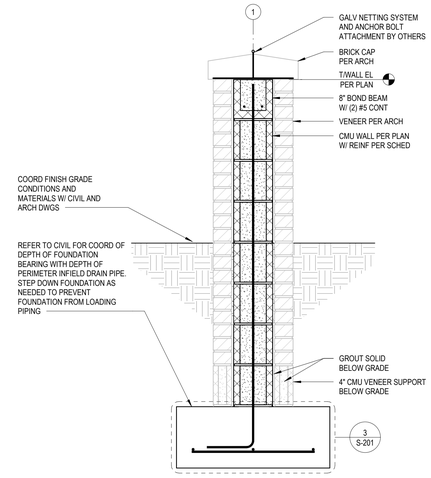
Sheet Information:

S-004

SPECIAL INSPECTIONS



21 S-101 FOUNDATION PLAN - BACKSTOP
1/4" = 1'-0"



10 S-101 FOUNDATION SECTION
1" = 1'-0" | S-101

20 S-101 FOUNDATION SECTION
1" = 1'-0" | S-101

COLUMN FOOTING SCHEDULE				
MARK	LENGTH	WIDTH	DEPTH	REINFORCEMENT
F42	3'-6"	3'-6"	1'-4"	(5)-#5 EW BTM
TF24	2'-0"	2'-0"	1'-0"	(3)-#5 EW BTM

WALL FOOTING SCHEDULE			
MARK	WIDTH	DEPTH	REINFORCEMENT
TS18	1'-6"	1'-6"	(3)-#5 CONT W/ #5 X 1'-0" TRANS @ 1'-6" OC
W24	2'-0"	1'-0"	(3)-#5 CONT W/ #5 X 1'-6" TRANS @ 1'-4" OC
W30	2'-6"	1'-0"	(3)-#5 CONT W/ #5 X 2'-0" TRANS @ 1'-6" OC
W42	3'-6"	1'-0"	(4)-#5 CONT W/ #5 X 3'-0" TRANS @ 1'-6" OC

FOUNDATION PLAN NOTES:

1. ELEVATIONS ARE BASED ON A REFERENCE FLOOR ELEVATION OF 0'-0", UNO. TOP OF SLAB ON GRADE IS AT THE REFERENCE ELEVATION UNLESS NOTED OTHERWISE. REFER TO CIVIL DRAWINGS FOR MEAN SEA ELEVATION SITE ELEVATIONS.
2. T/FOOTING ELEVATION = -1'-4", TYP, UNO
3. EXTERIOR SLAB ON GRADE IS 6 INCHES THICK AND REINFORCED WITH WWF 6X6 W2.9XW2.9. SLAB ON GRADE SHALL BE PLACED OVER 4 INCHES (MIN) COMPACTED GRANULAR FILL. SEE TYPICAL SLAB ON GRADE DETAILS FOR MORE INFORMATION.
4. "F24" INDICATES COLUMN OR ISOLATED SPREAD FOOTING MARK. SEE SCHEDULE FOR SIZE AND REINFORCEMENT.
5. "W24" INDICATES WALL OR CONTINUOUS FOOTING MARK. SEE SCHEDULE FOR SIZE AND REINFORCEMENT.
6. "TE" DENOTES TURN-DOWN SLAB EDGE. SEE TYPICAL DETAIL FOR SIZE AND REINFORCING.
7. FOR ELEVATIONS, WALL SECTIONS, AND DIMENSIONS NOT SHOWN, SEE ARCHITECTURAL DRAWINGS.
8. FOR SIDEWALKS, PAVING, AND SITE DETAILS AT THE BUILDING EXTERIOR, SEE ARCHITECTURAL AND CIVIL DRAWINGS.

FOUNDATION PLAN NOTES

8/5/2024 4:22:57 PM

MHM

McCarty Holsaple McCarty
550 W. Main St., Suite 300
Knoxville, TN 37902
t 865.544.2000
www.mhminc.com

Project Information:

24023

OAK RIDGE HIGH SCHOOL SOFTBALL

15 WILBERFORCE AVE
OAK RIDGE, TN 37830

OAK RIDGE SCHOOLS

Seal:

Project Status

CASEY BROWN — REGISTERED ENGINEER — No. 120017 — STATE OF TENNESSEE

Consultant:

HAINES STRUCTURAL GROUP
800 S. GAY STREET, STE. 1700 KNOXVILLE, TN 37929
(865) 329-9920 | WWW.HAINES-SG.COM
project no. 24023

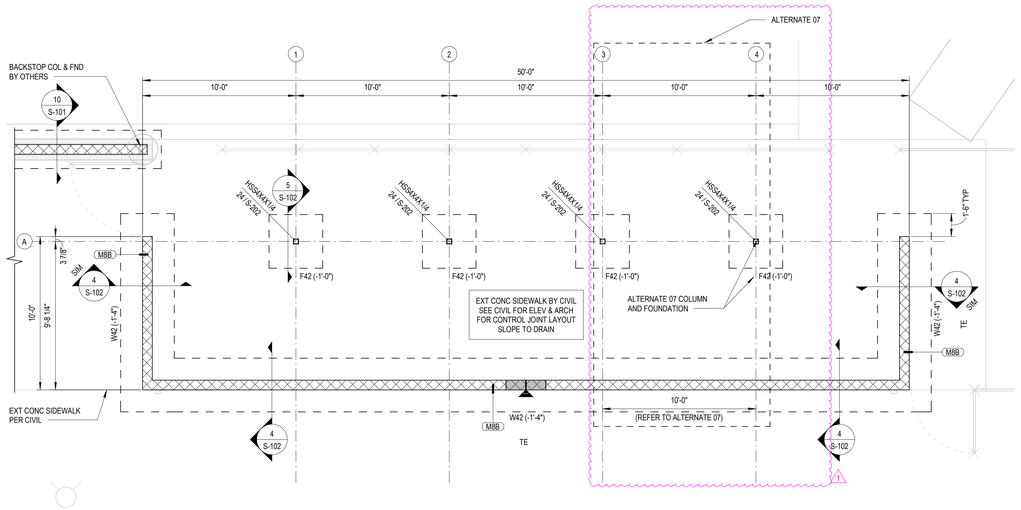
#	ISSUED BY:	DATE

Issue Date:	AUG 05, 2024
PIC	R. HAINES
PM	C. BROWN
PA	C. BROWN
Drawn By:	K. SHERRILL
Checked By:	T. WHELAN

Sheet Information:

S-101

FRAMING PLANS - BACKSTOP



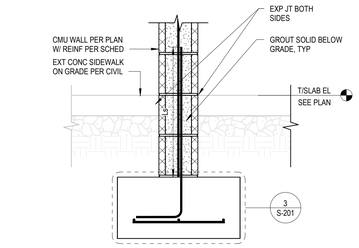
COLUMN FOOTING SCHEDULE				
MARK	LENGTH	WIDTH	DEPTH	REINFORCEMENT
F42	3'-6"	3'-6"	1'-4"	(5)-#5 EW BTM
TF24	2'-0"	2'-0"	1'-0"	(3)-#5 EW BTM

WALL FOUNDATION SCHEDULE			
MARK	WIDTH	DEPTH	REINFORCEMENT
TS18	1'-6"	1'-6"	(3)-#5 CONT W/ #5 X 1'-0" TRANS @ 1'-6" OC
W24	2'-0"	1'-0"	(3)-#5 CONT W/ #5 X 1'-6" TRANS @ 1'-4" OC
W30	2'-6"	1'-0"	(3)-#5 CONT W/ #5 X 2'-0" TRANS @ 1'-6" OC
W42	3'-6"	1'-0"	(4)-#5 CONT W/ #5 X 3'-0" TRANS @ 1'-6" OC

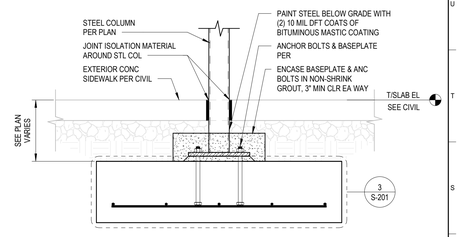
6 S-102 FOUNDATION PLAN - DUGOUT
1/4" = 1'-0" |

FOUNDATION PLAN NOTES:
1. ELEVATIONS ARE BASED ON A REFERENCE FLOOR ELEVATION OF 0'-0", UNO. TOP OF SLAB ON GRADE IS AT THE REFERENCE ELEVATION UNLESS NOTED OTHERWISE. REFER TO CIVIL DRAWINGS FOR MSE SITE ELEVATION.
2. 'F24' INDICATES COLUMN OR ISOLATED SPREAD FOOTING MARK. SEE SCHEDULE FOR SIZE AND REINFORCEMENT.
3. 'W24' INDICATES WALL OR CONTINUOUS FOOTING MARK. SEE SCHEDULE FOR SIZE AND REINFORCEMENT.
4. FOR ELEVATIONS, WALL SECTIONS, AND DIMENSIONS NOT SHOWN, SEE ARCHITECTURAL DRAWINGS.
5. FOR SIDEWALKS, PAVING, AND SITE DETAILS AT THE BUILDING EXTERIOR, SEE ARCHITECTURAL AND CIVIL DRAWINGS.

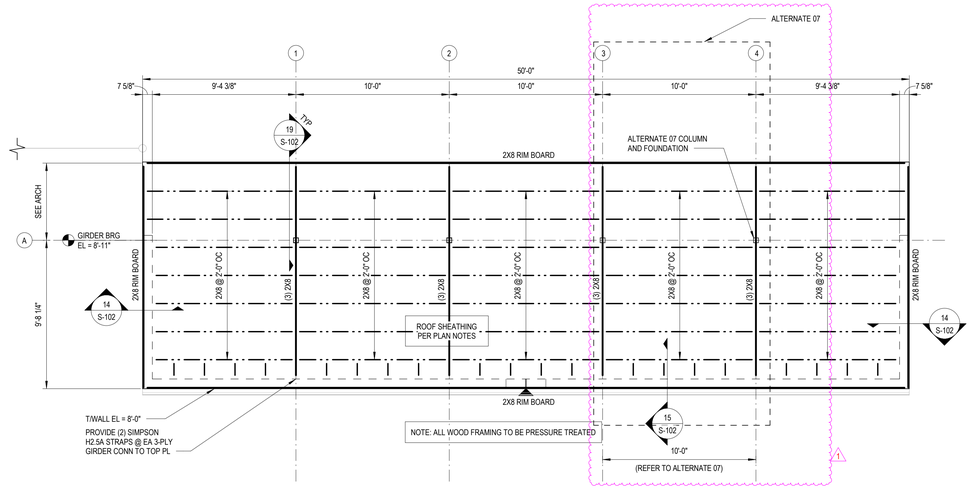
FOUNDATION PLAN NOTES



4 S-102 FOUNDATION SECTION
1" = 1'-0" | S-102



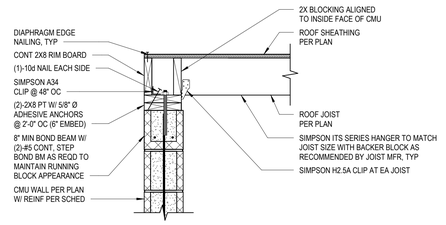
5 S-102 FOUNDATION SECTION
1" = 1'-0" | S-102



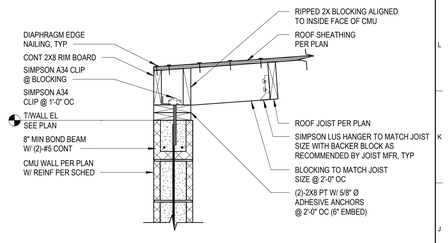
16 S-102 ROOF FRAMING PLAN
1/4" = 1'-0" |

ROOF FRAMING PLAN NOTES:
1. ELEVATIONS ARE BASED ON A REFERENCE FLOOR ELEVATION OF 0'-0", UNO. TOP OF SLAB ON GRADE BELOW IS AT THE REFERENCE ELEVATION UNLESS NOTED OTHERWISE. REFER TO CIVIL DRAWINGS FOR MEAN SEA ELEVATION SITE ELEVATIONS.
2. WOOD ROOF SHEATHING SHALL BE 19/32" UNO. SEE GENERAL NOTES FOR MORE INFORMATION. SEE TYPICAL DETAIL FOR ATTACHMENT AND LAYOUT REQUIREMENTS. BLOCKING IS NOT REQUIRED UNLESS NOTED IN DETAILS. REFER TO STRUCTURAL GENERAL NOTES FOR ADDITIONAL REQUIREMENTS.

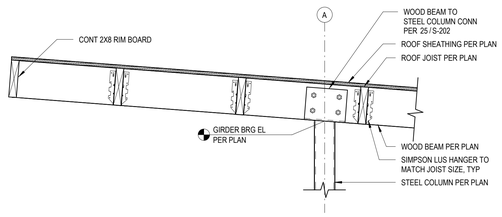
ROOF FRAMING PLAN NOTES



14 S-102 ROOF FRAMING SECTION
1" = 1'-0" | S-102



15 S-102 ROOF FRAMING SECTION
1" = 1'-0" | S-102



19 S-102 ROOF FRAMING SECTION
1" = 1'-0" | S-102

MHM
McCarty Holsaple McCarty
550 W. Main St., Suite 300
Knoxville, TN 37902
t 865.544.2000
www.mhminc.com

Project Information:

24023

OAK RIDGE HIGH SCHOOL SOFTBALL
15 WILBERFORCE AVE
OAK RIDGE, TN 37830

OAK RIDGE SCHOOLS

Seal:

Project Status

Consultant:

HAINES STRUCTURAL GROUP
800 S. GAY STREET, STE. 1700 KNOXVILLE, TN 37929
(865) 329-9920 | WWW.HAINES-SG.COM
project no. 24033

#	ISSUED BY:	DATE
1	BIDDING	09/23/24

Issue Date:	AUG 05, 2024
PIC	R. HAINES
PM	C. BROWN
PA	C. BROWN
Drawn By:	K. SHERRILL
Checked By:	T. WHELAN

Sheet Information:

S-102

FRAMING PLANS - DUG OUT

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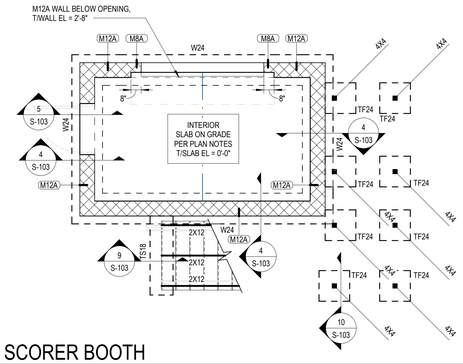


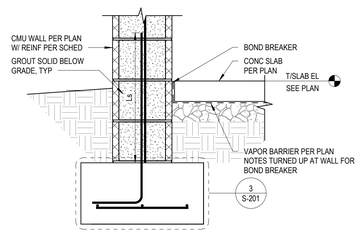
6 FOUNDATION PLAN - SCORER BOOTH
S-103 | 1/4" = 1'-0" |

COLUMN FOOTING SCHEDULE				
MARK	LENGTH	WIDTH	DEPTH	REINFORCEMENT
TF24	2'-0"	2'-0"	1'-0"	(3)-#5 EW BTM

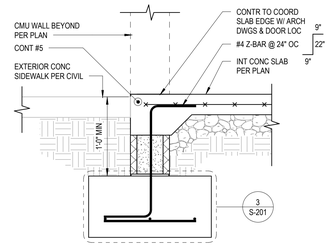
WALL FOOTING SCHEDULE			
MARK	WIDTH	DEPTH	REINFORCEMENT
TS18	1'-6"	1'-6"	(3)-#5 CONT W/ #5 X 1'-0" TRANS @ 1'-6" OC
W24	2'-0"	1'-0"	(3)-#5 CONT W/ #5 X 1'-6" TRANS @ 1'-4" OC

FOUNDATION PLAN NOTES:
1. ELEVATIONS ARE BASED ON A REFERENCE FLOOR ELEVATION OF 0'-0", UNO. TOP OF SLAB ON GRADE IS AT THE REFERENCE ELEVATION UNLESS NOTED OTHERWISE. REFER TO CIVIL DRAWINGS FOR MSE SITE ELEVATIONS.
2. T/FOOTING ELEVATION = -1'-4", TYP, UNO
3. INTERIOR SLAB ON GRADE IS 4 INCHES THICK AND REINFORCED WITH WWF 6X6 W2.1XW2.1. SLAB ON GRADE SHALL BE PLACED OVER A VAPOR BARRIER AND 4 INCHES (MIN) COMPACTED GRANULAR FILL IN ACCORDANCE WITH THE GEOTECHNICAL REPORT. SEE TYPICAL SLAB ON GRADE DETAILS FOR MORE INFORMATION.
4. ALL EXTERIOR, EXPOSED WOOD FRAMING SHALL BE PRESSURE TREATED PER THE STRUCTURAL GENERAL NOTES.
5. ( ) INDICATES TOP OF FOOTING ELEVATION AT NON-TYPICAL LOCATIONS.
6. 'F60' INDICATES COLUMN OR ISOLATED SPREAD FOOTING MARK. SEE SCHEDULE FOR SIZE AND REINFORCEMENT.
7. 'W24' INDICATES WALL OR CONTINUOUS FOOTING MARK. SEE SCHEDULE FOR SIZE AND REINFORCEMENT.
8. 'TS24' & 'TF24' INDICATE THICKENED SLAB AREAS TO BE POURED MONOLITHICALLY WITH SLAB ON GRADE. SEE SCHEDULE FOR SIZE AND REINFORCEMENT.
9. FOR ELEVATIONS, WALL SECTIONS, AND DIMENSIONS NOT SHOWN, SEE ARCHITECTURAL DRAWINGS.
10. FOR SIDEWALKS, PAVING, AND SITE DETAILS AT THE BUILDING EXTERIOR, SEE ARCHITECTURAL AND CIVIL DRAWINGS.

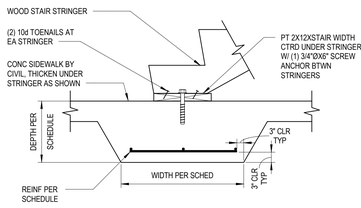
FOUNDATION PLAN NOTES



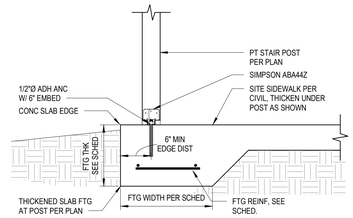
4 FOUNDATION SECTION
S-103 | 1" = 1'-0" | S-103



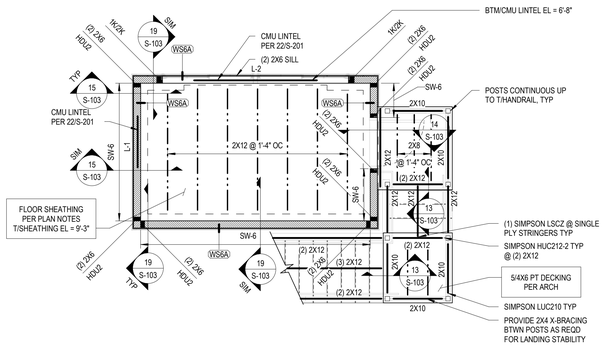
5 FOUNDATION SECTION
S-103 | 1" = 1'-0" | S-103



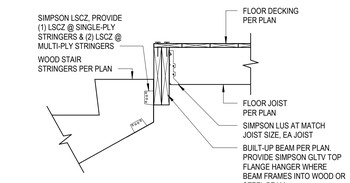
9 TYPICAL STAIR BEARING
S-103 | 1" = 1'-0" | S-103



10 POST BASE INTO SLAB ON GRADE
S-103 | 1" = 1'-0" | S-103



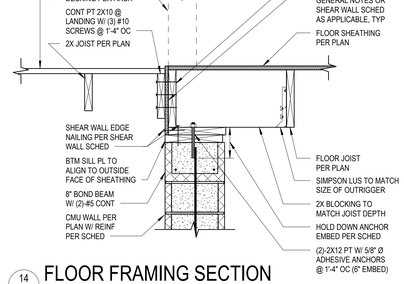
16 FLOOR FRAMING PLAN - SCORER BOOTH
S-103 | 1/4" = 1'-0" |



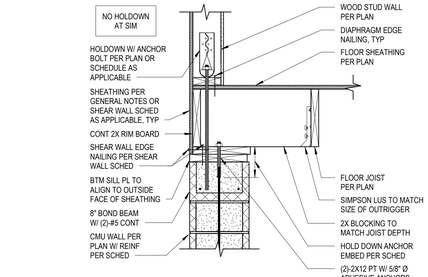
13 TYP FRAMING AT STAIR LANDING
S-103 | 1" = 1'-0" | S-103

FLOOR FRAMING PLAN NOTES:
1. ELEVATIONS ARE BASED ON A REFERENCE FLOOR ELEVATION OF 0'-0", UNO. TOP OF SLAB ON GRADE BELOW IS AT THE REFERENCE ELEVATION UNLESS NOTED OTHERWISE. REFER TO CIVIL DRAWINGS FOR MSE SITE ELEVATIONS.
2. WOOD FLOOR SHEATHING SHALL BE 23/32" UNO. SEE GENERAL NOTES FOR MORE INFORMATION. SEE TYPICAL DETAIL FOR ATTACHMENT AND LAYOUT REQUIREMENTS. BLOCKING IS NOT REQUIRED UNLESS NOTED IN DETAILS. REFER TO STRUCTURAL GENERAL NOTES FOR ADDITIONAL REQUIREMENTS.
3. FOR ELEVATIONS, WALL SECTIONS, AND DIMENSIONS NOT SHOWN, SEE ARCHITECTURAL DRAWINGS.

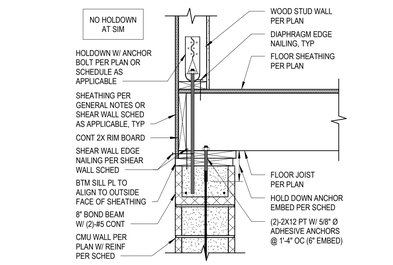
FLOOR FRAMING PLAN NOTES



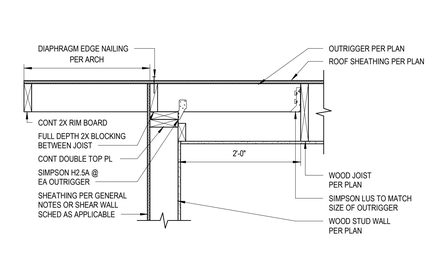
14 FLOOR FRAMING SECTION
S-103 | 1" = 1'-0" | S-103



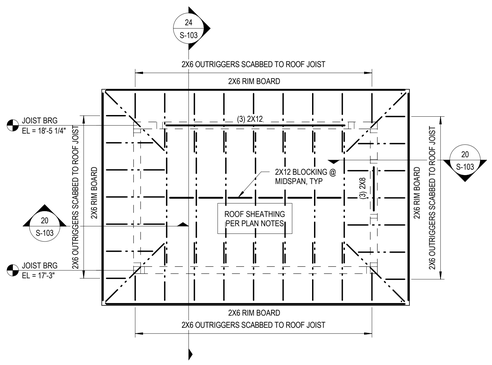
15 FLOOR FRAMING SECTION
S-103 | 1" = 1'-0" | S-103



19 FLOOR FRAMING SECTION
S-103 | 1" = 1'-0" | S-103



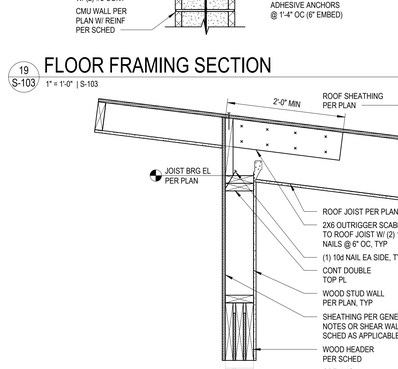
20 ROOF FRAMING SECTION
S-103 | 1" = 1'-0" | S-103



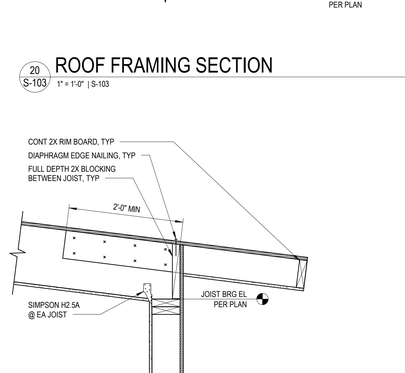
21 ROOF FRAMING PLAN - SCORER BOOTH
S-103 | 1/4" = 1'-0" |

FLOOR FRAMING PLAN NOTES:
1. ELEVATIONS ARE BASED ON A REFERENCE FLOOR ELEVATION OF 0'-0", UNO. TOP OF SLAB ON GRADE BELOW IS AT THE REFERENCE ELEVATION UNLESS NOTED OTHERWISE. REFER TO CIVIL DRAWINGS FOR MSE SITE ELEVATIONS.
2. WOOD ROOF SHEATHING SHALL BE 19/32" UNO. SEE GENERAL NOTES FOR MORE INFORMATION. SEE TYPICAL DETAIL FOR ATTACHMENT AND LAYOUT REQUIREMENTS. BLOCKING IS NOT REQUIRED UNLESS NOTED IN DETAILS. REFER TO STRUCTURAL GENERAL NOTES FOR ADDITIONAL REQUIREMENTS.
3. WINDOW AND DOOR HEADERS TO BE (3)-2X12 MIN, TYP UNO.

ROOF FRAMING PLAN NOTES



24 ROOF FRAMING SECTION
S-103 | 1" = 1'-0" | S-103



MHM

McCarty Holsaple McCarty
550 W. Main St., Suite 300
Knoxville, TN 37902
t 865.544.2000
www.mhminc.com

Project Information:

24023

OAK RIDGE HIGH SCHOOL SOFTBALL
15 WILBERFORCE AVE
OAK RIDGE, TN 37830

OAK RIDGE SCHOOLS

Seal:

Project Status

Consultant:

HAINES STRUCTURAL GROUP
800 S. GAY STREET, STE. 1705 KNOXVILLE, TN 37929
(865) 329-9920 | WWW.HAINES-SG.COM
project no. 24035

#	ISSUED BY:	DATE

Issue Date:	AUG 05, 2024
PIC	R. HAINES
PM	C. BROWN
PA	C. BROWN
Drawn By:	K.SHERRILL
Checked By:	T. WHELAN

Sheet Information:

S-103

FRAMING PLANS - SCORER BOOTH

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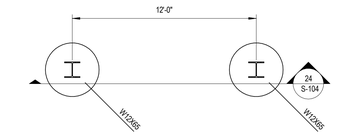
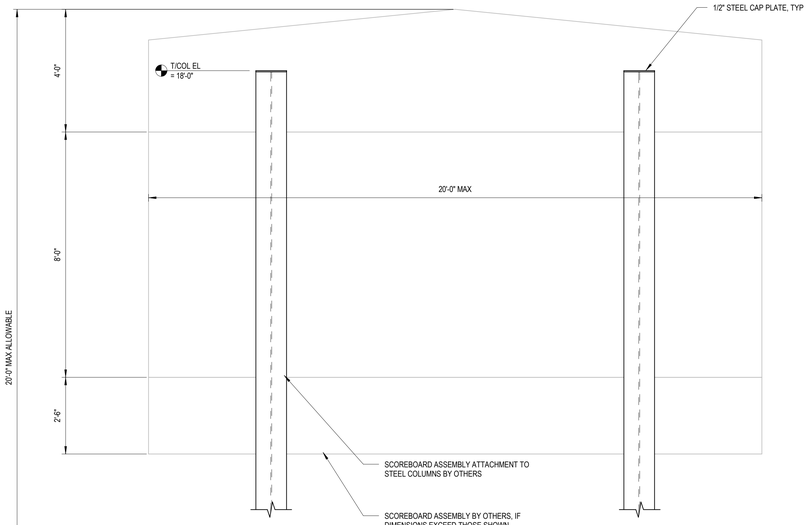
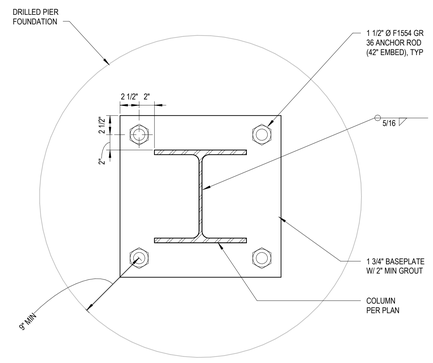


9 S-104 SCOREBOARD FOUNDATION PLAN

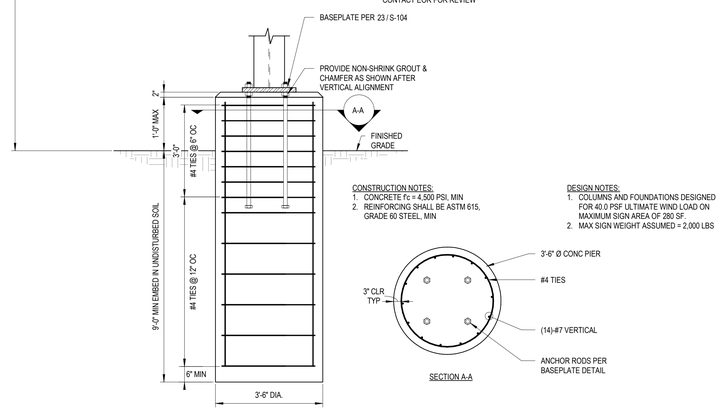
1/4" = 1'-0"





23 S-104 SCOREBOARD POST BASEPLATE DETAIL

1 1/2" = 1'-0"



CONSTRUCTION NOTES:
1. CONCRETE f'c = 4,500 PSI, MIN
2. REINFORCING SHALL BE ASTM 615, GRADE 60 STEEL, MIN

DESIGN NOTES:
1. COLUMNS AND FOUNDATIONS DESIGNED FOR 40.0 PSF ULTIMATE WIND LOAD ON MAXIMUM SIGN AREA OF 280 SF.
2. MAX SIGN WEIGHT ASSUMED = 2,000 LBS

24 S-104 TYPICAL SCOREBOARD POST FOUNDATIONS

1/2" = 1'-0"

8/5/2024 4:23:00 PM

MHM

McCarty Holsaple McCarty
550 W. Main St., Suite 300
Knoxville, TN 37902
t 865.544.2000
www.mhminc.com

Project Information:

24023

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15 WILBERFORCE AVE
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OAK RIDGE SCHOOLS

Seal:

Project Status

Consultant:

HAINES STRUCTURAL GROUP
800 S. GAY STREET, STE. 1703 KNOXVILLE, TN 37929
(865) 329-9920 | WWW.HAINES-SG.COM
project no. 24033

#	ISSUED BY:	DATE

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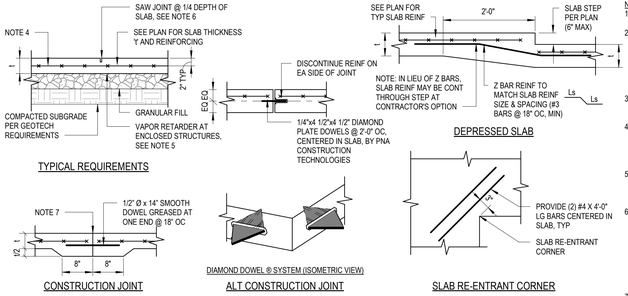
PIC	R. HAINES
PM	C. BROWN
PA	C. BROWN
Drawn By:	K. SHERRILL
Checked By:	T. WHELAN

Sheet Information:

S-104

FRAMING PLANS - SCOREBOARD



TYPICAL REQUIREMENTS

DEPRESSED SLAB

CONSTRUCTION JOINT

DIAMOND DOWEL @ SYSTEM (ISOMETRIC VIEW)

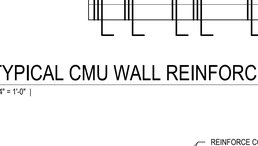
ALT CONSTRUCTION JOINT

SLAB RE-ENTRANT CORNER

NOTES:
1. ALL SLAB-ON-GRADE CONSTRUCTION SHALL FOLLOW THE RECOMMENDATIONS OF ACI 302.1 "GUIDE FOR CONCRETE FLOOR AND SLAB CONSTRUCTION"
2. PROVIDE CURING, FINISHING & SEALING OF SLABS PER ACI 302.1 GUIDELINES. CONCRETE SLABS SHALL CONFORM TO ACI 117-90 FOR FLATNESS AND LEVELNESS. PROVIDE CLASS 1 FLOOR FINISH WITH A FLATNESS/LEVELNESS OF 25/20 (16/13 MIN) ACCORDING TO ASTM E1155, UNLESS SHOWN ON ARCHITECTURAL DRAWINGS OR OTHERWISE NOTED. CONTRACTOR TO PROVIDE FLOOR FLATNESS AND LEVELNESS TESTING WITHIN 72 HOURS OF CONCRETE FINISHING. TEST RESULTS SHALL BE PROVIDED TO THE ARCHITECT AND STRUCTURAL ENGINEER.
3. PROVIDE CURING USING A LIQUID MEMBRANE-FORMING CURING COMPOUND. PROVIDE A POLYETHYLENE (PLASTIC) FILM WHERE WEATHER/TEMPERATURE CONDITIONS REQUIRE ADDITIONAL PROTECTION FOR CURING.
4. WIRE FABRIC SHALL BE PLACED 2" BELOW TOP OF SLAB, UNO. WWF SHALL BE SUPPORTED AT A MAXIMUM SPACING OF 3'-0" OC IN ANY DIRECTION. ALL WELDED WIRE FABRIC SHALL LAP TWO FULL MESHES AND BE SECURELY WIRED AT EACH SIDE AND END. WELDED WIRE FABRIC SHALL BE FABRICATED FROM SHEETS. ROLLS ARE NOT ALLOWED.
5. A VAPOR BARRIER SHALL BE PROVIDED BELOW SLAB-ON-GRADE AT ALL INTERIOR LOCATIONS. VAPOR BARRIER SHALL BE LAPPED AND TAPED AS REQUIRED BY MANUFACTURER. SEE ARCHITECTURAL FOR ADDITIONAL VAPOR BARRIER REQUIREMENTS.
6. PROVIDE CONTROL JOINTS THAT DIVIDE THE SLAB-ON-GRADE INTO RECTANGULAR AREAS WITH LENGTH TO WIDTH RATIOS OF 1.5 OR LESS. LOCATE CONTROL JOINTS UNDER PARTITIONS AND ON COLUMN LINES WHERE POSSIBLE. SUBMIT JOINT LOCATIONS TO OWNER'S REPRESENTATIVE FOR APPROVAL PRIOR TO CONSTRUCTION. CONTROL JOINT LOCATIONS SHOWN ON PLAN ARE THE MINIMUM ALLOWABLE BASED ON ONE CONTINUOUS SLAB POUR. ADDITIONAL JOINTS SHALL BE ADDED BY THE CONTRACTOR AS REQUIRED BASED ON POUR SEQUENCE AND SLAB LAYOUT. CONTROL JOINT SPACING SHALL NOT EXCEED THE MAXIMUM SPACING NOTED ON PLAN.
7. ALL CONSTRUCTION JOINTS SHALL BE PLACED AT COLUMN LINES OR UNDER PARTITIONS AT DISCRETION OF CONTRACTOR. FOR SLAB POUR MAINTAIN CONSISTENT SPACING WITH CONTROL JOINTS.

1 S-201 TYPICAL SLAB-ON-GRADE CONSTRUCTION
3/4" = 1'-0" |

COLUMN FOOTING SCHEDULE				
MARK	LENGTH	WIDTH	DEPTH	REINFORCEMENT
F42	3'-6"	3'-6"	1'-4"	(5)-#5 EW BTM
TF24	2'-0"	2'-0"	1'-0"	(3)-#5 EW BTM



6 S-201 TYPICAL COLUMN FOOTING SCHEDULE
1" = 1'-0" |

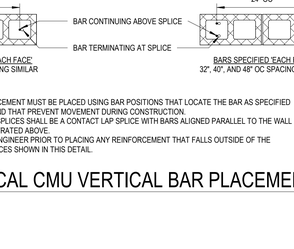
NOTES:
1. NOTATIONS:
   db: NOMINAL BAR DIAMETER (INCHES)
   Ld: TENSION DEVELOPMENT LENGTH (INCHES) FOR REINFORCEMENT SATISFYING THE FOLLOWING REQUIREMENTS:
   SLABS AND WALLS : CLEAR SPACING > 2db, AND CONCRETE CLEAR COVER > db
   BEAMS AND COLUMNS: CLEAR SPACING > db, AND CONCRETE CLEAR COVER > db
   Lt: DEVELOPMENT LENGTH OF BARS IN THICK CONCRETE = 1.3 X Ld (INCHES)
   Lb: DEVELOPMENT LENGTH OF BARS OR DOWELS IN COMPRESSION = 19 X db (INCHES)
   Lc: TIED COLUMN LAP SPLICE IN COMPRESSION = 30 X db (INCHES)
   Lcs: SPIRAL COLUMN LAP SPLICE IN COMPRESSION = 22.5 X db (INCHES)
   Ls: TYPICAL LAP SPLICE LENGTH = 1.3 X Ld (INCHES)
   Lab: LAP SPLICE LENGTH OF HORIZONTAL BARS IN THICK CONCRETE = 1.69 X Ld (INCHES)
2. MULTIPLY VALUES IN THE TABLE BY 1.5 IF CLEAR SPACING OR CONCRETE COVER DO NOT MEET THE REQUIREMENTS FOR Ld IN NOTE 1.
3. MULTIPLY VALUES IN THE TABLE BY 1.5 IF CLEAR SPACING OR CONCRETE COVER DO NOT MEET THE REQUIREMENTS FOR Ld IN NOTE 1.
4. "HORIZONTAL BARS IN THICK CONCRETE" REFERS TO BARS WITH MORE THAN 12 INCHES OF FRESH CONCRETE CAST BELOW. THIS INCLUDES BEAMS, SLABS, FOUNDATIONS, AND WALLS.
5. THE DEVELOPMENT AND SPLICE LENGTHS ARE BASED ON REINFORCEMENT STRENGTH Fy = 60 KSI.
6. #14 AND #18 BARS SHALL NOT BE LAP SPLICED. SEE "GENERAL NOTES"
7. MULTIPLY VALUES IN THE TABLE BY 1.3 FOR USE WITH LIGHTWEIGHT AGGREGATE CONCRETE.
8. ALL BENDS SHALL BE MADE COLD
9. #14 AND #18 BARS SHALL BE BEND TESTED & LAB APPROVED PRIOR TO BENDING

f'c = 3,000 PSI

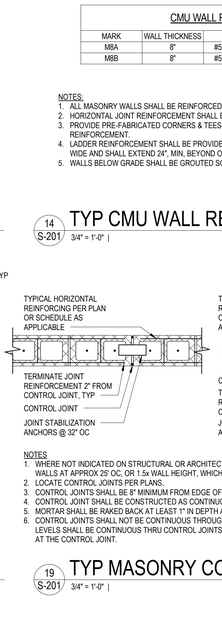
BAR SIZE	Ld	Lt	Ls	Lsb
#3	17	22	22	28
#4	22	29	29	38
#5	28	36	36	47
#6	33	43	43	56
#7	48	63	63	81
#8	55	72	72	93
#9	62	81	81	105
#10	70	91	91	118
#11	78	101	101	131
#14	93	121	--	--
#18	124	161	--	--

f'c = 4,000 & 4,500 PSI

BAR SIZE	Ld	Lt	Ls	Lsb
#3	15	19	19	25
#4	19	25	25	33
#5	24	31	31	41
#6	29	37	37	49
#7	42	54	54	71
#8	48	62	62	81
#9	54	70	70	91
#10	61	79	79	102
#11	67	87	87	114
#14	81	105	--	--
#18	108	140	--	--

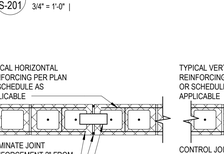


7 S-201 CONCRETE DEVELOPMENT LENGTH & REINF BEND SCHEDULE
3/4" = 1'-0" |

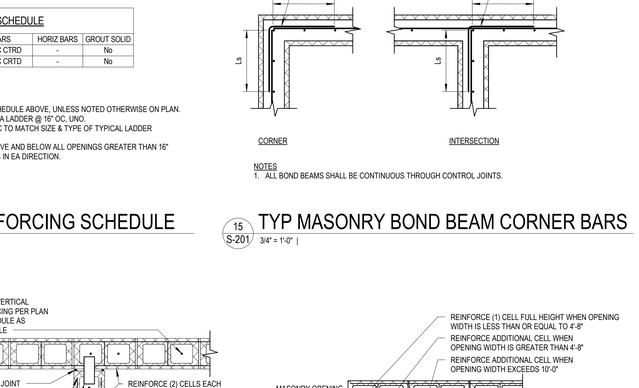


WALL FOOTING SECTION A-A

WALL FOOTING SCHEDULE			
MARK	WIDTH	DEPTH	REINFORCEMENT
TS18	1'-6"	1'-6"	(3)-#5 CONT W/ #5 X 1'-0" TRANS @ 1'-6" OC
W24	2'-0"	1'-0"	(3)-#5 CONT W/ #5 X 1'-6" TRANS @ 1'-4" OC
W30	2'-6"	1'-0"	(3)-#5 CONT W/ #5 X 2'-0" TRANS @ 1'-6" OC
W42	3'-6"	1'-0"	(4)-#5 CONT W/ #5 X 3'-0" TRANS @ 1'-6" OC

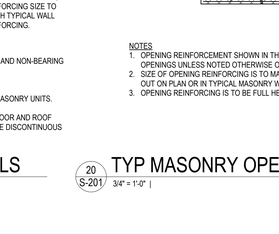


WALL FOOTING ELEVATION B-B



WALL FOOTING PLAN AT CORNER

3 S-201 TYPICAL WALL FOOTING REINFORCING SCHEDULE
1" = 1'-0" | S-101



SECTION A-A

NOTES:
1. IF PIPE IS GREATER THAN 4'-0" BELOW BOTTOM OF FOOTING, NO CONCRETE TRENCH SHALL BE REQUIRED.
2. TRENCH WIDTH TO EQUAL FOOTING WIDTH ABOVE.
3. FTG & TRENCH MAY BE POURED MONOLITHICALLY @ CONTRACTORS OPTION.
4. PIPES MAY BE ENCASED BELOW THE FTG, EMBEDDED IN THE FOOTING ABOVE THE REINFORCEMENT, OR THROUGH THE STEM WALL BELOW THE SLAB AS SHOWN.
5. FOR PIPES RUNNING THROUGH FOOTING: PIPE SHALL PASS ABOVE FOOTING REINF. DO NOT BREAK FOOTING REINF. MAINTAIN 3" MIN CONCRETE COVER. MAINTAIN 2" OF CONCRETE BETWEEN PIPE SLEEVE AND REINFORCEMENT, MIN AS SHOWN.
6. FOR PIPES RUNNING PARALLEL TO STRIP FOOTINGS, FOOTING DEPTH AND PIPE LOCATION SHALL BE COORDINATED SO THAT THE PIPE IS NOT WITHIN THE FTG LOAD DISTRIBUTION THAT EXTENDS AT 45 DEGREE ANGLE OUT FROM THE BOTTOM EDGE OF THE FOOTING AS SHOWN.
7. IF CLEARANCES WITHIN FOOTING CANNOT BE ACHIEVED, PIPES AND PIPE SLEEVES MAY NOT BE INSTALLED THROUGH THE FOOTING.

9 S-201 TYPICAL PIPE AND TRENCH LOCATIONS AT FOOTINGS / WALLS
NTS |

11 S-201 TYPICAL FOOTING STEP
3/4" = 1'-0" |

THICKENED SLAB EDGE SCHEDULE			
MARK	DEPTH	WIDTH	REINFORCING
TE	1'-4"	1'-0"	(2)-#5 CONT W/ #5 TRANSVERSE @ 1'-6" OC

12 S-201 TYPICAL THICKENED SLAB EDGE DETAIL
1" = 1'-0" | S-101

CMU SPLICE AND DEVELOPMENT LENGTHS			
BAR SIZE	Ld & Ls		STD HOOK DEV LENGTH, Lh
	CENTERED	AT FACE	
#3	13	17	5
#4	17	30	9
#5	22	45	8
#6	37	54	9
#7	51	63	11
#8	79	79	12

(ALL VALUES IN INCHES)
f'm = 2,000 PSI
fs = 32,000 PSI

13 S-201 CMU DVPMT & SPLICE LENGTH SCHEDULE
3/4" = 1'-0" |

CMU WALL REINF SCHEDULE				
MARK	WALL THICKNESS	VERT BARS	HORIZ BARS	GROUT SOLID
M8A	8"	#5 @ 48" OC CTRD	-	No
M8B	8"	#5 @ 16" OC CRTD	-	No

NOTES:
1. ALL MASONRY WALLS SHALL BE REINFORCED PER SCHEDULE ABOVE. UNLESS NOTED OTHERWISE ON PLAN.
2. HORIZONTAL JOINT REINFORCEMENT SHALL BE (2) 9 GA LADDER @ 16" OC, UNO.
3. PROVIDE PRE-FABRICATED CORNERS & TEES @ 16" OC TO MATCH SIZE & TYPE OF TYPICAL LADDER REINFORCEMENT.
4. LADDER REINFORCEMENT SHALL BE PROVIDED 8" ABOVE AND BELOW ALL OPENINGS GREATER THAN 16" WIDE AND SHALL EXTEND 24", MIN, BEYOND OPENINGS IN EA DIRECTION.
5. WALLS BELOW GRADE SHALL BE GROUTED SOLID.

14 S-201 TYP CMU WALL REINFORCING SCHEDULE
3/4" = 1'-0" |

CORNER

INTERSECTION

NOTES
1. ALL BOND BEAMS SHALL BE CONTINUOUS THROUGH CONTROL JOINTS.

15 S-201 TYP MASONRY BOND BEAM CORNER BARS
3/4" = 1'-0" |

CMU WALL CONSTRUCTION NOTES
1. COORDINATE WITH ARCH / MECH / ELEC & PLUMBING DRAWINGS FOR SIZE AND LOCATION OF ALL OPENINGS THROUGH WALLS.
2. VERTICAL CONTROL JOINTS ARE LOCATED ON THE STRUCTURAL PLANS. SEE 'TYPICAL CMU WALL CONTROL JOINT DETAIL' FOR CONSTRUCTION REQUIREMENTS.
3. HOLES TO BE CORED IN WALLS AFTER CONSTRUCTION SHALL BE LOCATED SUCH THAT NO HORIZ OR VERT REINF IS CUT. ALL HOLES SHALL BE SEALED WITH ELASTOMERIC SEALANT.
4. REINFORCING SHALL BE AS INDICATED ON THE PLANS. WHERE NOT CALLED OUT ON PLAN, PROVIDE REINFORCING PER TYPICAL MASONRY WALL REINFORCING SCHEDULE.
5. SLOPE FOR VERTICAL OFFSET BARS NOT TO EXCEED 1:6.
6. REINF INDICATED AS TYPICAL APPLIES TO THE ENTIRE LENGTH OF WALL, UNO.
7. ALL CELLS WITH REINF ARE TO BE GROUTED SOLID.
8. ALL WALLS ARE TO BE LAID UP IN RUNNING BOND, UNO.
9. ADDITIONAL REINFORCING SHALL BE PROVIDED AS NOTED IN TYPICAL DETAILS AND SCHEDULES. FOR TYPICAL OPENING, SEE ELEVATION.
10. BENDING OF DOWELS OUT OF STEM WALLS FOR ALIGNMENT INTO CELLS OF MASONRY UNITS IS NOT PERMITTED UNLESS APPROVED BY THE STRUCTURAL ENGINEER.
11. VERT REINF SHALL BE POSITIONED AND TIED AT EACH BAR LAP. CENTER BAR IN CELL, UNO. SEE TYPICAL VERTICAL BAR POSITIONING DETAIL FOR MORE INFORMATION.
12. COORDINATE PLACEMENT OF VERTICAL BARS TO AVOID INTERFERENCE WITH BEAM BEARING PLATES AND EMBEDS.

16 S-201 TYPICAL CMU WALL REINFORCING - ELEVATION
3/4" = 1'-0" |

NOTES:
1. REINFORCEMENT MUST BE PLACED USING BAR POSITIONS THAT LOCATE THE BAR AS SPECIFIED ABOVE AND THAT PREVENT MOVEMENT DURING CONSTRUCTION.
2. ALL BAR SPLICES SHALL BE A CONTACT LAP SPLICE WITH BARS ALIGNED PARALLEL TO THE WALL AS ILLUSTRATED ABOVE.
3. NOTIFY ENGINEER PRIOR TO PLACING ANY REINFORCEMENT THAT FALLS OUTSIDE OF THE TOLERANCES SHOWN IN THIS DETAIL.

18 S-201 TYPICAL CMU VERTICAL BAR PLACEMENT
3/4" = 1'-0" |

NOTES
1. WHERE NOT INDICATED ON STRUCTURAL OR ARCHITECTURAL PLANS, SPACE CONTROL JOINT FOR BEARING AND NON-BEARING WALLS AT APPROX 25' OC, OR 1.5x WALL HEIGHT, WHICHEVER IS LESS.
2. LOCATE CONTROL JOINTS PER PLANS.
3. CONTROL JOINTS SHALL BE 8" MINIMUM FROM EDGE OF OPENINGS.
4. CONTROL JOINT SHALL BE CONSTRUCTED AS CONTINUOUS VERTICAL HEAD JOINTS USING FULL AND HALF MASONRY UNITS.
5. MORTAR SHALL BE RAKED BACK AT LEAST 1" IN DEPTH AND CAULKED PER ARCH DRAWINGS.
6. CONTROL JOINTS SHALL NOT BE CONTINUOUS THROUGH BOND BEAMS. BOND BEAM REINFORCEMENT AT FLOOR AND ROOF LEVELS SHALL BE CONTINUOUS THRU CONTROL JOINTS. ALL OTHER HORIZONTAL REINFORCEMENT SHALL BE DISCONTINUOUS AT THE CONTROL JOINT.

19 S-201 TYP MASONRY CONTROL JOINT DETAILS
3/4" = 1'-0" |

NOTES
1. OPENING REINFORCEMENT SHOWN IN THIS DETAIL IS TYPICAL AT EACH SIDE OF ALL OPENINGS UNLESS NOTED OTHERWISE ON PLAN.
2. SIZE OF OPENING REINFORCING IS TO MATCH SIZE OF TYPICAL WALL REINFORCING CALLED OUT ON PLAN OR IN TYPICAL MASONRY WALL REINFORCING SCHEDULE AS APPLICABLE.
3. OPENING REINFORCING IS TO BE FULL HEIGHT OF WALL.

20 S-201 TYP MASONRY OPENING REINFORCEMENT
3/4" = 1'-0" |

NOTES
1. CORNER REINFORCEMENT SHOWN IN THIS DETAIL IS TYPICAL AT ALL CORNERS UNLESS NOTED OTHERWISE ON PLAN.
2. SIZE OF CORNER REINFORCING IS TO MATCH SIZE OF TYPICAL WALL REINFORCING CALLED OUT ON PLAN OR IN TYPICAL MASONRY WALL REINFORCING SCHEDULE AS APPLICABLE.
3. CORNER REINFORCING IS TO BE FULL HEIGHT OF WALL.

21 S-201 TYP MASONRY CORNER REINFORCEMENT
3/4" = 1'-0" |

NOTES:
1. 'S' DENOTES CLEAR SPAN OF LINTEL.
2. FOR LINTELS NOT CALLED OUT ON PLAN, PROVIDE LINTELS AS SHOWN ABOVE BASED ON THE CLEAR SPAN SHOWN.
3. PROVIDE MINIMUM BEARING LISTED ABOVE ON EACH SIDE OF OPENING, TYP
4. VERTICAL JAM STEEL SHALL BE CONTINUOUS THROUGH LINTEL BEARING, TYP
5. CONVENTIONAL MASONRY LINTELS MUST BE SHORED UNTIL GROUT HAS CURED FOR 7 DAYS.
6. ONE COURSE EQUALS 8" IN HEIGHT.
7. TYPICAL VERTICAL & HORIZONTAL WALL REINFORCEMENT IS REQUIRED ABOVE ALL LINTELS. NOT SHOWN HERE FOR CLARITY.
8. VERTICAL WALL REINFORCING TO EXTEND TO BOTTOM OF LINTEL, TYP
9. U-BLOCKS SHALL BE USED FOR LINTELS. OPEN CELL LINTEL BLOCKS WITH FORMED BOTTOMS ARE NOT PERMITTED.

22 S-201 TYPICAL CONVENTIONAL MASONRY LINTELS
1" = 1'-0" |

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MHM
McCarty Holsaple McCarty
550 W. Main St., Suite 300
Knoxville, TN 37902
t 865.544.2000
www.mhminc.com

Project Information:

24023

OAK RIDGE HIGH SCHOOL SOFTBALL
15 WILBERFORCE AVE
OAK RIDGE, TN 37830

OAK RIDGE SCHOOLS

Seal:

Project Status

Consultant:

HAINES STRUCTURAL GROUP
800 S. GAY STREET, STE. 1710, KNOXVILLE, TN 37929
(865) 329-9920 | WWW.HAINES-SG.COM
project no. 24033

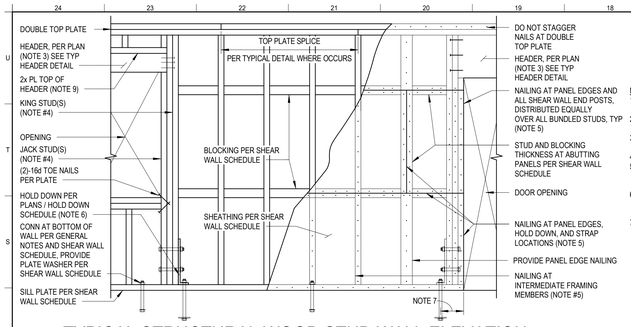
#	ISSUED BY:	DATE

Issue Date:	AUG 05, 2024
PIC	R. HAINES
PM	C. BROWN
PA	C. BROWN
Drawn By:	K. SHERRILL
Checked By:	T. WHELAN

Sheet Information:

S-201

TYPICAL DETAILS - CONCRETE & MASONRY

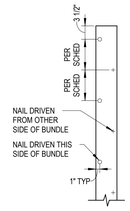


NOTES:
1. THIS DIAGRAM IS TO BE USED IN CONJUNCTION WITH DETAILS ON THIS SHEET.
2. UNLESS NOTED OTHERWISE, NAILING SHALL CONFORM TO IBC TABLE 2304.9.1.
3. KING AND JACK STUDS PER SCHEDULE, NAILED TOGETHER PER BUNDLED STUD SCHEDULE.
4. NAILING REQUIREMENTS PER SHEAR WALL SCHEDULE.
5. LOCATE HOLD DOWNS AS CLOSE TO THE END OF THE SHEAR WALL AS POSSIBLE. NOTIFY ENGINEER IF LOCATED MORE THAN 10 INCHES FROM EDGE OF WALL.
6. ANCHOR BOLT LAYOUT STARTS 4" MIN, 12" MAX FROM EACH END OF THE CONCRETE WALL WITH 2 BOLTS, MINIMUM, PER WALL. 7" EMBED HOLD DOWN ANCHORS MAY BE COUNTED AS ANCHOR BOLTS.
7. SEE TYPICAL STRUCTURAL WALL INTERSECTION DETAIL FOR WALL CORNERS AND INTERSECTIONS.

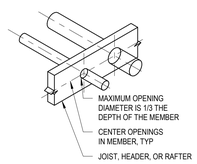
1 S-202 TYPICAL STRUCTURAL WOOD STUD WALL ELEVATION
3/4" = 1'-0"

BUNDLED STUD SCHEDULE		
# OF STUDS	STUD SIZE	FACE NAILING FOR BUNDLED STUDS
2	2x	10d @ 6" OC STAGGERED ALT FACE
3	2x	20d @ 8" OC STAGGERED ALT FACE
4	2x	20d @ 8" OC STAGGERED ALT FACE

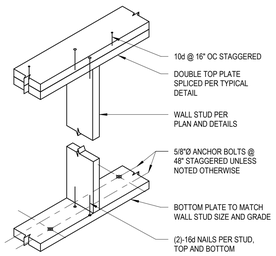
NOTES:
1. AS ALTERNATE TO BUNDLED STUD NAILING FOR BUNDLES OF 3 OR MORE, STUDS MAY BE BUNDLED PER 2 STUDS WITH 10d @ 6" OC STAGGERED FOR EACH ADDITIONAL STUD.
2. ALL BUNDLED STUDS SHALL BE CONSIDERED AS ONE STUD IN ALL DETAILS THAT CALL FOR A "NUMBER OF STUDS".



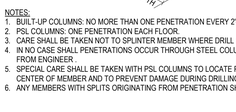
6 S-202 BUNDLED STUD SCHEDULE
3/4" = 1'-0"



NOTE: DETAIL ONLY APPLIES TO SAWN LUMBER. DETAIL DOES NOT APPLY TO HEAVY TIMBER OR ENGINEERED LUMBER (LSL, LVL, PSL, OR I-JOIST)



7 S-202 TYPICAL WOOD WALL STUD ANCHORAGE
1" = 1'-0"

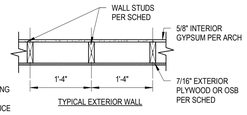


NOTES:
1. BUILT-UP COLUMNS: NO MORE THAN ONE PENETRATION EVERY 2'-0" VERTICAL ALONG MEMBER LENGTH.
2. PSL COLUMNS: ONE PENETRATION EACH FLOOR.
3. CARE SHALL BE TAKEN NOT TO SPLINTER MEMBER WHERE DRILL BIT WILL EMERGE.
4. IN NO CASE SHALL PENETRATIONS OCCUR THROUGH STEEL COLUMNS WITHOUT WRITTEN CONSENT FROM ENGINEER .
5. SPECIAL CARE SHALL BE TAKEN WITH PSL COLUMNS TO LOCATE PENETRATION DIRECTLY THROUGH CENTER OF MEMBER AND TO PREVENT DAMAGE DURING DRILLING.
6. ANY MEMBERS WITH SPLITS ORIGINATING FROM PENETRATION SHALL BE REPLACED.

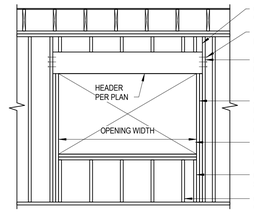
WOOD STUD WALL SCHEDULE	
MARK	STUD SIZE & SPACING
WS6A	2X6 @ 16" OC

STUD WALL FRAMING NOTES:
1. THIS WALL SCHEDULE APPLIES ONLY TO STRUCTURAL BEARING AND SHEAR WALLS.
2. STUD SIZE AND SPACING IS BASED ON NO1/NO2 GRADE SPRUCE PINE FIR MATERIAL WITH THE FOLLOWING PROPERTIES.
3. Fb = 875 psi, Fc = 1150 psi, E = 1400 ksi
4. ALL EXTERIOR, BREEZEWAY, AND SHARED TENANT WALLS ARE CONSIDERED STRUCTURAL AND SHALL BE CONSTRUCTED BY THIS SCHEDULE.
5. WHERE ARCHITECTURAL STUD REQUIREMENTS CONFLICT WITH THIS SCHEDULE, THE MORE RESTRICTIVE SHALL APPLY.
6. ALL STUD WALLS, STRUCTURAL AND NON-STRUCTURAL, SHALL BE FRAMED AT A MINIMUM WITH 2X4 STUDS @ 16" OC, TYP

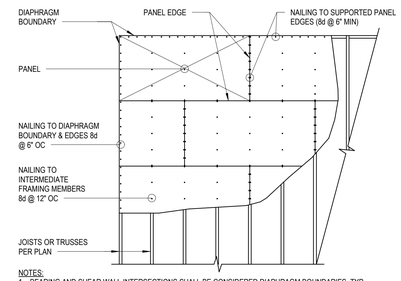
3 S-202 WOOD WALL STUD SCHEDULE
3/4" = 1'-0"



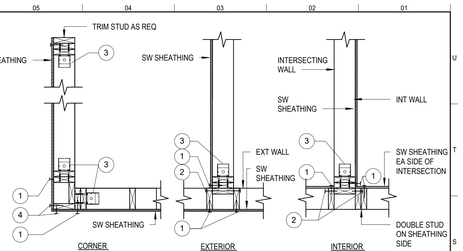
TYPICAL EXTERIOR WALL



4 S-202 TYPICAL HEADER DETAIL
3/8" = 1'-0"

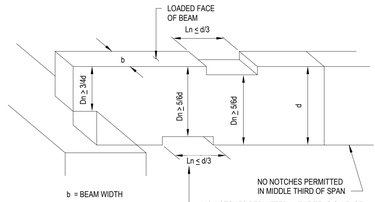


NOTES:
1. BEARING AND SHEAR WALL INTERSECTIONS SHALL BE CONSIDERED DIAPHRAGM BOUNDARIES, TYP
2. FLOOR AND ROOF SHEATHING PANELS SHALL BE STAGGERED AS SHOWN WITH LONG DIRECTION OF SHEATHING PERPENDICULAR TO TRUSSES OR JOISTS. SEE SHEARWALL SCHEDULE FOR WALL SHEATHING PANEL ORIENTATION.



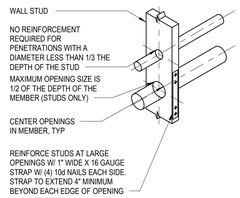
1. PLYWOOD OR OSB PANEL EDGE NAILING PER SHEAR WALL SCHEDULE
2. NAILING TO MATCH SHEAR WALL SCHEDULE SPACING
3. HOLD DOWN AND END POST STUDS PER SHEARWALL SCHEDULE AND PLANS.
4. NAIL SHEATHING TO TRIM STUDS W/ 8d NAILS @ 12" OC, TYP

5 S-202 TYPICAL WALL INTERSECTION
3/4" = 1'-0"



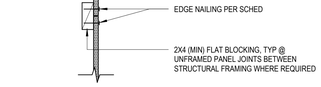
b = BEAM WIDTH
d = BEAM DEPTH
Dn = DEPTH OF BEAM AT NOTCH
Ln = NOTCH LENGTH

NO NOTCHES PERMITTED IN THE TENSION FACE WHEN b>3-1/2" (EXCEPT WHEN NOTCHED AT ENDS FORBEARING OVER A SUPPORT)

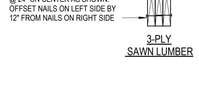


NOTES:
1. NO MORE THAN ONE PENETRATION EVERY 2'-0" VERTICAL ALONG MEMBER LENGTH.
2. CARE SHALL BE TAKEN NOT TO SPLINTER MEMBER WHERE DRILL BIT WILL EMERGE.
3. ANY MEMBERS WITH SPLITS ORIGINATING FROM PENETRATION SHALL BE REPLACED.

8 S-202 TYP WALL STUD PENETRATION DETAILS
1" = 1'-0"



9 S-202 TYP ROOF / FLOOR SHEATHING LAYOUT
3/4" = 1'-0"



10 S-202 TYP NOTCH LIMITS FOR SAWN LUMBER
3/4" = 1'-0"

WOOD STRINGER SIZE	MINIMUM EFFECTIVE DEPTH, "X"
2X12	5"

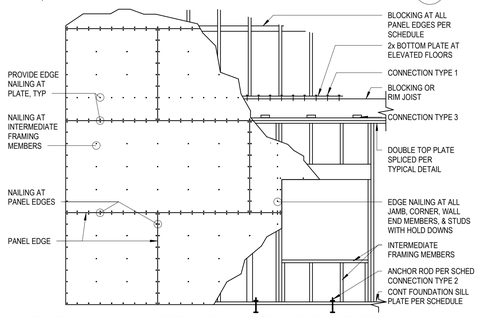
NOTES:
1. DRILL 1/4" HOLE AT EACH NOTCH CORNER AND CUT TO THE HOLE. CARE SHOULD BE TAKEN NOT TO OVERCUT NOTCHES.
2. IF NOTCHES ARE OVERCUT, EFFECTIVE DEPTH SHALL BE MEASURED PERPENDICULAR FROM BOTTOM FACE OF STRINGER TO EDGE OF NOTCH. WHERE MINIMUM EFFECTIVE DEPTH LISTED IS NOT OBTAINED, STRINGER SHALL BE REPLACED.

11 S-202 TYPICAL WOOD JOIST PENETRATION
1" = 1'-0"

CONNECTION	NAIL	LOCATION
JOIST TO SILL OR GIRDER	(3) - 8d COMMON	TOE NAIL
BRIDGING TO JOIST	(2) - 8d COMMON	TOE NAIL EACH END
1" X 6" SUBFLOOR OR LESS TO EACH JOIST	(2) - 8d COMMON	FACE NAIL
WIDER THAN 1" X 6" SUBFLOOR TO EACH JOIST	(3) - 8d COMMON	FACE NAIL
2" SUBFLOOR TO JOIST OR GIRDER	(2) - 16d COMMON	BLIND & FACE NAIL
SOLE PLATE TO JOIST OR BLOCKING	16d COMMON @ 16" OC	TYPICAL FACE NAIL
SOLE PLATE TO JOIST OR BLOCKING @ BRACED WALL PANEL	(3) - 16d COMMON @ 16" OC	BRACED WALL PANELS
TOP PLATE TO STUD	(2) - 16d COMMON	END NAIL
STUD TO SOLE PLATE	(4) - 8d COMMON	TOE NAIL
STUD TO SOLE PLATE	(2) - 16d COMMON	END NAIL
DOUBLED STUDS	16d (3 1/2" x 0.135") @ 24" OC	FACE NAIL
DOUBLED TOP PLATE	16d (3 1/2" x 0.135") @ 16" OC	TYPICAL FACE NAIL
DOUBLED TOP PLATE	(8) - 16d COMMON	LAP SPLICE
BLOCKING BETWEEN JOISTS OR RAFTERS TO TOP PLATE	(3) - 8d COMMON	TOE NAIL
RIM JOIST TO TOP PLATE	8d (2 1/2" x 0.131") @ 6" OC	TOE NAIL
TOP PLATES, LAPS AND INTERSECTIONS	(2) - 16d COMMON	FACE NAIL
CONTINUOUS HEADER, TWO PIECES	16d COMMON @ 16" OC	ALONG EDGE
CEILING JOISTS TO PLATE	(3) - 8d COMMON	TOE NAIL
CONTINUOUS HEADER TO STUD	(4) - 8d COMMON	TOE NAIL
CEILING JOISTS, LAPS OVER PARTITIONS	(3) - 16d COMMON	FACE NAIL (SEE TABLE 2304.10.1)
CEILING JOISTS TO PARALLEL RAFTERS	(3) - 16d COMMON	FACE NAIL (SEE TABLE 2304.10.1)
RAFTER TO PLATE	(3) - 8d COMMON	TOE NAIL
1" DIAGONAL BRACE TO EACH STUD AND PLATE	(2) - 8d COMMON	FACE NAIL
1" X 8" SHEATHING TO EACH BEARING	(3) - 8d COMMON	FACE NAIL
WIDER THAN 1" X 8" SHEATHING TO EACH BEARING	(3) - 8d COMMON	FACE NAIL
BUILT-UP CORNER STUDS	16d COMMON @ 24" OC	FACE NAIL
BUILT-UP GIRDER AND BEAMS	20d COMMON @ 32" OC	FACE NAIL AT TOP AND BOT STAGGERED ON OPPOSITE SIDES
	(2) - 20d COMMON	FACE NAIL AT ENDS AND AT EACH SPLICE
2" PLANKS	16d COMMON	AT EACH BEARING
COLLAR TIE TO RAFTER	(3) - 10d COMMON	FACE NAIL
JACK RAFTER TO HIP	(3) - 10d COMMON	TOE NAIL
	(2) - 16d COMMON	FACE NAIL
ROOF RAFTER TO 2-BY RIDGE BEAM	(2) - 16d COMMON	FACE OR TOE NAIL
JOIST TO BAND JOIST	(3) - 16d COMMON	FACE NAIL

NOTES:
1. USE NAILING SHOWN UNLESS NOTED OTHERWISE ELSEWHERE IN THESE DRAWINGS.
2. WHERE NAILING SHOWN DIFFERS FROM OTHER NAILING REQUIREMENTS IN THESE DRAWINGS OR NAILING REQUIREMENTS IN THE BUILDING CODE, USE MORE STRINGENT REQUIREMENT.

12 S-202 TYP WOOD COLUMN PENETRATION DETAIL
1" = 1'-0"



13 S-202 TYPICAL FLAT BLOCKING DETAIL
1 1/2" = 1'-0"

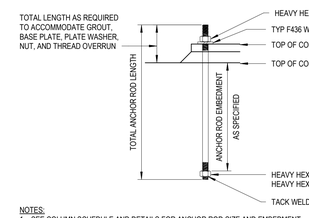
14 S-202 TYP BUILT-UP WOOD BEAM CONNECTIONS
1" = 1'-0"

15 S-202 TYPICAL CUT WOOD STRINGER
1" = 1'-0"

17 S-202 SHEAR WALL SCHEDULE - SPRUCE-PINE-FIR
3/4" = 1'-0"

VALID FOR DIMENSIONAL LUMBER PROJECT	SPRUCE PINE FIR STUD SHEAR WALL SCHEDULE							
	FRAMING REQUIREMENTS		NAILING REQUIREMENTS		WALL BOTTOM PLATE CONNECTION		CONN TO TOP PLATE	
SHEAR WALL TYPE	SHEATHING (NOTES 1,2)	FDN SILL PLATE, WALL STUDS OCCURRING AT ABUTTING PANEL EDGES, & BLOCKING (NOTES 4,5,6)	PANEL EDGES (NOTES 7,8)	INTERMEDIATE FRAMING MEMBERS	SILL TO WOOD FRAMING BELOW (CONNECTION TYPE 1)	SILL TO CONCRETE BELOW (CONNECTION TYPE 2) (NOTES 9,10)	WALL TOP PLATE TO FRAMING ABOVE (CONNECTION TYPE 3) (NOTE 11)	CAPACITY (PLF)
SW6	7/16" SHEATHING 1 SIDE	2x	8d @ 6" OC	8d @ 12" OC	16d @ 8" OC	5/8" Ø x 7" EMBED AB @ 48" OC	CLIPS @ 24" OC	239

NOTES:
1. SHEATHING TO BE APPLIED WITH THE LONG PANEL DIMENSION PERPENDICULAR TO WALL STUDS.
2. USE 15/32" SHEATHING IF PANELS ARE INSTALLED WITH LONG DIMENSION PARALLEL TO WALL STUDS.
3. PANEL JOINTS ON OPPOSITE SIDES OF THE WALL SHALL NOT OCCUR AT THE SAME FRAMING MEMBER.
4. IN LIEU OF 3x MEMBERS, DOUBLE 2x MEMBERS MAY BE USED WHEN NAILED TOGETHER PER WALL BOTTOM PLATE TO WOOD FRAMING BELOW.
5. WALL STUDS NOT OCCURING AT ABUTTING PANEL EDGES MAY BE 2x.
6. WALL BOTTOM PLATES OCCURING ABOVE WOOD FRAMING MAY BE 2x.
7. STAGGER NAILS AT ABUTTING PANEL EDGES.
8. INSTALL BLOCKING AT PANEL EDGES NOT OCCURRING AT STUDS OR PLATES.
9. ANCHOR BOLTS SHALL BE CAST-IN-PLACE, ADHESIVE, OR SCREW-ANCHOR TYPE CONNECTORS AND EMBEDMENT SHALL BE MEASURED TO THE TOP SIDE OF THE EMBEDDED NUT. LOCATE ANCHOR BOLTS WITHIN 8" OF ENDS OF WALLS.
10. FRAMING CLIPS SHALL BE SIMPSON A35, SIMPSON LTP5, OR APPROVED EQUAL.
11. DO NOT OVER DRIVE NAILS. REFER TO GENERAL NOTES.



NOTES:
1. SEE COLUMN SCHEDULE AND DETAILS FOR ANCHOR ROD SIZE AND EMBEDMENT.
2. UNLESS NOTED OTHERWISE, ALL ANCHOR ROD NUTS SHALL BE TIGHTENED TO A "SNUG TIGHT" CONDITION AS DEFINED BY AISC AFTER THE CONCRETE IS AT LEAST 14 DAYS OLD.
3. HOLE IN PLATE WASHER SHALL BE 1/16" LARGER THAN THE ROD DIAMETER.

20 S-202 TYPICAL COLUMN ANCHOR ROD
1 1/2" = 1'-0"

HOLD DOWN SCHEDULE, ANCHOR BOLT TYPES AND INSTALLATION CRITERIA									
HOLD DOWN MARK		WOOD POST AND CONNECTION		HOLD DOWN CAPACITY	ANCHOR SIZE	ADHESIVE ANCHOR TO FND		CIP SIMPSON ANCHOR TO FND	
MARK	HOLD DOWN TYPE	HOLD DOWN WOOD POST (S)	WOOD FASTENERS	DESIGN FORCE	DIAMETER (IN)	EMBED (IN)	EDGE DISTANCE (IN)	TYPE	EMBED (IN)
HDU2	HDU2-SDS2.5	(2) 2x	6-SDS 1/4x2.5	1,350	5/8	6	2-3/4	-	-

NOTES:
1. INSTALL HOLD DOWNS PER MANUFACTURER'S SPECIFICATIONS AND ICC REPORTS. INFORMATION TAKEN FROM THE SIMPSON C-2015 CATALOG.
2. THE CONTRACTOR SHALL MATCH THE WIDTH OF THE STUD WALLS SHOWN ON THE ARCH DRAWINGS. MULTIPLE STUDS SHALL BE NAILED TOGETHER PER TYPICAL BUNDLED STUD SCHEDULE .
3. SEE SHEAR WALL SCHEDULE DETAIL FOR SHEATHING EDGE NAILING REQUIREMENTS AT HOLD DOWN POSTS.
4. THIS SCHEDULE ASSUMES 3,000 PSI CONCRETE OR BETTER.
5. HOLD DOWN WOOD POSTS ABOVE ARE MINIMUM. SEE PLAN FOR ADDITIONAL POSTS.
6. END POSTS ARE TO BE FULL HEIGHT AND MAY REPLACE IN ADDITION TO KING STUDS REQUIRED PER TYPICAL DETAILS.

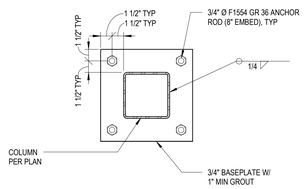
21 S-202 TYPICAL NAILING SCHEDULE
3/4" = 1'-0"

22 S-202 HOLD DOWN SCHEDULE
3/4" = 1'-0"

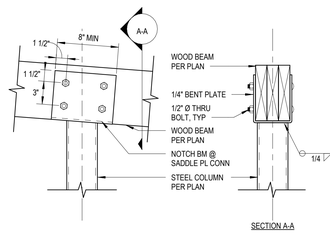
GROUT THICKNESS SCHEDULE	
MINIMUM BASE PLATE PLAN DIMENSION	MINIMUM GROUT THICKNESS
18" OR LESS	1"
19" TO 24"	1 1/2"
25" TO 30"	2"
31" TO 36"	2 1/2"
37" TO 42"	3"
43" TO 48"	3 1/2"
GREATER THAN 48"	REFER TO NOTE 2

NOTES:
1. REFER TO SPECIFICATIONS AND GENERAL NOTES FOR GROUT REQUIREMENTS.
2. ADD 1/2" GROUT THICKNESS FOR EACH ADDITIONAL 12" OF MINIMUM PLATE DIMENSION.

23 S-202 TYPICAL GROUT THICKNESS SCHEDULE
3/4" = 1'-0"



24 S-202 TYPICAL HSS COLUMN BASEPLATE DETAIL
1 1/2" = 1'-0"



SECTION A-A

25 S-202 TYP WOOD BEAM TO STEEL COL CONN
1 1/2" = 1'-0"

MHM
McCarty Holsaple McCarty
550 W. Main St., Suite 300
Knoxville, TN 37902
t 865.544.2000
www.mhminc.com

Project Information:

24023

OAK RIDGE HIGH SCHOOL SOFTBALL
15 WILBERFORCE AVE
OAK RIDGE, TN 37830

OAK RIDGE SCHOOLS

Seal:

Project Status

Consultant:

HAINES STRUCTURAL GROUP
800 S. GAY STREET, STE. 1700 KNOXVILLE, TN 37929
(865) 329-9920 | WWW.HAINES-SG.COM
project no. 24033

#	ISSUED BY:	DATE

Issue Date:	AUG 05, 2024
PIC	R. HAINES
PM	C. BROWN
PA	C. BROWN
Drawn By:	K. SHERRILL
Checked By:	T. WHELAN

Sheet Information:

S-202

TYPICAL DETAILS - WOOD & STEEL

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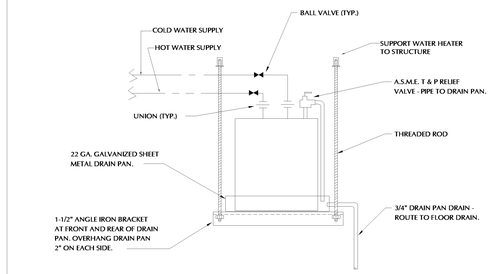
PLUMBING FIXTURE SCHEDULE

ITEM	DESCRIPTION	SPECIFICATIONS	CW	HW	W	V
HWL1	HANDWASH LAVATORY (ADA)	ELKAY, CHS1716LRSC, 16-3/4"X15-1/2"X13" SINGLE BOWL WALL HUNG HANDWASH SINK KIT, 20 GAUGE 304 STAINLESS, INCLUDED WITH PRODUCT: CHSA716LRS2, (1) LK940GN04L2H FAUCET, (1) LK8 DRAIN FITTING, (1) P-TRAP	1/2"	1/2"	1-1/4"	1-1/4"
	SUPPLIES	ZURN, Z8804-XL-LRLKQ-PC 1/2" X 3/8" COMP X COMP LAVATORY SUPPLY KIT WITH ESCUTCHEONS, 1/4 TURN CHROME PLATED STOPS AND CHROME PLATED COPPER TUBE SUPPLY LINES				
	TRAP WRAP	ZURN, Z8946-3-NT COMBINATION TRAP WRAP KIT WITH ONE OFFSET TRAP AND TWO SUPPLY PROTECTION WRAPS				
S1	SINK	ELKAY, EWS25202, WALL HUNG SINGLE BOWL 14 GA. 304 STAINLESS STEEL, 25" X 19.5" X 10-1/2", REAR CENTER DRAIN	1/2"	1/2"	1-1/2"	1-1/2"
	FAUCET	ZURN, Z841C1-XL-16F, 8"CC FAUCET, 8"GOOSENECK SPOUT WITH LEVER BLADE HANDLES, 1.0 GPM AERATOR				
	P-TRAP/DRAIN	P.V.C.				
	SUPPLIES	ZURN, Z8804-XL-LRLKQ-PC 1/2" X 3/8" COMP X COMP LAVATORY SUPPLY KIT WITH ESCUTCHEONS, 1/4 TURN CHROME PLATED STOPS AND CHROME PLATED COPPER TUBE SUPPLY LINES				
WH1	WALL HYDRANT	ZURN, Z1321 FREEZE PROOF, LOOSE KEY STYLE EXPOSED HOSE BIBB WITH INTEGRAL VACUUM BREAKER	3/4"			
FD1	FLOOR DRAIN	ZURN, ZN415-5B DURA-COATED CAST IRON BODY FLOOR DRAIN WITH 5" ROUND POLISHED NICKEL BRONZE STRAINER			3",4"	
	TRAP SEAL	ZURN, Z1072 ZSHIELD BARRIER TRAP SEAL DEVICE				
FD2	FLOOR DRAIN	ZURN, ZN415I DURA-COATED CAST IRON BODY FLOOR DRAIN FOR CONDENSATE WITH 5" POLISHED NICKEL BRONZE STRAINER RECESSED			2"	
	TRAP SEAL	ZURN, Z1072 ZSHIELD BARRIER TRAP SEAL DEVICE				
FS1	FLOOR SINK	ZURN, Z1910-1 WHITE ACID RESISTING PORCELAIN ENAMELED CAST IRON FLOOR SINK 8" X 8" X 6" WITH LESS GRATE AND WHITE ABS BOTTOM DOME STRAINER			4"	
HB1	HOSE BIBB	ZURN, 24P-1/2 W/ VACUUM BREAKER, WHEEL HANDLE	1/2"			
DF1	DRINKING FOUNTAIN	LK4420BF1UFRK, ELKAY OUTDOOR EZH20 UPPER BOTTLE FILLING STATION BI-LEVEL PEDESTAL NON-FILTERED NON-REFRIGERATED FREEZE RESISTANT, VANDAL RESISTANT, LAMINAR FLOW, MECHANICAL BUTTON ACTION, FLOOR MOUNT FREESTANDING FOR OUTDOOR APPLICATIONS, COLOR SELECTED BY ARCHITECT	1/2"		2"	

WATER HEATER SCHEDULE

HEATER NO.	GAL. CAP.	GAS B.T.U. INPUT	VOLTAGE /KW	RECOVERY	MFR. & MODEL DESIGN BASIS	EXPANSION TANK	MIXING VALVE
EWH1	19	--	208V/1Ø 4.5 KW	18.45	BRADFORD WHITE MODEL LE120U3-1	ZURN MODEL XT-8 2 GALLON	--



ELECTRIC WATER HEATER PIPING DIAGRAM

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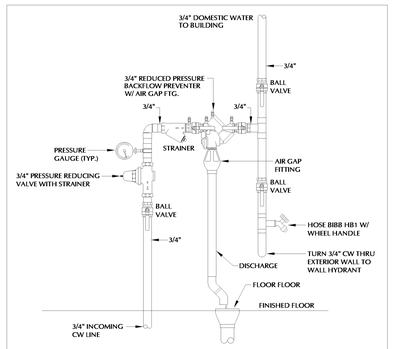
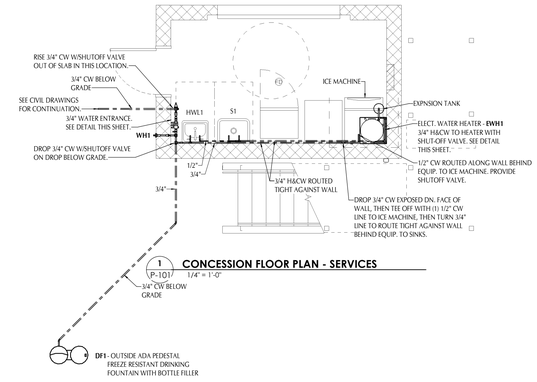


DOMESTIC WATER SERVICE ENTRANCE DETAIL

NTS

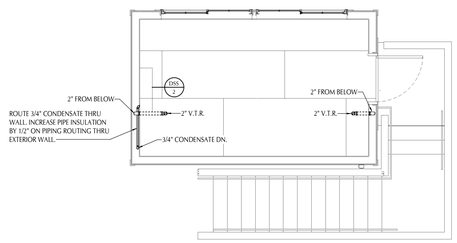
PLUMBING LEGEND

SYMBOL	DESCRIPTION
SA	SANITARY SEWER ABOVE FLOOR
SA	SANITARY SEWER BELOW FLOOR AND/OR GRADE
	SANITARY VENT PIPING
ESA	EXISTING SANITARY SEWER BELOW FLOOR OR GRADE
CW	COLD WATER (C.W.)
HW	HOT WATER (H.W)
	BALL VALVE
	SHUT-OFF VALVE ON RISE OR DROP
CD	CONDENSATE DRAIN
C.O.	CLEANOUT
V.T.R.	VENT THRU ROOF
SAN.	SANITARY SEWER



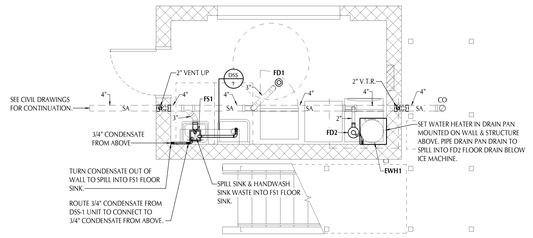
1 (P-101) CONCESSION FLOOR PLAN - SERVICES

1/4" = 1'-0"



2 (P-101) SCORE BOOTH FLOOR PLAN - WASTE & VENT

1/4" = 1'-0"



3 (P-101) CONCESSION FLOOR PLAN - WASTE & VENT

1/4" = 1'-0"

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MHM

McCarty Holsaple McCarty
550 W. Main St., Suite 300
Knoxville, TN 37902
t 865.544.2000
www.mhminc.com

Project Information:

24023

OAK RIDGE HIGH SCHOOL SOFTBALL

15 WILBERFORCE AVE
OAK RIDGE, TN 37830

OAK RIDGE SCHOOLS

Seal:

Engineering Services Group, Inc.
Consulting Engineers
900 East Hill Ave. Suite 350
Knoxville , Tennessee 37915
(865) 522-0393
Project No. 24749

#	ISSUED BY:	DATE

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Drawn By:	MEA
Checked By:	RWD

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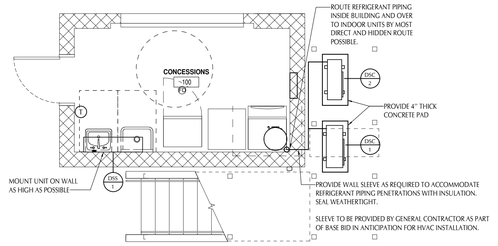
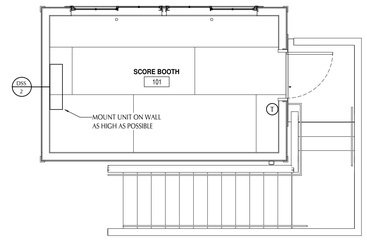
FLOOR PLANS - PLUMBING/PLUMBING SCHEDULES & DETAILS



1 CONCESSION FLOOR PLAN - HVAC

1/4" = 1'-0" | M-101



2 SCORE BOOTH FLOOR PLAN - HVAC

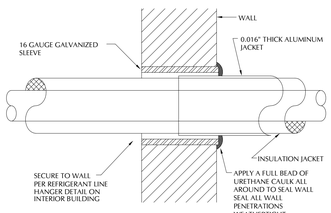
1/4" = 1'-0" | M-101

DUCTLESS SPLIT SYSTEM SCHEDULE

INDOOR UNIT DATA														CONDENSING UNIT DATA						
MARK	CFM	COOLING (BTUH) SENSIBLE	COOLING (BTUH) TOTAL	SEER2	HEATING BTU	HSPF	VOLTS/ PHASE	FAN F.L.A.	MOCP (AMPS)	WEIGHT (LBS)	TYPE	DESIGN BASIS	MARK	COOLING BTU	VOLTS/ PHASE	MCA	MOCP (AMPS)	WEIGHT (LBS)	DESIGN BASIS
BASEBALL FIELD																				
DSS-1	775	18.5	24.0	21.3	28.0	9.3	208/1	0.36	NOTE 4	46	WALL MOUNTED	MITSUBISHI TPKA0A0241KA70A	DSC-1	24.0	208/1	19	25	153	MITSUBISHI TRUZA0241HA70
DSS-2	425	9.7	12.0	20.8	18.0	10.2	208/1	0.33	NOTE 4	29	WALL MOUNTED	MITSUBISHI TPKA0A0123HA70A	DSC-2	12.0	208/1	11	15	93	MITSUBISHI TRUZA0121KA70
SOFTBALL FIELD																				
DSS-1	775	18.5	24.0	21.3	28.0	9.3	208/1	0.36	NOTE 4	46	WALL MOUNTED	MITSUBISHI TPKA0A0241KA70A	DSC-1	24.0	208/1	19	25	153	MITSUBISHI TRUZA0241HA70
DSS-2	425	9.7	12.0	20.8	18.0	10.2	208/1	0.33	NOTE 4	29	WALL MOUNTED	MITSUBISHI TPKA0A0123HA70A	DSC-2	12.0	208/1	11	15	93	MITSUBISHI TRUZA0121KA70

DUCTLESS SPLIT SYSTEM SCHEDULE NOTES:

1. UNITS SHALL BE U.L. LISTED AND COMPRESSORS SHALL HAVE A 5 YEAR WARRANTY.
2. FURNISH EACH SYSTEM COMPLETE WITH A PERMANENT, WASHABLE AIR FILTER, R-410A REFRIGERANT, REFRIGERANT PIPING, AND LOW AMBIENT COOLING CONTROL TO 30° FAHRENHEIT. PROVIDE REMOTE MOUNTED THERMOSTAT CONTROL.
3. FURNISH EACH UNIT WITH AN INTEGRAL CONDENSATE PUMP.
4. INDOOR UNITS RECEIVE POWER FROM OUTDOOR UNITS THROUGH FIELD-SUPPLIED INTERCONNECTED WIRING.
5. SUBJECT TO MEETING ALL REQUIREMENTS SET FORTH HERE AND IN THE PROJECT SPECIFICATIONS, THE FOLLOWING MANUFACTURES WILL BE CONSIDERED FOR SUBSTITUTION: MITSUBISHI, DAIKIN

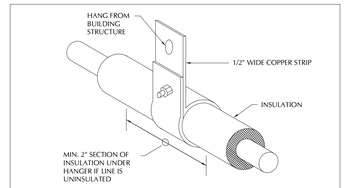


REFRIGERANT PIPE WALL PENETRATION ANCHORING DETAIL

NOT TO SCALE

NOTES:

1. LIQUID LINE ANCHOR SIMILAR EXCEPT THAT LIQUID LINE SHALL HAVE A FELT LINED BRASS SLEEVE AT U-BOLT ANCHOR.
2. ALL REFRIGERANT LINES OUTSIDE BUILDING SHALL HAVE A 0.016" THICK ALUMINUM JACKET FOR PROTECTION. ALL JOINTS AND SEAMS OF JACKET SHALL BE SEALED WEATHERTIGHT WITH URETHANE CAULK.



REFRIGERANT LINE HANGER DETAIL

NOT TO SCALE

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McCarty Holsaple McCarty
550 W. Main St., Suite 300
Knoxville, TN 37902
t 865.544.2000
www.mhminc.com

Project Information:

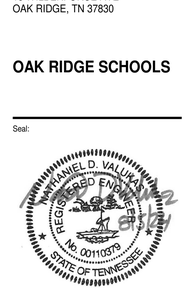
24023

OAK RIDGE HIGH SCHOOL SOFTBALL

15 WILBERFORCE AVE
OAK RIDGE, TN 37830

OAK RIDGE SCHOOLS

Seal:



Engineering Services Group, Inc.
Consulting Engineers
900 East Hill Ave. Suite 350
Knoxville , Tennessee 37915
(865) 522-0393
Project No. 24749

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FLOOR PLANS - HVAC
ALTERNATE NO. 02

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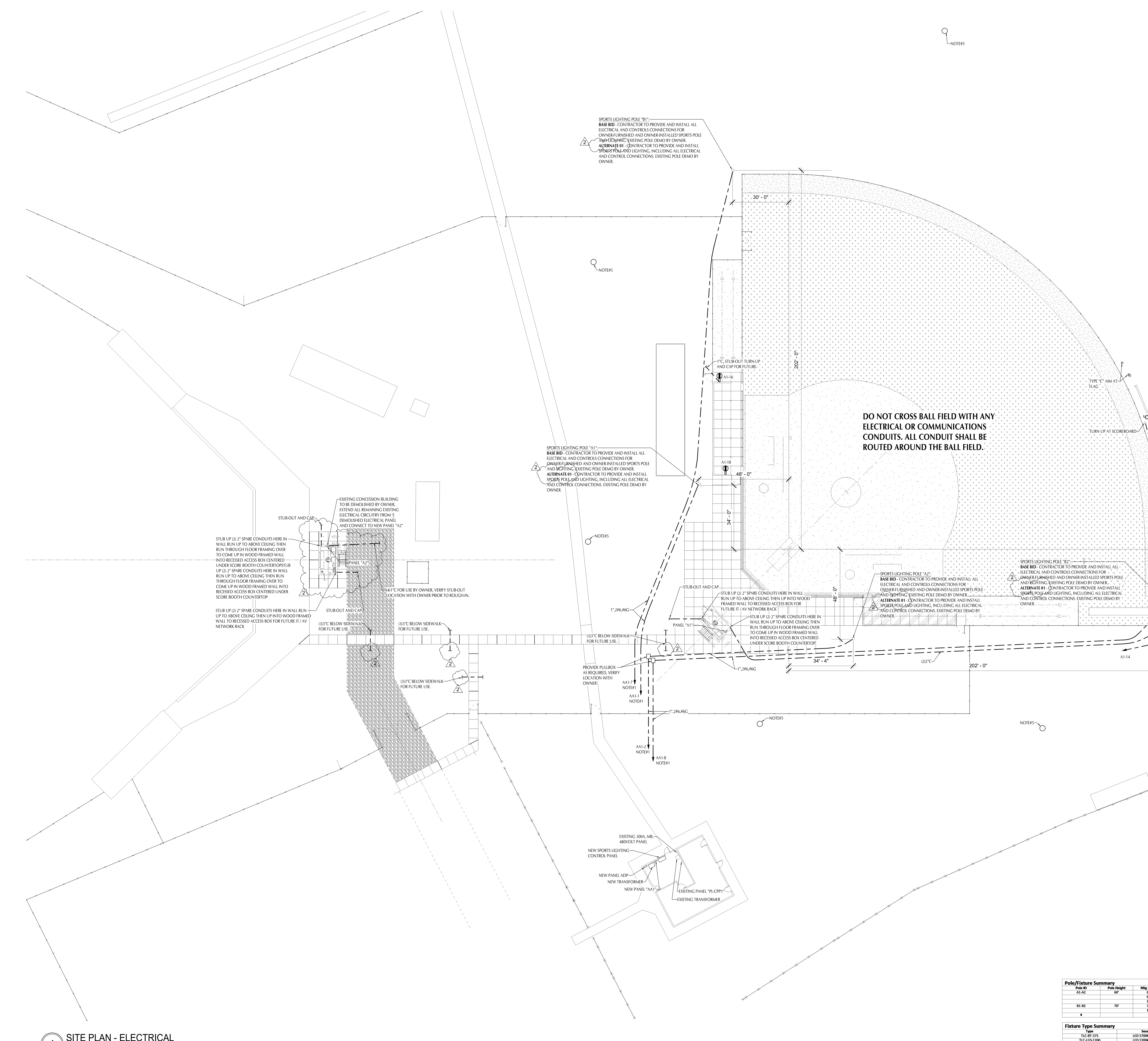

1 SITE PLAN - ELECTRICAL
1" = 20'-0" | ES101

NOTES:

1. EXTEND CIRCUIT FOR SPORTS LIGHTING TO CONTROLS PANEL AND TERMINATE ON RELAY. THEN FROM RELAY EXTEND CONDUCTOR TO CIRCUIT BREAKER NOTED.

2. CONTRACTOR SHALL PROVIDE ALL REQUIRED BRANCH CIRCUIT RACEWAY AND CONDUCTORS FOR CONNECTION OF DEVICES SHOWN. WIRING MAY BE ROUTED OVERHEAD OR BELOW THE CONCRETE SLAB AT THE CONTRACTOR'S OPTION. THIS APPLIES TO BUILDING INTERIOR SPACES ONLY. ALL ABOVE SLAB RACEWAY SHALL BE CONCEALED FROM VIEW IN WALLS OR ABOVE THE CEILINGS EXCEPT WHERE SPECIFICALLY NOTED TO BE SURFACE MOUNTED. PROVIDE A DEDICATED NEUTRAL CONDUCTOR FOR ALL 120V CIRCUITS. MINIMUM SIZE RACEWAY ROUTED BELOW CONCRETE SLAB SHALL BE 3/4" FOR POWER AND 1" FOR LOW VOLTAGE.

3. ALL BRANCH CIRCUITS SHALL BE SIZED TO COMPLY WITH IESS C405.9. SPECIFICALLY, ALL 120V, 20AMP CIRCUITS WITH HOMERUNS GREATER THAN 70' SHALL HAVE CIRCUIT CONDUCTORS OF #10AWG AS MINIMUM. ANY 120V, 20AMP CIRCUIT WITH OUTLETS GREATER THAN 100' OF BRANCH CIRCUIT LENGTH SHALL HAVE MINIMUM CIRCUIT CONDUCTOR OF #10AWG TO ALL OUTLETS AND HOMERUNS. ANY 120V, 20AMP CIRCUIT WITH HOMERUN GREATER THAN 140' SHALL HAVE BRANCH CIRCUIT CONDUCTOR OF #8AWG MINIMUM. PROVIDE ADEQUATE BOX FOR SPLICING #12AWG TO TERMINATE TO DEVICE. LARGER CONDUCTORS MAY REQUIRE THE UTILIZATION OF LARGER CONDUIT SIZES - REFER TO NEC TABLES.

4. ALL BRANCH CIRCUITS SHALL BE SIZED TO COMPLY WITH IESS C405.9. SPECIFICALLY, ALL 277V, 20 AMP CIRCUITS WITH HOMERUNS GREATER THAN 150 FEET SHALL HAVE CIRCUIT AND GROUNDING CONDUCTORS OF #10AWG AS MINIMUM. ANY 277V, 20 AMP CIRCUIT WITH OUTLETS GREATER THAN 220 FEET OF BRANCH CIRCUIT LENGTH SHALL HAVE CIRCUIT AND GROUNDING CONDUCTORS OF #10AWG MINIMUM TO ALL OUTLETS AND HOMERUN. ANY 277V, 20 AMP CIRCUIT WITH HOMERUN GREATER THAN 310 FEET SHALL HAVE BRANCH CIRCUIT AND GROUNDING CONDUCTORS OF #8AWG MINIMUM. PROVIDE ADEQUATE BOX TO SPLICE #12AWG FOR TERMINATION TO DEVICE. LARGER CONDUCTORS MAY REQUIRE THE UTILIZATION OF LARGER CONDUIT SIZES - REFER TO NEC TABLES.

5. EXISTING SPORTS LIGHTING POLE AND LIGHTING FIXTURE TO BE DEMOLISHED BY OWNER AS BASE BID . ALTERNATE SHALL BE FOR THE CONTRACTOR TO DEMOLISH EXISTING SPORTS LIGHTING AND POLES TO FIELD "A" AND ASSOCIATED CIRUITRY AND PULL BOXES. ALTERNATE AND BASE BIDS SHALL INCLUDE DEMOLITION OF EXISTING CIRCUITRY TO SCOREBOARD AND SCORER TABLE. MAINTAIN ALL EXISTING ELECTRICAL CIRCUITRY TO EXISTING FIELDS THAT ARE REMAINING.

6. ALL CONDUITS NOTED TO BE STUBBED OUT FOR OWNER'S OR FUTURE USE SHALL EXTEND 5FT BEYOND BUILDING OR PAVEMENT SURFACES AND BE CAPPED BELOW GRADE.

Control Module ID: 1 **Lighting Circuit Voltage: 480/60/3**

Circuit Summary by Switch

Switch	Zone Description	Pole ID	Qty of Fixtures	Full load amperes	Contactor Size (Amps)	Cabinet #	Contactor ID
1	Softball	A1	4	5.81	30	1	C1
	Softball	A2	4	5.81	30	1	C2
	Softball	B1	5	10.69	30	1	C3
	Softball	B2	5	10.69	30	1	C4

Equipment List For Areas Shown

Pole				Luminaires		
QTY	LOCATION	SIZE	GRADE ELEVATION	ABOVE GRADE LEVEL	LUMINAIRE TYPE	QTY/POLE
2	A1-A2	60'	-	60'	TLC-LED-1200	1
				60'	TLC-LED-900	2
				15.5'	TLC-BT-575	1
2	B1-B2	70'	-	70'	TLC-LED-1500	4
				15.5'	TLC-BT-575	1
4	Totals					18

Pole/Fixture Summary

Pole ID	Pole Height	Mtg Height	Fixture Qty	Luminaire Type	Load	Circuit
A1-A2	60'	60'	1	TLC-LED-1200	1.17 kW	A
		60'	2	TLC-LED-900	1.76 kW	A
		16'	1	TLC-BT-575	0.57 kW	A
B1-B2	70'	70'	4	TLC-LED-1500	5.64 kW	A
		16'	1	TLC-BT-575	0.57 kW	A
4			18		19.44 kW	

Fixture Type Summary

Type	Source	Wattage	Lumens	L90	L80	L70	Quantity
TLC-BT-575	LED 5700K - 75 CRI	575W	52,000	>120,000	>120,000	>120,000	4
TLC-LED-1200	LED 5700K - 75 CRI	1170W	150,000	>120,000	>120,000	>120,000	2
TLC-LED-1500	LED 5700K - 75 CRI	1410W	181,000	>120,000	>120,000	>120,000	8
TLC-LED-900	LED 5700K - 75 CRI	880W	104,000	>120,000	>120,000	>120,000	4

MHM

McCarty Holsaple McCarty
550 W. Main St., Suite 300
Knoxville, TN 37902
t 865.544.2000
www.mhminc.com

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OAK RIDGE SCHOOLS

Seal:

Engineering Services Group, Inc.
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900 East Hill Ave. Suite 350
Knoxville , Tennessee 37915
(865) 522-0393
Project No. 24749

#	ISSUED BY:	DATE
1	PERMITTING	8/12/24
2	BIDDING	9/23/24

Issue Date:	AUG 05, 2024
PIC	NDV
PM	NDV
PE	ECH
Drawn By:	MWE
Checked By:	ECH

Sheet Information:

ES101

SITE PLAN - ELECTRICAL

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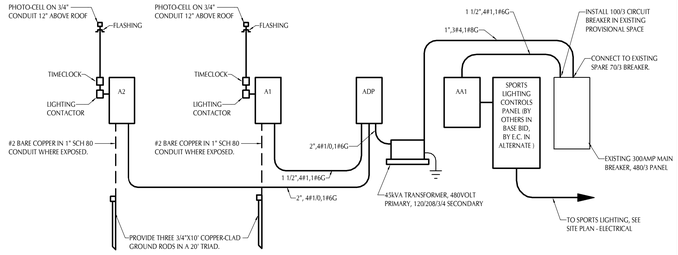


PARTIAL FEEDER DIAGRAM

NO SCALE

LIGHTING FIXTURE SCHEDULE

TYPE	SOURCE	MOUNTING	FIXTURE DESCRIPTION	MANUFACTURER'S NAME AND CATALOG NUMBER	INPUT WATTAGE	NOTES
A	LED 5000 LUMENS 4000 K	SURFACE	48" WRAPAROUND	LITHONIA FML4W 48 5000LM 840 ZT MVOLT	53W	ALL
B	LED 4177 LUMENS 4000 K	WALL HEIGHT AS NOTED	WALL PACK WITH INTEGRAL PHOTO-CELL, VERIFY FINISH WITH ARCHITECT. PROVIDE "EM" FIXTURES WITH BATTERY BACK-UP.	LITHONIA WDGE2 LED P4 40K 80CRI T4M MVOLT PE-E20WC (WHERE NOTED EM) ****	47W	ALL
C	LED 5196 LUMENS 4000K	STANCHION	SPOT LIGHTING FIXTURE AIMED AT FLAG. PROVIDE WITH MEDIUM SPOT OPTICS.	LITHONIA DSXF1LED P2 40K MSP MVOLT	42W	ALL
XW	LED	WALL 7'6"AFF	COMBINATION EXIT SIGN/EMERGENCY LIGHT WITH WHITE HOUSING, RED LETTERS AND SELF-DIAGNOSTIC BATTERY BACK-UP. PROVIDE "WG" FIXTURES WITH WIREGUARD.	MULE LIGHTING SQCR-U-R-WW-SD		ALL

LIGHTING FIXTURE SCHEDULE NOTES:

1. REFER TO ARCHITECTURAL REFLECTED CEILING PLAN FOR EXACT LOCATION OF LIGHTING FIXTURES AND PLANNED CEILING MATERIALS. VERIFY FINISH OF ALL FIXTURES WITH ARCHITECT PRIOR TO ORDERING.
2. ALL LINEAR FIXTURES SHALL UTILIZE A HOUSING MADE FROM A MINIMUM 22 GAUGE STEEL AND BE PAINTED AFTER FABRICATION WITH NO SHARP EDGES WHETHER SPECIFIED IN THE FIXTURE SCHEDULE OR NOT. THESE FIXTURES UTILIZING A HINGED DOOR SHALL ALSO HAVE SPRING LOADED CAM LATCHES.
3. ALL LED DRIVERS AND EMERGENCY/EXIT FIXTURES SHALL BE 'UNIVERSAL VOLTAGE' WITH TAPS FOR 120V AND 277V WHETHER SPECIFIED IN THE FIXTURE SCHEDULE OR NOT. WHERE SUCH DRIVERS OR FIXTURES ARE NOT AVAILABLE, IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO COORDINATE DRIVER VOLTAGE WITH THE ELECTRICAL PLANS TO ENSURE COMPATIBILITY WITH THE DESIGNED ELECTRICAL SYSTEM.
4. ALL INDOOR LED SOURCES SHALL BE THE SAME COLOR TEMPERATURE. VERIFY COLOR TEMPERATURE WITH ARCHITECT PRIOR TO ORDERING FIXTURES.
5. SHOP DRAWING SUBMITTALS: SUBMIT A LIGHTING POWER DENSITY STATISTICS TABLE INDICATING ROOM NAME, NUMBER OF LUMINAIRES, TOTAL WATTS PER AREA, AND DENSITY (WATTS PER SQ FT) PER AREA AND A SEPARATE LINE ITEM INDICATING THE TOTALS FOR THE ENTIRE BUILDING INTERIOR. ALSO PROVIDE PHOTOMETRIC POINT-BY-POINT CALCULATIONS FOR ALL AREAS. SUBMITTALS WILL NOT BE REVIEWED UNLESS THE ABOVE INFORMATION IS PROVIDED IN WHOLE AS PART OF THE LIGHTING SUBMITTAL PACKAGE. FAILURE TO SUBMIT THIS INFORMATION AS PART OF THE SUBMITTAL WILL RESULT IN REJECTING THE LIGHTING SUBMITTAL IN IT'S ENTIRETY, NO EXCEPTIONS.

SOFTBALL MECHANICAL EQUIPMENT CONNECTION SCHEDULE

ITEM NO.	EQUIPMENT	EQUIPMENT CHARACTERISTICS				CIRCUIT NUMBER	FULL LOAD AMPS	CIRCUIT CONDUCTORS (COPPER UNLESS NOTED OTHERWISE)	BREAKER (TRIP/POLE)	LOCAL MEANS OF DISCONNECT (FRAME/POLE/FUSE/NEMA)	KEYED NOTES
		VOLTAGE	PHASE	HP	kW						
1	DSC-1	208	1			A1-6	19.0	3/4",2#10,1#10G	25A/2P	30A/2P HD, 25A RK5, NEMA 3R	---
2	DSC-2	208	1			A1-10	11.0	3/4",2#12,1#12G	15A/2P	30A/2P HD, 15A RK5, NEMA 3R	---
3	DSS-1	208	1			NOTE 1	0.0	3/4",2#10,1#10G	25A/2P	MOTOR RATED SWITCH	1
4	DSS-2	208	1			NOTE 1	0.0	3/4",2#12,1#12G	15A/2P	MOTOR RATED SWITCH	1
5	WH-1	208	1		4.5	A1-20	21.6	3/4",2#10,1#10G	30A/2P	30A/2P HD, 30A RK5, NEMA 1	---

GENERAL NOTES:

A. THE ELECTRICAL CONTRACTOR SHALL FIELD VERIFY ELECTRICAL REQUIREMENTS OF ALL EQUIPMENT TO BE CONNECTED WITH NAMEPLATE DATA PRIOR TO ROUGH-IN.
B. ALL DISCONNECTS LOCATED OUTDOORS SHALL BE WEATHERPROOF, NEMA 3R RATED, UNLESS SPECIFICALLY INDICATED OTHERWISE.
C. THE ELECTRICAL CONTRACTOR SHALL PROVIDE FUSED DISCONNECTS WHERE SCHEDULED FOR EQUIPMENT SHOWN IN THIS LIST AND ELSEWHERE AS REQUIRED BY THE NEC.
D. INTERNAL MEANS OF DISCONNECT SHALL NOT BE UTILIZED IN LIEU OF SPECIFIED EXTERNAL MEANS OF DISCONNECT EXCEPT WHERE THE WORD "INTEGRAL" APPEARS IN THIS SCHEDULE.

KEYED NOTES:

1. INDOOR UNIT IS FED FROM OUTDOOR UNIT. PROVIDE ALL REQUIRED CONDUIT, CONDUCTORS AND OVERCURRENT PROTECTION.

BASEBALL MECHANICAL EQUIPMENT CONNECTION SCHEDULE

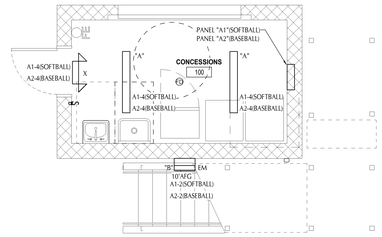
ITEM NO.	EQUIPMENT	EQUIPMENT CHARACTERISTICS				CIRCUIT NUMBER	FULL LOAD AMPS	CIRCUIT CONDUCTORS (COPPER UNLESS NOTED OTHERWISE)	BREAKER (TRIP/POLE)	LOCAL MEANS OF DISCONNECT (FRAME/POLE/FUSE/NEMA)	KEYED NOTES
		VOLTAGE	PHASE	HP	kW						
1	DSC-1	208	1			A2-6	19.0	3/4",2#10,1#10G	25A/2P	30A/2P HD, 25A RK5, NEMA 3R	---
2	DSC-2	208	1			A2-10	11.0	3/4",2#12,1#12G	15A/2P	30A/2P HD, 15A RK5, NEMA 3R	---
3	DSS-1	208	1			NOTE 1	0.0	3/4",2#10,1#10G	25A/2P	MOTOR RATED SWITCH	1
4	DSS-2	208	1			NOTE 1	0.0	3/4",2#12,1#12G	15A/2P	MOTOR RATED SWITCH	1
5	WH-1	208	1		4.5	A2-20	21.6	3/4",2#10,1#10G	30A/2P	30A/2P HD, 30A RK5, NEMA 1	---

GENERAL NOTES:

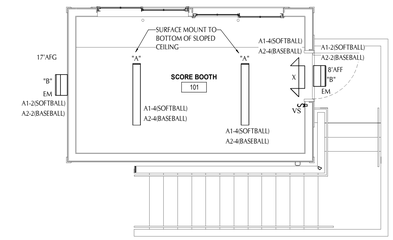
A. THE ELECTRICAL CONTRACTOR SHALL FIELD VERIFY ELECTRICAL REQUIREMENTS OF ALL EQUIPMENT TO BE CONNECTED WITH NAMEPLATE DATA PRIOR TO ROUGH-IN.
B. ALL DISCONNECTS LOCATED OUTDOORS SHALL BE WEATHERPROOF, NEMA 3R RATED, UNLESS SPECIFICALLY INDICATED OTHERWISE.
C. THE ELECTRICAL CONTRACTOR SHALL PROVIDE FUSED DISCONNECTS WHERE SCHEDULED FOR EQUIPMENT SHOWN IN THIS LIST AND ELSEWHERE AS REQUIRED BY THE NEC.
D. INTERNAL MEANS OF DISCONNECT SHALL NOT BE UTILIZED IN LIEU OF SPECIFIED EXTERNAL MEANS OF DISCONNECT EXCEPT WHERE THE WORD "INTEGRAL" APPEARS IN THIS SCHEDULE.

KEYED NOTES:

1. INDOOR UNIT IS FED FROM OUTDOOR UNIT. PROVIDE ALL REQUIRED CONDUIT, CONDUCTORS AND OVERCURRENT PROTECTION.



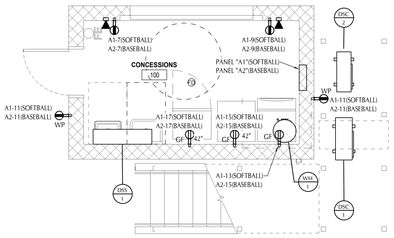
1 CONCESSION FLOOR PLAN - LIGHTING
1/4" = 1'-0" | E-101



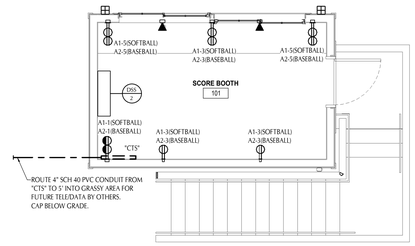
2 SCORE BOOTH FLOOR PLAN - LIGHTING
1/4" = 1'-0" | E-101

NOTES:

1. PRIOR TO LOCATING ANY AND ALL DEVICES AT CASEWORK, COUNTERTOPS, ETC. THE ELECTRICAL CONTRACTOR SHALL REFER TO FINAL ARCHITECTURAL CASEWORK ELEVATIONS AND SHOP DRAWINGS TO VERIFY MOUNTING HEIGHTS AND LOCATIONS. ALL DEVICE LOCATIONS SHALL BE COORDINATED WITH THESE DRAWINGS AND/OR THE ARCHITECT PRIOR TO ROUGHING-IN.
2. CONTRACTOR SHALL PROVIDE ALL REQUIRED BRANCH CIRCUIT RACEWAY AND CONDUCTORS FOR CONNECTION OF DEVICES SHOWN. WIRING MAY BE ROUTED OVERHEAD OR BELOW THE CONCRETE SLAB AT THE CONTRACTOR'S OPTION. ALL ABOVE SLAB RACEWAY SHALL BE CONCEALED FROM VIEW IN WALLS OR ABOVE THE CEILINGS EXCEPT WHERE SPECIFICALLY NOTED TO BE SURFACE MOUNTED. PROVIDE A DEDICATED NEUTRAL CONDUCTOR FOR ALL 120V CIRCUITS. MINIMUM SIZE RACEWAY ROUTED BELOW CONCRETE SLAB SHALL BE 3/4" FOR POWER AND 1" FOR LOW VOLTAGE.
3. ALL BRANCH CIRCUITS SHALL BE SIZED TO COMPLY WITH IESS C405.9. SPECIFICALLY, ALL 120V, 20AMP CIRCUITS WITH HOMERUNS GREATER THAN 70' SHALL HAVE CIRCUIT CONDUCTORS OF #10AWG AS MINIMUM. ANY 120V, 20AMP CIRCUIT WITH OUTLETS GREATER THAN 100' OF BRANCH CIRCUIT LENGTH SHALL HAVE MINIMUM CIRCUIT CONDUCTOR OF #10AWG TO ALL OUTLETS AND HOMERUNS. ANY 120V, 20AMP CIRCUIT WITH HOMERUN GREATER THAN 140' SHALL HAVE BRANCH CIRCUIT CONDUCTOR OF #8AWG MINIMUM. PROVIDE ADEQUATE BOX FOR SPLICING #12AWG TO TERMINATE TO DEVICE. LARGER CONDUCTORS MAY REQUIRE THE UTILIZATION OF LARGER CONDUIT SIZES - REFER TO NEC TABLES.
4. ALL BRANCH CIRCUITS SHALL BE SIZED TO COMPLY WITH IESS C405.9. SPECIFICALLY, ALL 277V, 20 AMP CIRCUITS WITH HOMERUNS GREATER THAN 150 FEET SHALL HAVE CIRCUIT AND GROUNDING CONDUCTORS OF #10AWG AS MINIMUM. ANY 277V, 20 AMP CIRCUIT WITH OUTLETS GREATER THAN 220 FEET OF BRANCH CIRCUIT LENGTH SHALL HAVE CIRCUIT AND GROUNDING CONDUCTORS OF #10AWG MINIMUM TO ALL OUTLETS AND HOMERUN. ANY 277V, 20 AMP CIRCUIT WITH HOMERUN GREATER THAN 310 FEET SHALL HAVE BRANCH CIRCUIT AND GROUNDING CONDUCTORS OF #8AWG MINIMUM. PROVIDE ADEQUATE BOX TO SPLICE #12AWG FOR TERMINATION TO DEVICE. LARGER CONDUCTORS MAY REQUIRE THE UTILIZATION OF LARGER CONDUIT SIZES - REFER TO NEC TABLES.



3 CONCESSION FLOOR PLAN - POWER & COMMUNICATIONS
1/4" = 1'-0" | E-101



4 SCORE BOOTH FLOOR PLAN - POWER & COMMUNICATIONS
1/4" = 1'-0" | E-101

MHM

McCarty Holsaple McCarty
550 W. Main St., Suite 300
Knoxville, TN 37902
t 865.544.2000
www.mhminc.com

Project Information:

24023

OAK RIDGE HIGH SCHOOL SOFTBALL

15 WILBERFORCE AVE
OAK RIDGE, TN 37830

OAK RIDGE SCHOOLS

Seal:

Engineering Services Group, Inc.
Consulting Engineers
900 East Hill Ave. Suite 350
Knoxville , Tennessee 37915
(865) 522-0393
Project No. 24749

#	ISSUED BY:	DATE

Issue Date:	AUG 05, 2024
PIC	NDV
PM	NDV
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Drawn By:	MWE
Checked By:	ECH

Sheet Information:

E-101

FLOOR PLAN - ELECTRICAL

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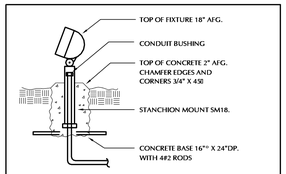


FIXTURE TYPE "C" DETAIL

N.T.S.

NOTES:

1. COORDINATE EXACT LOCATION OF TYPE "C" FIXTURES WITH ARCHITECT PRIOR TO ROUGH-IN.
2. BOND EQUIPMENT GROUND TO FIXTURE WITH ONE HOLE LUG FACTORY INSTALLED.

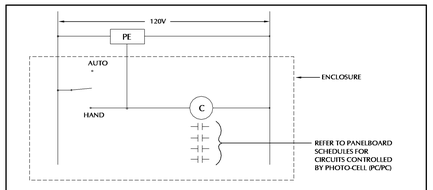
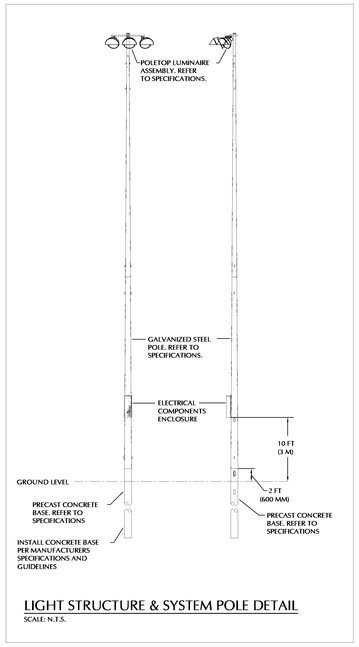


PHOTO-CELL WIRING DETAIL

N.T.S.

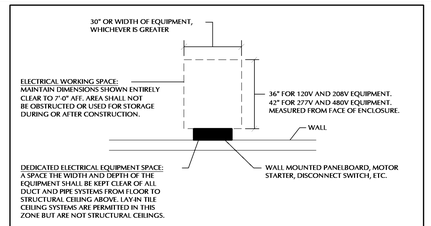
NOTES:

1. AUTO/TEST SWITCH MOUNTED IN FACE OF ENCLOSURE.
2. AUTO/TEST SWITCH SHALL BE CUTLER-HAMMER 10250T20KE WITH ENGRAVED NAMEPLATE CUTLER-HAMMER 10250T539.
3. CONTACTOR SHALL CONTAIN REQUIRED NUMBER OF POLES AS SHOWN ON THE DRAWINGS WITH A MINIMUM OF TWO SPARE CONTACTS. CUTLER-HAMMER CM35 SERIES.
4. ENCLOSURE SHALL BE HOFFMAN CO. HINGED COVER. MOUNTING SHALL MATCH PANELBOARDS EITHER SURFACE OR RECESSED.
5. POWER FOR CONTACTOR COIL SHALL ORIGINATE FROM SAME PANEL AS THE CIRCUITS CONTROLLED BY THE CONTACTOR.
6. EACH ENCLOSURE SHALL CONTAIN ONLY THE CONTACTORS SERVING CIRCUITS FROM A PANELBOARD. NO ENCLOSURE SHALL CONTAIN CONTACTORS SERVING CIRCUITS FROM TWO DIFFERENT PANELBOARDS.



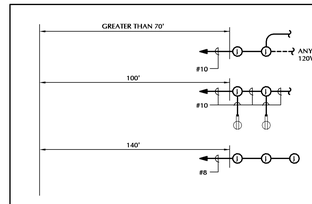
LIGHT STRUCTURE & SYSTEM POLE DETAIL

SCALE: N.T.S.



ELECTRICAL CLEAR SPACE DETAIL

N.T.S.

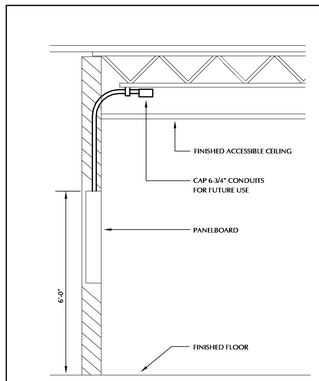


20AMP, 120V CIRCUIT CONDUCTOR INCREASE FOR VOLTAGE DROP

N.T.S.

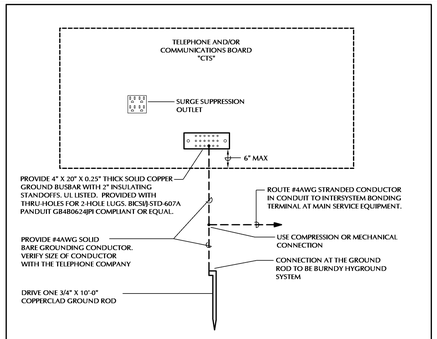
NOTES:

1. BRANCH CIRCUIT WIRING: 120VOLT, 20AMP CIRCUITS WITH HOMERUNS GREATER THAN 70 FEET SHALL HAVE CIRCUIT CONDUCTORS OF #10AWG AS MINIMUM. ANY 120VOLT, 20AMP CIRCUIT WITH OUTLETS GREATER THAN 100FEET OF BRANCH CIRCUIT LENGTH SHALL HAVE MINIMUM CIRCUIT CONDUCTOR OF #10AWG TO ALL OUTLETS AND HOMERUN. ANY 120VOLT, 20AMP CIRCUIT WITH HOMERUN GREATER THAN 140 FEET SHALL HAVE BRANCH CIRCUIT CONDUCTOR OF #8AWG MINIMUM. PROVIDE ADEQUATE BOX FOR SPLICE #12 TO TERMINATE TO DEVICE. INCREASE GROUNDING AND CONDUIT SIZE AS REQUIRED IN ACCORDANCE WITH NEC WHEN CONDUCTOR SIZE INCREASES TO #10 AND #8.



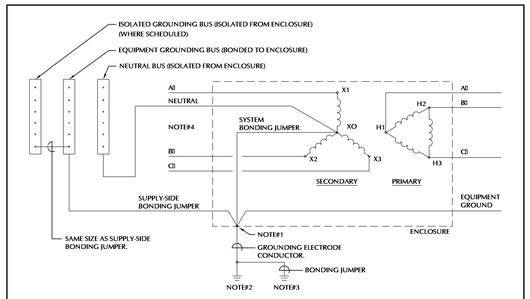
TYPICAL SECTION AT RECESSED PANEL

N.T.S.



"CTS" GROUNDING DETAIL

N.T.S.

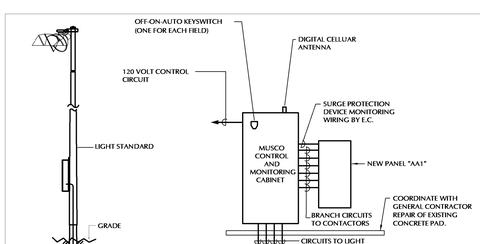


△-Y TRANSFORMER CONNECTION DIAGRAM

N.T.S.

NOTES:

1. TERMINAL BUS BAR INSTALLED INSIDE TRANSFORMER BY MANUFACTURER, WITH SUITABLE TERMINATIONS FOR ALL CONDUCTORS AND BONDED TO TRANSFORMER ENCLOSURE. INSTALL PER NEC 450.10(A) WITHOUT EXCEPTION.
2. EXTEND GROUNDING ELECTRODE CONDUCTOR TO BUILDING STEEL AND BOND USING A TWO HOLE COMPRESSION LUG. REFER TO FEEDER DIAGRAM FOR EQUIPMENT GROUND AND SUPPLY-SIDE BONDING JUMPER SIZES. GROUNDING ELECTRODE CONDUCTOR AND SYSTEM BONDING JUMPER CONDUCTOR SHALL MATCH THE SUPPLY-SIDE BONDING JUMPER IN SIZE.
3. EXTEND BONDING JUMPER FROM GROUNDING ELECTRODE CONDUCTOR TO METALLIC WATER PIPE IN THE BUILDING AREA SERVED BY THE SECONDARY SYSTEM. THIS IS IN ADDITION TO WATER PIPE BONDING REQUIRED AT SERVICE GROUNDING, IF ANY IS PRESENT. INSTALL PER NEC 250.104(D)(1). SIZE SHALL MATCH THE GROUNDING ELECTRODE CONDUCTOR.
4. SECONDARY SIDE PHASE CONDUCTORS SHALL NOT EXCEED 10 FEET IN LENGTH BETWEEN SECONDARY TERMINALS AND AN OVERCURRENT DEVICE. SUCH OVERCURRENT DEVICE IS NOT DEPICTED ON THIS DETAIL; REFER TO DRAWINGS. COMPLY WITH NEC 240.21(C)(2).



CONTROL AND MONITORING DETAIL

SCALE: N.T.S.

ELECTRICAL SYMBOL LEGEND

SYMBOL	DESCRIPTION
a b / "A"	L.E.D. LIGHTING FIXTURE: "A" REFERS TO DESIGNATION IN THE LIGHTING FIXTURE SCHEDULE. PROVIDE ADDITIONAL CONDUCTORS AS REQUIRED FOR DIMMING CIRCUITS. 0-10V DIMMING WIRING SHALL BE #16AWG OR LARGER. ETHERNET OR CATEGORY CABLE IS NOT ACCEPTABLE FOR 0-10V DIMMING. UNLESS NOTED OTHERWISE ON PLANS, WHERE TROFFER TYPES ARE INDICATED IN GYP CEILINGS, PROVIDE MODULAR FLANGE KIT ACCESSORY FOR RECESSED INSTALLATION. "3" REFERS TO CIRCUIT NUMBER
EM / "A"	L.E.D. EMERGENCY LIGHTING FIXTURE: EQUIPPED WITH BUILT-IN EMERGENCY POWER BATTERY UNITS AND HOT MONITOR LINE TO ALLOW SWITCHING CONTROL. BATTERY SHALL PROVIDE 1400 LUMENS MINIMUM LIGHT OUTPUT IN EMERGENCY MODE. BATTERY UNIT SHALL OPERATE TWO DIODE STRINGS IN FIXTURE FOR 90 MINUTES UPON LOSS OF NORMAL BUILDING POWER. LIGHT FIXTURE SHALL BE WIRED SO THAT THE FAILURE OF ONE DIODE STRING DURING EMERGENCY MODE OPERATION SHALL NOT CAUSE SECOND LAMP TO FAIL AND PUT FIXTURE IN TOTAL DARKNESS. "NL" INDICATES UNSWITCHED FOR USE AS NIGHT LIGHT
3 "B"	L.E.D. LIGHTING FIXTURE: "B" REFERS TO DESIGNATION IN THE LIGHTING FIXTURE SCHEDULE. PROVIDE ADDITIONAL CONDUCTORS AS REQUIRED FOR DIMMING CIRCUITS. "EM" INDICATES EQUIPPED WITH BUILT-IN EMERGENCY POWER BATTERY UNITS AND HOT MONITOR LINE TO ALLOW SWITCHING CONTROL. BATTERY SHALL PROVIDE 1000 LUMENS MINIMUM LIGHT OUTPUT IN EMERGENCY MODE. BATTERY SHALL OPERATE TWO DIODES. "b" REFERS TO SWITCH CONTROL "EM" EQUIPPED WITH EMERGENCY BATTERY BACK-UP
b 3	LIGHT SWITCH: WALL MOUNTED 48" AFF TO TOP OF ROUGH-IN, 20A, SINGLE POLE UNLESS NOTED. PROVIDE WHITE TAPE LABEL WITH 1/4" HIGH TYPED BLACK LETTERING ON COVERPLATE INDICATING PANELBOARD AND CIRCUIT NUMBER. PROVIDE A NEUTRAL CONDUCTOR TO ALL SWITCH BOXES FOR USE BY WALL OCCUPANCY SENSORS. WIRE-NUT CONDUCTOR IF NOT USED. "b" REFERS TO FIXTURES CONTROLLED BY SWITCH "OS" WALL STATION OCCUPANCY SENSOR: AUTO-ON SETTING "VS" WALL STATION VACANCY SENSOR: MANUAL-ON SETTING BOTH "OS" AND "VS" SENSORS SHALL USE BOTH ULTRASONIC AND PASSIVE INFRARED TO DETECT AND SHALL BE FIELD CONFIGURABLE BETWEEN OCCUPANCY AND VACANCY MODES. PROVIDE NEUTRAL CONDUCTOR CONNECTION. SWITCH SHALL NOT GENERATE ANY CURRENT ON THE GROUND CONDUCTOR OR RACEWAY. WATTSTOPPER #DW-100 "3" 3-WAY "4" 4-WAY
	EXIT LIGHT FIXTURE WITH EMERGENCY LIGHT HEADS: EXIT SIGN WITH BUILT-IN TWIN-HEAD EMERGENCY LIGHT AND SELF-CONTAINED EMERGENCY BATTERY UNIT WITH 90 MINUTE CAPACITY, THERMOPLASTIC HOUSING, RED LETTERING, LED LAMP SOURCE FOR LETTERING, DIRECTIONAL ARROWS AS INDICATED, SELF-DIAGNOSTICS.
	DUPLEX PLUG RECEPTACLE: 18" AFF TO CENTER OF ROUGH-IN, 20A, 120V, TAMPER RESISTANT TYPE. PROVIDE WHITE TAPE LABEL WITH 1/4" HIGH TYPED BLACK LETTERING ON COVERPLATE OF RECEPTACLE INDICATING PANELBOARD AND CIRCUIT NUMBER. "T" LOCATE ALONGSIDE TELEVISION OUTLET "GF" INDICATES CONNECTED TO 5mA CLASS A GFCI CIRCUIT BREAKER.
	COLORED SIDES, SPECIAL MOUNTING HEIGHT IN OR AROUND CASEWORK OR EQUIPMENT, SEE ARCHITECTURAL DRAWINGS AND CASEWORK ELEVATIONS
	COLORED CENTER WITH BUILT-IN GROUND FAULT PROTECTION, 44" AFF TO CENTER OF ROUGH-IN AT CASEWORK, 18" ALL OTHER LOCATIONS AND OUTSIDE. "WP" WEATHERPROOF IN-USE 'EXTRA-DUTY' (UL 514D) METAL COVER AND WEATHER-RESISTANT (UL 498) TYPE GFCI DEVICE. "R" INDICATES MOUNTED ON THE ROOF PROVIDE DEDICATED NEUTRAL FOR EACH CIRCUIT SERVING AN OUTLET.
	COLORED SIDE TRANSIENT VOLTAGE, SURGE SUPPRESSION RECEPTACLE
	QUADPLEX PLUG RECEPTACLE: PROVIDE TWO DUPLEX RECEPTACLES IN A DOUBLE GANG BOX WITH A DOUBLE GANG COVERPLATE. REFER TO RECEPTACLE DESCRIPTIONS ABOVE FOR RECEPTACLE TYPE REQUIRED.
	JUNCTION BOX: FUNCTION, SIZE AND USE AS REQUIRED
	BRANCH CIRCUIT HOMERUN: CONDUIT WITH CONDUCTORS EXTENDED AND CONNECTED TO OVERCURRENT DEVICE(S) NOTED. CROSSLINES INDICATE QUANTITY OF #12 AWG CONDUCTORS WHEN MORE THAN TWO. PROVIDE A DEDICATED NEUTRAL FOR EACH LINE-TO-NEUTRAL CIRCUIT IN A HOMERUN. WHERE ONE NEUTRAL IS PROVIDED FOR A MULTI-CIRCUIT HOMERUN. THE CONTRACTOR SHALL PROVIDE DISCONNECTING MEANS FOR EACH CONDUCTOR AS REQUIRED BY THE NEC. GROUNDING CONDUCTOR IS NOT ILLUSTRATED.
	CONDUIT: SOLID LINE AND CLOSED DOT INDICATE INSTALLED IN WALL OR CEILING SHOWN TURNING DOWN. ALL CONDUITS SHALL CONTAIN AN EQUIPMENT GROUNDING CONDUCTOR WHICH IS NOT ILLUSTRATED. BROKEN LINE AND OPEN DOT INDICATE INSTALLED IN FLOOR CONSTRUCTION OR UNDERGROUND SHOWN TURNING UP. ALL CONDUITS SHALL CONTAIN AN EQUIPMENT GROUNDING CONDUCTOR WHICH IS NOT ILLUSTRATED.
	POWER PANELBOARD: FLUSH OR SURFACE-MOUNTED, TOP 6'-0" AFF. SEE PANELBOARD SCHEDULE FOR SUPPORT INFORMATION.
XX / 01	EQUIPMENT NUMBER: REFER TO SCHEDULES AND EQUIPMENT SUPPLIERS DRAWINGS FOR SUPPORTING INFORMATION
"CTS"	COMMUNICATIONS TERMINAL SPACE: 3/4" PLYWOOD BOLTED TO WALL, TOP 6'-0" AFF, WIDTH AS INDICATED ON THE DRAWINGS. INSTALL GROUND BAR AND 1#4CU GROUND WIRE TO BUILDING GROUND SYSTEM. PAINT WITH FIRE-RETARDANT PAINT.
	TELE/DATA OUTLET: 4-11/16" SQUARE BOX WITH SINGLE GANG DEVICE RING AND BLANK TRIM PLATE, 18" AFF TO CENTER OF ROUGH-IN OR 44" AFF TO CENTER OF ROUGH-IN AT CASEWORK. EXTEND (2) 1" CONDUITS TO CTS. PROVIDE PULLSTRING "C" SPECIAL MOUNTING HEIGHT IN OR AROUND CASEWORK, SEE ARCHITECTURAL DRAWINGS AND CASEWORK ELEVATIONS
	P.A. SPEAKER ROUGH-IN: INSTALL A WALL RECESSED SINGLE GANG BOX, VERIFY HEIGHT WITH ARCHITECT. ROUTE 1" C TO "CTS", PROVIDE PULLSTRING. PROVIDE WEATHERPROOF BOX AND BLANK TRIMPLATE.
	DISCONNECT SWITCH: HORSEPOWER RATED, FUSED, HEAVY DUTY "WP" INDICATES NEMA 3R ENCLOSURE UNLESS NOTED OTHERWISE. COORDINATE MOUNTING LOCATION ON EXTERIOR FACADES WITH ARCHITECT.

NOTES:

1. ALL CONDUITS SHALL CONTAIN AN EQUIPMENT GROUNDING CONDUCTOR WHICH IS NOT ILLUSTRATED.
2. PRIOR TO LOCATING ANY AND ALL DEVICES AT CASEWORK, COUNTERTOPS, ETC., THE CONTRACTOR SHALL REFER TO FINAL ARCHITECTURAL CASEWORK ELEVATIONS AND SHOP DRAWINGS TO VERIFY MOUNTING HEIGHTS AND LOCATIONS. ALL DEVICE LOCATIONS SHALL BE COORDINATED WITH THESE DRAWINGS AND/OR THE ARCHITECT PRIOR TO ROUGH-IN.
3. ALL 120V, 20 AMP CIRCUITS WITH HOMERUNS GREATER THAN 70 FEET SHALL HAVE CIRCUIT CONDUCTORS OF #10AWG AS MINIMUM. ANY 120V, 20 AMP CIRCUIT WITH OUTLETS GREATER THAN 100 FEET OF BRANCH CIRCUIT LENGTH SHALL HAVE MINIMUM CIRCUIT CONDUCTOR OF #10AWG TO ALL OUTLETS AND HOMERUN. ANY 120V, 20 AMP CIRCUIT WITH HOMERUN GREATER THAN 140 FEET SHALL HAVE BRANCH CIRCUIT CONDUCTOR OF #8AWG MINIMUM. PROVIDE ADEQUATE BOX TO SPLICE #12AWG FOR TERMINATION TO DEVICE. LARGER CONDUCTORS MAY REQUIRE THE UTILIZATION OF LARGER CONDUIT SIZES - REFER TO NEC TABLES.
4. PROVIDE A DEDICATED NEUTRAL FOR EACH LINE-TO-NEUTRAL CIRCUIT IN A MULTI-CIRCUIT HOMERUN.
5. DEVICE ACCESSIBILITY: DEVICES INTENDED FOR NORMAL USE OR OPERATION BY BUILDING OCCUPANTS SHALL BE LOCATED AT AN ACCESSIBLE MOUNTING HEIGHT AS DEFINED BY THE AMERICANS WITH DISABILITIES ACT (ADA). AT UNOBSTRUCTED APPROACH LOCATIONS, OPERABLE PARTS SHALL NOT BE GREATER THAN 48" AFF AND NOT LESS THAN 15" AFF. COORDINATE CLEAR FLOOR SPACE AND OBSTRUCTED APPROACHES WITH ADA SECTION 309.

PANELBOARD 'AA1' SCHEDULE

VOLTAGE: 480 Y277V, 3 PHASE, 4 WIRE | MAIN: LUG ONLY | MOUNTING: SURFACE 6"x20" | NEMA TYPE 1
BUS SIZE: 100 AMPERES | LOAD: 22.9 kVA TOTAL | FAULT DUTY: 22,000 AIC | LOCATION & FEEDER: SEE DRAWINGS

CKT NO	SERVICE TO:	LOAD (kVA) LTG	RECPT	OTHER	O.C./ POLE	TRIP TYPE	PHASE A	B	C	TRIP TYPE	O.C./ POLE	LOAD (kVA) LTG	RECPT	OTHER	SERVICE TO:	CKT NO
1	SPORTS POLE LIGHTING "A1"	1.30					**2.6**					1.30			SPORTS POLE LIGHTING "A2"	2
3		1.30			30/3			**2.6**			30/3	1.30				4
5		1.30							**2.6**			1.30				6
7	SPORTS POLE LIGHTING "B1"	2.50					**5.0**					2.50			SPORTS POLE LIGHTING "B2"	8
9		2.50			30/3			**5.0**			30/3	2.50				10
11		2.50							**5.0**			2.50				12
13	SPARE						**0.1**				20/1	0.10			FLAG POLE LIGHTING	14
15					30/3						20/1				SPACE	16
17											20/1				SPACE	18
19	SPACE				20/1						20/1				SPACE	20
21	SPACE				20/1						20/1				SPACE	22
23	SPACE				20/1						20/1				SPACE	24
25	SPACE				20/1										SURGE SUPPRESSION DEVICE	26
27	SPACE				20/1						30/3					28
29	SPACE				20/1											30

PANELBOARD NOTES:
1. PROVIDE PANEL WITH SURGE SUPPRESSION DEVICE.
2. (PC)CIRCUIT CONTROLLED BY PHOTO-CELL.
3.
4.
5.

PHASE TOTALS: A 7.7 | B 7.6 | C 7.6

TOTAL CONNECTED LOAD: 22.9 kVA AT 480Y277V = 27.5 AMPERES

PANELBOARD 'ADP' SCHEDULE

VOLTAGE: 208 Y120V, 3 PHASE, 4 WIRE | MAIN: 150 A MAIN BKR | MOUNTING: SURFACE 6"x20" | NEMA TYPE 1
BUS SIZE: 150 AMPERES | LOAD: 38.2 kVA TOTAL | FAULT DUTY: 10,000 AIC | LOCATION & FEEDER: SEE DRAWINGS

CKT NO	SERVICE TO:	LOAD (kVA) LTG	RECPT	OTHER	O.C./ POLE	TRIP TYPE	PHASE A	B	C	TRIP TYPE	O.C./ POLE	LOAD (kVA) LTG	RECPT	OTHER	SERVICE TO:	CKT NO
1	PANEL A1	0.60	2.50	4.25			**14.0**					0.10	0.50	4.00	PANEL A2	2
3		0.20	3.20	3.35	100/3			**12.3**			100/3	0.20	2.20	3.10		4
5			3.10	3.10					**11.9**			0.50	2.10	3.10		6
7	SPORTS LIGHTING CONTROLS			0.10	20/1		**0.1**				20/1				SPACE	8
9	SPARE				20/1						20/1				SPACE	10
11	SPARE				20/1						20/1				SPACE	12
13	SPARE				20/1						20/1				SPACE	14
15	SPACE				20/1						20/1				SPACE	16
17	SPACE				20/1						20/1				SPACE	18
19	SPACE				20/1										SURGE SUPPRESSION	20
21	SPACE				20/1						30/3					22
23	SPACE				20/1											24

PANELBOARD NOTES:
1. PROVIDE PANEL WITH SURGE SUPPRESSION DEVICE.
2.
3.
4.
5.

PHASE TOTALS: A 14.1 | B 12.3 | C 11.9

TOTAL CONNECTED LOAD: 38.2 kVA AT 208Y120V = 106.0 AMPERES

PANELBOARD 'A1' SCHEDULE

VOLTAGE: 208 Y120V, 3 PHASE, 4 WIRE | MAIN: 100 A MAIN BKR | MOUNTING: FLUSH 6"x20" | NEMA TYPE 1
BUS SIZE: 100 AMPERES | LOAD: 20.3 kVA TOTAL | FAULT DUTY: 10,000 AIC | LOCATION & FEEDER: SEE DRAWINGS

CKT NO	SERVICE TO:	LOAD (kVA) LTG	RECPT	OTHER	O.C./ POLE	TRIP TYPE	PHASE A	B	C	TRIP TYPE	O.C./ POLE	LOAD (kVA) LTG	RECPT	OTHER	SERVICE TO:	CKT NO
1	RECEPTACLE @ CTS		1.00		20/1		**1.1**			PCTC	20/1	0.10			EXTERIOR LIGHTING	2
3	RECEPTACLES RM 101		0.70		20/1			**0.9**			20/1	0.20			INTERIOR LIGHTING	4
5	RECEPTACLES RM 101		0.70		20/1				**2.7**		25/2			2.00	DSC-1	6
7	POINT OF SALE		0.50		20/1		**2.5**							2.00		8
9	POINT OF SALE		0.50		20/1			**1.6**			15/2			1.10	DSC-2	10
11	RECEPT BLDG EXTERIOR		0.40		20/1				**1.5**					1.10		12
13	ICE MAKER		1.00		20/1	GF	**1.5**				20/1	0.50			SCOREBOARD	14
15	FREEZER		1.00		20/1	GF		**2.0**			20/1		1.00		PITCHING MACHINE	16
17	REFRIGERATOR		1.00		20/1	GF			**2.0**		20/1		1.00		PITCHING MACHINE	18
19	SPARE				20/1		**2.3**				30/2			2.25	WATER HEATER	20
21	SPARE				20/1			**2.3**						2.25		22
23	SPARE				20/1						20/1				SPACE	24
25	SPACE				20/1						20/1				SPACE	26
27	SPACE				20/1						30/2				SURGE SUPPRESSION.	28
29	SPACE				20/1											30

PANELBOARD NOTES:
1. (GF)PROVIDE 5mA GFCI TYPE BREAKER.
2. (PCTC)CIRCUIT CONTROLLED BY PHOTOCELL/TIMECLOCK.
3. PROVIDE PANEL WITH SURGE SUPPRESSION DEVICE.
4.
5.

PHASE TOTALS: A 7.3 | B 6.8 | C 6.2

TOTAL CONNECTED LOAD: 20.3 kVA AT 208Y120V = 56.3 AMPERES

PANELBOARD 'A2' SCHEDULE

VOLTAGE: 208 Y120V, 3 PHASE, 4 WIRE | MAIN: 100 A MAIN BKR | MOUNTING: FLUSH 6"x20" | NEMA TYPE 1
BUS SIZE: 100 AMPERES | LOAD: 22.3 kVA TOTAL | FAULT DUTY: 10,000 AIC | LOCATION & FEEDER: SEE DRAWINGS

CKT NO	SERVICE TO:	LOAD (kVA) LTG	RECPT	OTHER	O.C./ POLE	TRIP TYPE	PHASE A	B	C	TRIP TYPE	O.C./ POLE	LOAD (kVA) LTG	RECPT	OTHER	SERVICE TO:	CKT NO
1	RECEPTACLE @ CTS		1.00		20/1		**1.1**			PCTC	20/1	0.10			EXTERIOR LIGHTING	2
3	RECEPTACLES RM 101		0.70		20/1			**0.9**			20/1	0.20			INTERIOR LIGHTING	4
5	RECEPTACLES RM 101		0.70		20/1				**2.7**		20/2			2.00	DSC-1	6
7	POINT OF SALE		0.50		20/1		**2.5**							2.00		8
9	POINT OF SALE		0.50		20/1			**1.6**			20/2			1.10	DSC-2	10
11	RECEPT BLDG EXTERIOR		0.40		20/1				**1.5**					1.10		12
13	ICE MAKER		1.00		20/1	GF	**3.0**				30/1			2.00	EXISTING LOAD	14
15	FREEZER		1.00		20/1	GF		**3.0**			30/1			2.00	EXISTING LOAD	16
17	REFRIGERATOR		1.00		20/1	GF			**1.5**		20/1	0.50			EXISTING SCOREBOARD	18
19	SPARE				20/1		**2.3**				30/2			2.25	WATER HEATER	20
21	SPARE				20/1			**2.3**						2.25		22
23	SPARE				20/1						20/1				SPACE	24
25	SPACE				20/1						20/1				SPACE	26
27	SPACE				20/1						30/2				SURGE SUPPRESSION.	28
29	SPACE				20/1											30

PANELBOARD NOTES:
1. (GF)PROVIDE 5mA GFCI TYPE BREAKER.
2. (PCTC)CIRCUIT CONTROLLED BY PHOTOCELL/TIMECLOCK.
3. PROVIDE PANEL WITH SURGE SUPPRESSION DEVICE.
4.
5.

PHASE TOTALS: A 8.9 | B 7.8 | C 5.7

TOTAL CONNECTED LOAD: 22.3 kVA AT 208Y120V = 61.9 AMPERES

8/6/2024 7:39:52 AM

MHM
McCarty Holsaple McCarty
550 W. Main St., Suite 300
Knoxville, TN 37902
t 865.544.2000
www.mhminc.com

Project Information:

24023

OAK RIDGE HIGH SCHOOL SOFTBALL

15 WILBERFORCE AVE
OAK RIDGE, TN 37830

OAK RIDGE SCHOOLS

Seal:

Engineering Services Group, Inc.
Consulting Engineers
900 East Hill Ave. Suite 350
Knoxville , Tennessee 37915
(865) 522-0393
Project No. 24749

#	ISSUED BY:	DATE

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ELECTRICAL LEGEND SCHEDULES & DETAILS