Notice to Bidders/Interested Persons
Tompkins County
Recycling and Materials Management

The County of Tompkins hereby gives notice that proposals for **Recycling Center Phase 2** will be accepted up until **2 PM Monday, June 15, 2026**. Responses to this RFP and any other required documents shall be submitted online through the Tompkins County website at: https://www.tompkinscountyny.gov/All-Departments/Finance-Department/Purchasing-Division and selecting 'Open Solicitations'. This will take you to Bidnet Direct where the RFP information is posted for the public. Bidders who do not have, or cannot obtain, internet access must contact the Purchasing Division, (607) 274-5500 for further proposal submission instructions.

TOMPKINS COUNTY
GENERAL INSTRUCTIONS and CONDITIONS

Responses submitted to any Request for Bids, Request for Proposals, or Request for Qualifications become the property of Tompkins County and are subject to Public Information Policy. Any confidential information, such as a company's financial status, if required by the specifications, shall be submitted in a separate sealed envelope with the word "CONFIDENTIAL" on the outside.

Minority Business Enterprises (MBE) and Woman Owned Business Enterprise (WBE) entities are encouraged to submit bids.

Bids will not be accepted from Bidder's determined to be a "Non-Responsible Entity" by the New York State Office of General Services in accordance with General Municipal Law 5A-103-b. This Project is a "Covered Project" under New York State Labor Law 220-I, and each Bidder must hold a valid Certificate of Registration from the New York State Department of Labor (NYSDOL) to submit a Bid. Each Bidder must submit a copy of their NYSDOL Certificate of Registration with their Bid at the time the Bid is made. Bidders will need to ensure that each Subcontractor working under them hold valid NYSDOL Certificate of Registration before commencing any work on a covered project.

Note: The following terms are used interchangeably: Consultant, Contractor, Respondent, Respondent, Responder, and Bidder. Additionally, the following terms may be used interchangeably: Contract and Agreement.

PROJECT IDENTIFICATION:

1. Title: **Tompkins County Recycling Center Phase 2**
2. Requesting Department: **Department of Recycling and Materials Management**
3. Due Date/Time: **June 15, 2026, at 2 PM ET**

NOTE: A **pre-bid meeting** will be held at the facility on **Wednesday, May 27, 2026, at 10 AM ET** (Tompkins County Recycling & Solid Waste Center, 160 Commercial Ave., Ithaca, NY). Contractors wishing to attend the pre-bid meeting shall notify Leo Riley, Director, Department of Recycling & Materials Management prior to the meeting date ldriley@tompkins-co.org or (607) 273-6632. Any questions resulting from the site visit and meeting shall be submitted in accordance with the procedures outlined in the General Instructions.

SPECIFICATIONS:

Technical Specifications and Architectural and Engineering Plans are noted within this set of contract documents.

The County does not assume any responsibility for errors or misinterpretations resulting from the use of incomplete sets of proposals.

SUBMISSION of PROPOSALS:

1. Bids and any other required documents shall be submitted online through the Tompkins County website at: https://www.tompkinscountyny.gov/All-Departments/Finance-Department/Purchasing-Division and selecting 'Open Solicitations'. This will take you to Bidnet Direct where the RFP information is posted for the public. Bidders who do not have, or cannot obtain, internet access must contact the Purchasing Division via email (preferred), purchase@tompkins-co.org or by telephone, (607) 274-5500 for further instructions.

2. Please add purchase@tompkins-co.org to your email address book to ensure timely notifications regarding the project(s) you have requested.

3. Bids shall be uploaded and responded to no later than the date and time indicated in the Notice to Bidders and/or the Bid Identification section above.

4. Tompkins County reserves the right to reject any or all proposals in whole or in part, to waive any and all informalities, and to disregard all non-conforming, non-responsive or conditional proposals.

**NOTE: If you experience difficulty submitting your bid, contact the Purchasing Division via email (preferred), purchase@tompkins-co.org or by telephone, (607) 274-5500. If you do not receive a response from the Purchasing Division, you may contact the Finance Team (607) 274-5544.*

BACKGROUND
The Tompkins County Department of Recycling & Materials Management (TCRMM) contracts with a third-party operator responsible for the daily operation of the facility. Built in 1995, the Recycling and Solid Waste Center allows for commercial and residential disposal of solid wastes, recyclable materials, and organic and yard wastes. These materials are transferred by the operator to disposal sites, and/or to recycling markets. The County has allocated funding for Capital infrastructure improvements at the facility.

PURPOSE OF REQUEST
TCRMM is soliciting construction bids for the replacement of the office vestibule, replace gutter system, removal of roof vent fans and roof repairs. Bids are encouraged by qualified construction contractors.

PROJECT MANAGEMENT
The Tompkins County Department of Recycling & Materials Management will be the administrative agency for Recycling & Solid Waste Center (RSWC) Infrastructure Upgrade Project. As such, management of and contract administration will be overseen by the Department, and staff will be directly involved in all stages of the project. The Department's consulting engineer, Barton & Loguidice, will provide construction administration and observation in coordination with the Department.

GENERAL REQUIREMENTS
The Tompkins County Department of Recycling & Materials Management is seeking bids from qualified contractors to provide the following:
- Replacement of office vestibule and gutters
- Removal of roof fans and roof repairs

LOCATION OF THE WORK
The work will be conducted at the Tompkins County Recycling & Solid Waste facility, located at 160 Commercial Avenue, Ithaca, NY.

OBLIGATION OF BIDDERS
At the time of the opening of the Bids, each Bidder will be presumed to have inspected the Site, to have informed itself fully of the conditions relating to the work and labor required for the work, and to have read and acquainted itself will all the Contract Documents. Failure to do so will not relieve the Bidder who is awarded the Contract of the obligation to complete the work for the price or prices bid, or of any other obligation under the Contract. The failure or omission of any Bidder to receive or examine any Contract Documents shall in no way relieve them from any obligation in respect to the Bid.

SPECIFIC REQUIREMENTS

The selected Contractor will coordinate all work under this contract with Tompkins County Department of Recycling & Materials Management administration, and the Recycling Facility operator, to prevent any interference with public access and use of the facility during normal work hours and shall coordinate all operations to allow normal operations of the facility by the Recycling Facility operator staff.

The Contractor shall provide temporary fencing, barricades, and or traffic control barrels or cones to demarcate the areas of work and allow for normal traffic flow within the facility. All operations that will interfere with the operation of the facility shall be scheduled after 3:30 pm, unless arrangements are made with the operator. Normal public access to the facility is Monday-Saturday, 7:00am to 3:30pm. The Contractor may work on Sundays if dispensation is approved through the NYSDOL.

The contractor will be required to submit a work phasing plan as part of the pre-construction meeting that will detail the plan of work, and any required area closures. The phasing plan will be reviewed by the County and operator, and the contractor shall modify the plan as required to accommodate facility operations. Phasing requirements for specific trades are to be indicated in the phasing plans.

Recycling of Materials: As the owner of a recycling center, Tompkins County R&MM is committed to reusing and recycling materials to the maximum extent possible. As part of the work phasing plan, the Contractor shall identify the materials to be removed from the facility that may be reused or recycled, as well as a materials management plan for handling, which will require reuse prior to recycling. The County will be available to work with the contractor to identify viable reuse outlets, if needed. Additionally, the County will indicate whether recyclables will be accepted at the facility. If not accepted at the facility, then the Contractor shall identify other sites for recycling the materials. Materials shall only be considered construction and demolition debris or solid waste if no identified reuse opportunity or recycling center is identified. Materials subject to reuse and recycling are varied, but may include removed lighting fixtures, usable surplus construction materials, cardboard, and other similar materials.

Construction & Demolition and Solid Wastes: For materials determined not to be salvageable or recyclable, the contractor shall provide dumpsters for the handling of solid waste and construction & demolition debris. Solid waste and acceptable construction & demolition debris shall be disposed of at the Tompkins County Recycling & Solid Waste Center as incoming waste and debris. The Contractor shall utilize the County's standard payment and weigh protocols established at the facility. The County will provide the Contractor with temporary permits for facility use if needed. The Contractor will be responsible for payment of tipping fees and shall account for these fees as part of their bid.

Areas within the facility for equipment storage, contractor vehicle parking and laydown will be identified during the pre-construction meeting prior to commencement of the work. Due to the layout of the facility, and the requirement for continued public operation of the recycling and solid waste bays, these areas may not be proximal to the work zones.

A performance bond, and Labor and Material Payment bonds are required for this project.

General Conditions, General Requirements (sections 00750 - 01640) as provided in Attachment E, are incorporated and made part of the Contract Documents.

SUBMISSION REQUIREMENTS:

1. Successful bidder shall submit their references within 30 days of notification of Intent to Award.
2. Successful bidder shall submit a listing disclosing all subcontractors supplying services for this contract with their qualifications.
3. Successful bidders and their employees shall conduct themselves in a manner that is consistent with the professional nature of the work when present at the Tompkins County Recycling and Solid Waste Facility, and general conduct themselves as professionals.
4. The successful bidder shall agree to perform the services as described in the Contract Documents.
5. The bid form includes a lump sum base bid.

PROPOSAL EVALUATION
To be reviewed, a proposal must be complete and must comply with all requirements of this RFP.

Contract will be awarded to the lowest qualified proposer, based on the total cost of the work provided (lump sum base bid) on the Bid Form.

TIMELINE

Action Item	Date
RFP Issue	**May 13, 2026**
Pre-bid Meeting	**May 27, 2026**
Deadline for Questions	**June 8, 2026**
Completed Proposal Due	**June 15, 2026**
**Award Notification (anticipated)	**September 1, 2026**
** Contract Start Date (anticipated)	**September 15, 2026**

SUBMISSION DEADLINE:

The deadline for submission of proposals is **June 15, 2026 @ 2 PM ET**.

SPECIFICATION CLARIFICATION:

Clarification to the specifications must be submitted, via Bidnet Direct, no later than seven (7) days prior to the bid/rfp due date before **5 PM on June 8, 2026**. Answers to questions will be posted on Bidnet Direct as they are available.

DISQUALIFICATION:

1. The County reserves the right to refuse to issue a Contract to a prospective vendor should such vendor be in default for any of the following reasons:
   (a) Failure to comply with any pre-qualification regulations of the County, if such regulations were cited, or otherwise included in the specifications as a requirement for responding.

   (b) Contractor's default under previous contracts with the County.

   (c) Contractor's unsatisfactory work on previous contracts with the County.

2. Responses received from Contractors who have previously failed to complete contracts within the time required, or who have previously performed similar work in an unsatisfactory manner, may be rejected. A response may be rejected if the Contractor cannot show that it has the necessary ability, plant and equipment to commence the work at the time prescribed and thereafter to perform and complete the work at the rate or time specified. A response may be rejected if the Contractor is already obligated for the performance of other work which would delay the commencement, performance or completion of the work if the Contractor is not able to demonstrate the ability to fulfill the requirements of the proposal in a manner agreed upon by the County and the Contractor.

3. Tompkins County reserves the right to reject any proposal if the information submitted by, or investigation of, such Contractor fails to satisfy the County that such Contractor is properly qualified to carry out the obligations of the Contract and to complete the work contemplated therein.

4. Proposals will be considered irregular and shall be subject to rejection for the following reasons:

   (a) If there are unauthorized additions, conditional or alternate pay items, or irregularities of any kind which make the proposal incomplete, indefinite, or otherwise ambiguous.

The County reserves the right to award the Contract to the Respondent who submits the proposal that proves to be in the best interest of the County. The County has the sole discretion and reserves the right to cancel this request, reject any/all responses, award in part or in whole, to waive any/all informalities and/or irregularities if it is deemed to be in the best interest of the County to do so. A notice of Contract award shall not be binding upon the County until the Contract has been fully executed by both parties.

Contract Extension:

The County agrees, under the General Municipal Law of New York State to allow all authorized users who wish to utilize any Contract awarded as a result of this solicitation to do so. However, it is understood that the extension of such Contract is at the discretion of the Respondent and the Respondent is only bound to the Contract between itself and the County.

Term of Contract:

Contract period shall be from **September 15, 2026 to December 31, 2026**.

Contract Award:

The Contract award, if any, will be made by September 6th, 2026. The Contract shall be awarded to the Respondent(s) who submits the proposal that proves to be in the best interest of the County.

The resulting Contract will incorporate Tompkins County Contract Terms and Conditions, this RFP, any addendum, and Bidder's response thereto, all additional agreements and stipulations, and the results of any final negotiations will constitute the final Contract. The terms and conditions as contained in the Contract for services shall take precedence over any conflicting terms.

Payment Terms:

Payment terms to be negotiated. Interest penalties to the County will not be allowed. Tompkins County is not subject to federal, state, or local taxes.

Non-Appropriation Clause:

In accordance with the New York State General Municipal Law, the County will not be liable for any purchases or contracts for goods or services for which funding is not available. As a result, the Respondent agrees to hold the County harmless for any contracts let for which funding either does not currently exist, or for which funding has been removed prior to the authorization to proceed. Should it become necessary for the County to cancel a project after the order to proceed has been issued, the County will only be liable for, and the Respondent agrees, to only assess those financial damages that it can prove to have incurred as a result of the Contract termination.

Indemnification, Hold Harmless, and Insurance:

- The successful bidder shall release, waive, indemnify, hold harmless, and defend the County and its officers, employees, agents and elected officials from and against any and all claims, demands, actions, causes of action, suits, or judgements, including but not limited to, losses, costs, expenses, penalties, or other damages or liability brought against the County and its officers, employees, agents and elected officials for injury, illness, or death to any person or persons or damage to property arising out of the performance of the Agreement entered as a result of this solicitation by the successful bidder, its employees, subcontractors or agents with the exception of actions and claims arising out of the negligence of the County. The indemnification will survive the term of such Agreement whether it is terminated or expired. The successful bidder shall maintain the minimum limits of insurance as outlined by such Agreement in Attachment B or as required by law, whichever is greater.
- The successful Bidder will be required to procure and maintain, at its own expense, the minimum limits of insurance as described in the County's standard insurance requirements or as required by law, whichever is greater.
- No work shall be commenced under the Contract until the successful Bidder has delivered to the County proof of issuance of all policies of insurance required by the Contract. If at any time, any of said policies shall expire or become unsatisfactory to the County, the successful Bidder shall promptly obtain a new policy and submit proof of insurance of the same to the County for approval. Upon failure of the successful Bidder to furnish, deliver and maintain such insurance as above provided, the Contract may, at the election of the County, be forthwith declared suspended, discontinued or terminated. Failure of the successful Bidder to procure and maintain any required insurance, shall not relieve the successful Bidder from any liability under the Contract, nor shall the insurance requirements be construed to conflict with the obligations of the successful Bidder concerning indemnification.

Training:

If required, training shall take place during regular business hours. Training shall be provided until all County personnel involved in the Contract are adequately trained.

MWBE:

Tompkins County is committed to inclusion in our procurement processes and to support underrepresented businesses. MBEs, WBEs, and other Disadvantaged Business Enterprises (DBE's) are encouraged to complete the Business Demographic Survey (Attachment D).

Workforce Diversity and Inclusion:

Tompkins County government is committed to creating a diverse and fully inclusive workplace that strengthens our organization and enhances our ability to adapt to change by developing and maintaining:

A. An organization-wide understanding and acceptance of the purpose and reasons for diversity.
B. Recruitment and retention policies that promote and sustain a diverse workforce.
C. A workplace environment that is welcoming and supportive of all.
D. Awareness, understanding and education regarding diversity issues.
E. Zero tolerance for expressions of discrimination, bias, harassment, or negative stereotyping toward any person or group.
F. A workforce ethic that embraces diversity and makes it the norm for all interactions, including delivery of services to the public.

All Respondents must comply with the Workforce Diversity and Inclusion terms and conditions as well as sign an Anti-discrimination certificate. Respondents are encouraged to include an outline of their diversity policy in their proposal response.

Contract Re-Assignment:

The Respondent shall not re-assign any portion of any contract that results from this solicitation without the express written consent of the County.

Governing Law:

Any resulting Agreement and any controversies arising thereunder, shall be interpreted, governed, and construed under the laws of the State of New York. The Bidder consents to the exclusive jurisdiction of, and venue in, the State Courts within Tompkins County, New York or the United States District Court for the Northern District of New York if Federal jurisdiction is sought. Any such Agreement is binding on all successors, heirs, executors, administrators, representatives, and assigns of all the Bidder/Contractor.

The successful bidder is responsible for complying with all current labor rates and regulations throughout the duration of any contract resulting from this solicitation.

Interpretation:

In the event of any discrepancy, disagreement or ambiguity among the documents which comprise this RFP, and/or, the Agreement (between the County and the successful Proposer) and its incorporated documents, the documents shall be given preference in the following order to interpret and to resolve such discrepancy, disagreement or ambiguity: 1) the Agreement; 2) the RFP; 3) the Contractor's proposal.

Remedy for Breach:

In the event of a breach by Contractor, Contractor shall pay to the County within ninety (90) days all direct and consequential damages caused by such breach, including, but not limited to, all sums expended by the County to procure a substitute Contractor to satisfactorily complete the contract work, together with the County's own costs incurred in procuring a substitute Contractor. All legal and equitable claims against the County of Tompkins shall be brought in the Supreme Court of Tompkins County or the United States District Court for the Northern District of New York if federal jurisdiction is sought.

Conflict of Interest:

No officer or employee of the County shall participate in any decision relating to the Contract which affects their personal interest or the interest of any corporation, partnership, or association in which they are directly or indirectly interested.

New York State Sexual Harassment Legislation:

By submitting a response to this solicitation, the Bidder hereby represents that it complies with all federal and New York state laws and regulations prohibiting sexual harassment in the workplace including, without limitation, that said Bidder has implemented a written policy compliant with New York laws and regulations addressing sexual harassment prevention in the workplace and provides annual sexual harassment prevention training to all of its employees.

Living Wage:

Tompkins County must consider the wage levels and benefits, particularly health care, provided by Contractors when awarding bids or negotiating contracts, and to encourage the payment of livable wages whenever practical and reasonable.

If Contractor certifies on Tompkins County Livable Wage attestation that its employees directly providing services outlined in the Contract are NOT paid a living wage, the department contract representative may have a conversation with the Contractor to understand the cost implications of achieving the living wage threshold, whether there are structural barriers impacting the ability to pay the living wage, plans to improve wages over time, generous fringe benefits, or other considerations that should be applied when addressing the question of whether it is practical or reasonable to meet the living wage threshold including the cost required to bring the Contract to the living wage threshold.

Regulatory Compliance:

The Respondent agrees to comply with all federal, state, and local laws and regulations governing the provision of goods and services under this Contract. To the extent that federal funds are provided to the Respondent under this Contract, the Respondent agrees that it will comply with all applicable federal laws and regulations, including but not limited to those laws and regulations under which the federal funds were authorized.

Further, Respondent agrees to comply with the County's Compliance Plan regarding federal and state fraud and abuse laws; the Compliance Plan can be reviewed **here**, or a copy can be obtained from Tompkins County Administration, 125 East Court Street, Ithaca, NY 14850.

In the event that New York State Labor Law Articles 8 and/or 9 are applicable under the agreement and/or scopes of work, the statute requires that contractors and subcontractors pay the prevailing rate of wage and supplements (fringe benefits) to all workers under a public work contract and follow other requirements. Employers must pay the prevailing wage rate set for the locality where the work is performed. Prevailing wage is the pay rate set by the New York Department of Labor for work on public work projects. This applies to all laborers, workers or mechanics employed under a public work contract. Every contractor and subcontractor must keep and provide certified original payrolls or transcripts subscribed and affirmed as true under penalty of perjury. These must be made available to the County at its request. Payrolls must be maintained for at least three (3) years from the projects date of completion. Additionally, as per Article 6 of the Labor Law, contractors and subcontractors are required to establish, maintain, and preserve for not less than six (6) years, contemporaneous, true, and accurate payroll records. At a minimum, payrolls must show the following information for each person employed on a public work project: Name; Address, Last 4 Digits of Social Security number, Classification(s) in which the worker was employed, Hourly wage rate(s) paid, Supplements paid or provided, and Daily and weekly number of hours worked in each classification. Payroll records and transcripts are required to be kept on site during all the time that work under that contract is being performed.

Respondents that are providers of healthcare services must certify that the Respondent, and all employees, directors, officers, and subcontractors of the Respondent, are not "excluded individuals or entities" under federal and/or New York state statues, rules, and regulations.

The Respondent shall promptly notify the County if any employee, director, officer of subcontractor is on or has been added to the exclusion list. The County reserves the right to immediately cancel this Contract, at no penalty to the County, if any employee, director, officer, or subcontractor is on or has been added to the exclusion list.

By submitting a response to an RFP, you are attesting to the fact that you and/or the provider, which you represent, have not been sanctioned nor excluded by any of the aforementioned entities.

SPECIAL NOTE – NEW YORK STATE PREVAILING WAGE RATES

The Contractor shall ensure that workers are paid the appropriate wages and supplemental (fringe) benefits. Throughout the contract, the Contractor shall obtain and pay workers in accordance with periodic wage rate schedule updates from the NYS Department of Labor (NYSDOL). Wage rate amendments and supplements are available on the NYSDOL web site at http://www.labor.state.ny.us. All changes or clarification of labor classification(s) and applicability of prevailing wage rates shall be obtained in writing from the Office of the Director, NYSDOL Bureau of Public Work.

The NYSDOL prevailing wage rate schedule for this contract has been determined and is available on the internet. The prevailing wage rate schedule is accessed by visiting the NYSDOL web site, navigating to the appropriate web page, and entering the Prevailing Rate Case Number (**PRC# 2026010759**).

A copy of the project specific prevailing wage rate schedule will be provided to the successful bidder upon award of the contract. Upon written request, the schedule will be provided by the Engineer to prospective bidders without internet access.

Attachment A

CERTIFICATION

Bidders must certify that they will comply with the following requirements if funding is awarded as a result of this RFP. All awardees of funds shall:

1. Sign an Anti-discrimination Clause and comply with all Equal Opportunity Laws, including the Americans with Disabilities Act of 1990;
2. Sign a "Certification Regarding Debarment, Suspension, and Other Responsibility Matters," indicating that they have not been debarred or suspended from participating in federal programs because of crimes, fraud, or other serious violations of federal laws and regulations;
3. Sign a certification regarding lobbying, indicating that no federal funds will be used to attempt to influence any federal officer, employee, or elected official;
4. Sign a certification that they provide a drug-free workplace and have a written drug-free workplace policy;
5. Sign a certification that they have and have implemented a written policy addressing sexual harassment prevention in the workplace and provides annual sexual harassment prevention training to all of its employees;
6. Agree to provide training without any duplication of costs;
7. Provide a copy of their most recent financial audit before Contract execution;
8. Agree to allow on-site inspections and audits of any records related to their programs.

I certify that _____ (name of bidder organization) will comply with the above requirements.

_____
Name

_____
Title

_____
Signature and Date

Attachment A

Tompkins County
Request for Proposal – Submission Instructions

Respondents shall submit their proposal response per the instructions below. Respondents who do not follow these guidelines may have their proposals rejected as incomplete or non-responsive.

- Respondents shall read all documents contained in this specification package and complete all sections and attachments. Failure to do so does not excuse respondent from abiding by all instructions, terms or conditions.

- Responses shall be submitted to the location and in the format indicated in the specifications no later than the date and time indicated.

- Respondents must submit their questions regarding any portion of the specifications by posting them on the Q&A tab found in the solicitation by the date provided. Answers will be provided no later than five (5) days prior to the Proposal due date.

- The County reserves the right to amend the specifications prior to the due date by written "Addenda". It is the Respondent's responsibility to ascertain whether any Addenda have been issued prior to submitting their proposal.

- Bids and any other required documents shall be submitted online through the Tompkins County website at: https://www.tompkinscountyny.gov/All-Departments/Finance-Department/Purchasing-Division and selecting 'Open Solicitations'.

- Respondents shall submit **all** forms that require signatures with their proposal response.

- All responses submitted become the property of the County and are subject to the County's Policy on Public Access to Records.

- This invitation to respond does not commit the County to award a Contract, nor shall the County be responsible for any cost or expense that may be incurred by the Respondent in preparing and submitting their response or any cost incurred prior to the execution of a Contract.

- The County reserves the right to cancel the Contract without cause with a minimum of thirty (30) days written notice. Termination or cancellation of the Contract will not relieve the Respondent of any obligations or liabilities resulting from any acts committed by the Respondent prior to the termination of the Contract.

Submission of Proposals:

1. Responses to this RFP and any other required documents shall be submitted through the Tompkins County website at: https://www.tompkinscountyny.gov/All-Departments/Finance-Department/Purchasing-Division (see instructions below).

2. Responses must be uploaded and responded to no later than the date and time indicated.

3. Tompkins County reserves the right to reject any or all bids/proposals in whole or in part, to waive any and all informalities, and to disregard all non-conforming, non-responsive or conditional bids/proposals to make the award in a manner deemed to be in the best interest of the County, and to correct any award erroneously made as the result of a clerical error on the part of the County.

Attachment A

Online Bid Submission Instructions:

Bids and any other required documents shall be submitted online through the Tompkins County website at: https://www.tompkinscountyny.gov/All-Departments/Finance-Department/Purchasing-Division and selecting 'Open Solicitations'. This will take you to Bidnet Direct where the RFP information is posted for the public. Bidders who do not have, or cannot obtain, internet access must contact the Purchasing Division via email (preferred), purchase@tompkins-co.org or by telephone, (607) 274-5500 for further instructions.

Notice to Bidders/Interested Persons
Tompkins County
Recycling and Materials Management

The County of Tompkins hereby gives notice that proposals for **Recycling Center Phase 2** will be accepted up until **2 PM Monday, June 15, 2026**. Responses to this RFP and any other required documents shall be submitted online through the Tompkins County website at: https://www.tompkinscountyny.gov/All-Departments/Finance-Department/Purchasing-Division and selecting 'Open Solicitations'. This will take you to Bidnet Direct where the RFP information is posted for the public. Bidders who do not have, or cannot obtain, internet access must contact the Purchasing Division, (607) 274-5500 for further proposal submission instructions.

Attachment A

COUNTY OF TOMPKINS
GENERAL CONDITIONS

AFFIDAVIT OF NON-COLLUSION

NAME OF RESPONDER:_____ PHONE NO.:_____

BUSINESS ADDRESS:_____ EMAIL:_____

I hereby attest that I am the person responsible within my firm for the final decision as to the price(s) and amount of the proposal, or if not, that I have written authorization, enclosed herewith, from that person to make the statements set out below on their behalf and on behalf of my company.

I further attest that:

1. The prices in this bid/proposal have been arrived at independently without collusion, consultation, communication, or agreement, for the purpose of restricting competition with any other Contractor, Responder or potential Bidder; and
2. Neither the price(s), nor the amount of this bid/proposal, have been disclosed to any other firm or person who is a Responder or potential Responder on this project, and will not be so disclosed prior to bid/proposal opening; and
3. No attempt has been made or will be made to solicit, cause, or induce any company or person to refrain from responding to this RFP, or to submit a bid/proposal higher than the proposal of this company, or any intentionally high or non-competitive bid/proposal or other complementary proposal; and
4. The bid/proposal of my company is made in good faith and not pursuant to any agreement or discussion with, or inducement from any firm or person to submit a complementary proposal; and
5. My company has not offered or entered into a subcontract or agreement regarding the purchase of materials or services from any other company or person, offeror, promised or paid cash of anything of any value to any company or person, whether in connection with this or any other project, in consideration for an agreement or promise by a company or person to refrain from responding to this RFP or to submit a complementary bid/proposal on this project; and
6. My company has not accepted or been promised any subcontract or agreement regarding the sale of materials or services to any company or person, and has not been promised or paid cash or anything of value by and company or person, whether in connection with this or any project, in consideration for my company submitting a complementary bid/proposal or agreeing to do so on this project; and have made a diligent inquiry of all members, officers, employees, and agents of my company with responsibilities relating to the preparation, approval or submission of my company's proposal on this project and have been advised by each of them that he or she has not participated in any communication, consultation, discussion, agreement, collusion act or other conduct inconsistent with any statements and representations made in this affidavit.
7. **By submission of this proposal, I certify that I have read, am familiar with, and will comply with any and all segments of these specifications.**

The person signing this proposal, under the penalties of perjury, affirms the truth thereof.

Signature & Company Position: _____

Print Name & Company Position: _____

Company Name: _____

Date Signed: _____

Attachment A

ANTI-DISCRIMINATION CLAUSE

During the performance of this Contract, (the Contractor) hereby agrees as follows:

- The Contractor will not discriminate against any employee or applicant for employment for any of the following: race, creed, color, ethnicity, military service, marital status, disability, sexual preference, perceived gender, national origin, or status as an ex-offender, and will take affirmative action to ensure that they are afforded equal employment opportunities without discrimination. Such action shall be taken with reference, but not be limited, to recruitment, employment, job assignment, promotion, upgrading, demotion, transfer, layoff or termination, rates of pay or other forms of compensation, and selection for training or retraining, including apprenticeship and on-the-job training.

- The Contractor will send to each labor union or representative of workers with which they have or are bound by a collective bargaining or other agreement or understanding, a notice, to be provided by the State Commissioner for Human Rights, advising such labor union or representative of the Contractor's agreement under clauses (a) through (f) hereinafter called "non-discrimination clauses". If the Contractor was directed to do so by the contracting agency as part of the bid or negotiation of this Contract, the Contractor shall request such labor union or representative to furnish them with as written statement that such labor union or representative either will affirmatively cooperate, within the limits of its legal and contractual authority, in the implementation of the policy and provisions of these non-discrimination clauses or that it consents and agrees that recruitment, employment and the terms and conditions of employment under this Contract shall be in accordance with the purposes and provisions of these non-discrimination clauses. If such labor union or representative fails or refuses to comply with such a request that it furnish such a statement, the Contractor shall promptly notify the State Commission for Human Rights of such failure or refusal.

- The Contractor will post and keep posted in conspicuous places, available to employees and applicants for employment, notices to be provided by the State Commission for Human Rights setting forth the substance of the provisions of clauses (a) and (b) and such provisions of the State's and local Tompkins County Laws against discrimination as the State Commission for Human Rights shall determine.

- The Contractor will state, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, that all qualified applicants will be afforded equal employment opportunities without discrimination because of race, creed, color or national origin.

- The Contractor will comply with the provisions of Sections 291-299 of the Executive Law and the Civil Rights Law, will furnish all information and reports deemed necessary by the State Commission for Human Rights under these non-discrimination clauses and such sections of the Executive Law, and will permit access to their books, records and accounts by the State Commission for Human Rights, the Attorney General and the Industrial Commissioner for purposes of investigation to ascertain compliance with these non-discrimination clauses and such sections of the Executive Law and Civil Rights Law.

Attachment A

ANTI-DISCRIMINATION CLAUSE continued…

- This Contract may be forthwith cancelled, terminated or suspended, in whole or in part, by the contracting agency upon the basis of a finding made by the State Commission for Human Rights that the Contractor may be declared ineligible for future contracts made by or on behalf of the State or a public authority or agency of the State, until they satisfy the State Commission for Human Rights that they have established and are carrying out a program in conformity with the provisions of these non-discrimination clauses. Such finding shall be made by the State Commission for Human Rights after conciliation efforts by the Commission have failed to achieve compliance with these non-discrimination clauses and after a verified complaint has been filed with the Commission, notice thereof has been given to the Contractor and opportunity has been afforded them to be heard publicly before three members of the Commission. Such sanctions may be imposed, and remedies invoked independently of or in addition to sanctions and remedies otherwise provided by law. The Contractor will include the provisions of clauses (a) through (f) in every subcontract or purchase order in such a manner that such provisions be performed within the State of New York. The Contractor will take such action in enforcing such provisions of such subcontract or purchase order as the contracting agency may direct, including sanctions or remedies for non-compliance. If the Contractor becomes involved in or is threatened with litigation with a subcontractor or vendor as a result of such direction by the contracting agency, the Contractor shall promptly so notify the Attorney General, requesting them to intervene and protect the interests of the State of New York.

GENERAL CONDITIONS ACCEPTED BY:

Firm:_____

By:_____

Date:_____

Title:_____

Attachment A

COUNTY OF TOMPKINS
GENERAL CONDITIONS
BIDDER'S STATEMENT ON SEXUAL HARASSMENT

IN ACCORDANCE WITH NEW YORK STATE FINANCE LAW §139—l

In accordance with State Finance Law §139-l, which generally prohibits the County from entering into contracts pursuant to the bid process with persons who fail to submit a certification affirming compliance with New York Labor Law §201-g, the Bidder submits the following certification under the penalty of perjury:

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 the Bidder has and has implemented a written policy addressing sexual harassment prevention in the workplace and provides annual sexual harassment prevention training to all of its employees. Such policy shall meet or exceed the requirements of Section 201-g of the Labor Law.

_____County, New York

Dated: _____, 20_____

_____
Name of Bidder

_____
Signature of Authorized Official

_____
Printed or Typed Name of Official and Title

Sworn to before me this

_____ day of _____,

_____
Notary Public

Attachment A - Contractor's Representation - Livable Wage Policy

Livable Wage Policy: By policy, Tompkins County must "consider the wage levels and benefits, particularly health care, provided by Contractors when awarding bids or negotiating contracts, and to encourage the payment of livable wages whenever practical and reasonable."

Paying the living wage rate to all employees directly involved in providing the contracted County service ***is not mandatory but highly encouraged***. However, the attainment of a broadly applied living wage is a County goal and is therefore an important consideration applied by the County when reviewing contract proposals.

Current Living Wage: The Living Wage in Tompkins County was computed by the Ithaca and Buffalo Co-Labs of Cornell's School of Industrial and Labor Relations. Living wage is currently $24.82/hour for a single person without children. While the calculation is for a single person without children, there is an alternate online calculator from MIT that does provide local living wage figures for different family configurations in Tompkins County at https://livingwage.mit.edu/counties/36109. The rate will be re-evaluated again in 2027.

Requirement of All Contractors: As a part of its proposal or contract representations, a prospective service Contractor must advise the County whether it will pay the living wage rate to all Covered Employees directly involved in the provision of the contracted service, including employees of any subcontractor engaged to assist in providing the service.

Additionally, Contractors are asked to estimate the number of employees who will be directly involved in the provision of the contracted service. If not, all employees are going to be paid the Living Wage, Contractors are asked to estimate how many full-time, and how many part-time, covered employees will NOT be paid the living wage.

Covered Employees include all full- and part-time employees, other than those Excluded Employees described below, who are directly involved in the provision of the contracted service, including employees of sub-contractors engaged to assist in providing the service.

Excluded Employees are:

- Employees under the age of 18
- Seasonal or temporary employees (90 days or less)
- Employees in a probationary status (90 days or less)
- Those employed in a sheltered or supported work environment
- Employees participating in a limited-duration (90 day) job training program
- Employees participating in an academic work-study or academic internship program
- Volunteers
- Employees participating in mandated welfare-to-work programs
- Employees paid pursuant to a collective bargaining agreement

Contractor's Living Wage Representation

1. Approximately how many Covered Employees, including employees of any subcontractor involved in providing the service, will be involved in the provision of the contracted service?_____

2. Will all Covered Employees, including employees of any subcontractors directly involved in the provision of County services, be paid at least the living wage?

☐ Yes ☐ No

3. If the answer is "No", approximately how many covered employees will NOT be paid at the living wage?
Full-time_____ Part-time_____

Contractor Name:_____

If you answered "Yes" to the Living Wage Representation and are awarded the County Contract, you will be expected to maintain all employees directly involved in the provision of services under this Contract at or above the living wage as of the time of execution of the Contract for the duration of the Contract.

If you answered "No," your response will be among the considerations applied by the County in making its Contract award. As a part of Contract negotiations, the County may request additional information from you regarding the basis of this response.

Attachment B Insurance Requirements

Contractor/Subcontractor shall indemnify, hold harmless and defend Tompkins County, its officers, employees, agents, and elected officials for injury, illness, or death to any person or persons or damage to property arising out of the performance of this Agreement by the Contractor, its employees, subcontractors or agents except all actions and claims arising out of the negligence of Tompkins County. The Contractor shall be fully responsible for the worksite and shall indemnify and hold harmless Tompkins County, its officers, employees, agents, and elected officials from and against any and all claims for injury to persons, including employees of the Contractor or any subcontractor, where such claim asserts that the injury, illness, or death was the result of conditions of the worksite or that Tompkins County, its officers, employees, agents, and elected officials were in any way negligent in the hiring of the Contractor or any subcontractor to do the work or failure to maintain a safe worksite. The Contractor/Subcontractor shall maintain the following minimum limits of insurance or as required by law, whichever is greater.

A.) Workers' Compensation and New York Disability

Workers' Compensation
Statutory coverage complying with NYS Workers' Compensation Law Section 57 General Municipal Law Section 125, Contractor must submit one of the following:

CE-200 - Certification of Attestation of Exemption form NYS Workers' Compensation and/or Disability Benefits Coverage available at http://www.wcb.ny.gov/content/main/forms/AllForms.jsp, **OR**

CE-105.2 - Certification of NYS Workers' Compensation Insurance (U-26.3 f or State Insurance Fund version), **OR**

SI-12 - Certificate of NYS Workers' Compensation Self Insurance, **OR**

GSI-105.2 - Certificate of NYS Workers' Compensation Group Self-Insurance Employers' Liability - $1,000,000

Disability Benefits Requirements
Statutory coverage complying with NYS Workers' Compensation Law Section 220 (8) under General Municipal Law Section 125, Contractor must submit one of the following:

CE-200 - Certification of Attestation of Exemption from NYS Workers' Compensation and/or Disability Benefits Coverage, **OR**

DB120.1 - Certificate of Disability Benefits Insurance, **OR** DB155 - Certificate of Disability Self-Insurance

NOTE: Proof of NYS Workers' Compensation and NYS Disability Benefits must be provided on NYS forms as listed above (complete information available at http://www.wcb.ny.gov/content/main/forms/AllForms.jsp or Bureau of Compliance at (866) 546-9322).

B.) Commercial General Liability (CGL) including, contractual, independent contractors, products/completed operations

Each Occurrence	$1,000,000
General Aggregate	$2,000,000
Products/Completed Operations Aggregate	$2,000,000
Personal and Advertising Injury	$1,000,000
Damage to Rented Premises	$50,000
Medical Expense	$5,000

- If the CGL contains a General Aggregate Limit, such General Aggregate shall apply separately to each project.
- Contractor/Subcontractor shall maintain CGL coverage for itself and all additional insureds for the duration of the project and maintain Completed Operations coverage for itself and each additional insured for at least 3 years after completion of the work.
- Policy may not contain any exclusions relating to NY Labor Law or municipal work.
- It is expressly understood and agreed by the Contractor that the insurance requirements specified above, contemplate the use of occurrence liability forms.
- Tompkins County and its officers, employees, agents and elected officials are to be included as **Additional Insured's on a primary and non-contributory basis.**
- Contractor, Owner, and all other parties required of the Contractor shall be included as Additional Insured included Completed Operations on the CGL, using ISO Additional Insured Endorsement CG2010 (11/85) or CG2010 (04/13) **AND** CG2037 (04/13) or CG2037 (04/13) **AND** CG2038 (04/13) or an endorsement providing equivalent coverage to the additional insureds. This insurance for the additional insureds shall be as broad as the coverage provided for the named insured Contractor/Subcontractor. It shall apply as Primary and non-contributing Insurance before any other insurance or self-insurance, including any deductible, maintained by, or provided to, the additional insured.

C.) Commercial Umbrella $5,000,000

- Policy may not contain any exclusions relating to NY Labor Law or municipal work.
- Tompkins County and its officers, employees, agents and elected officials are to be included as **Additional Insured's on a primary and non-contributory basis.**
- Umbrella coverage must include as insureds all entities that are additional insureds on the CGL.
- Umbrella coverage for such additional insureds shall apply as primary before any other insurance or self-insurance, including any deductible, maintained by, or provided to, the additional insured other than the CGL, Auto Liability, and Employers Liability coverages maintained by the Contractor/Subcontractor.

D.) Business Auto Coverage Liability for Owned, Hired and Non-Owned — $1,000,000 CSL or $500,000 Per Person BI 1,000,000 Per Accident BI $250,000 PD Split Limits

- Contractor, Owner, and all other parties required of the Contractor shall be included as insureds on the auto policy.

E.) Owner's & Contractor's Protective Liability Each Occurrence $1,000,000 Annual Aggregate $2,000,000

F.) Waiver of Subrogation

Contractor/Subcontractor waives all rights against Tompkins County and its officers, employees, agents and elected officials for recovery of damages to the extent these damages are covered by commercial general liability, commercial umbrella liability, business auto liability, owner's and contractor's protective liability, or workers
compensation and employers liability insurance maintained per requirements stated above.

All insurance shall be written with insurance carriers licensed by New York State and have an A.M. Best's Key Rating no lower than "A – X". **Proof of liability insurance shall be provided on the Acord Certificate of Insurance, Acord 25 (03/2016), or insurance company certificate. Proof of Workers' Compensation and NYS Disability shall be provide on forms as outlined in A, above.** All insurance policies and Certificates shall contain a provision that coverage afforded under the policies will not be canceled, allowed to expire, or materially changed (except for non-payments) until at least thirty (30) days prior written notice has been given to the County. All Certificates must be signed by a licensed agent or authorized representative of the insurance company. Certificates of Insurance shall be submitted with the RFP, bid, and/or signed agreement.

Attachment C

TOMPKINS COUNTY
VENDOR RESPONSIBILITY QUESTIONNAIRE

FEIN#

VENDOR IS: □ PRIME CONTRACTOR	□ SUB-CONTRACTOR
IDENTIFICATION NUMBER:	WEBSITE ADDRESS:
VENDOR'S LEGAL BUSINESS NAME:	D/B/A – DOING BUISNESS AS: (if applicable)
ADDRESS OF PRIMARY PLACE OF BUSINESS:	ADDRESS OF PRIMARY PLACE OF BUSINESS IN *NEW YORK STATE* (if different):
TELEPHONE:	TELEPHONE:
FAX:	FAX:
AUTHORIZED CONTACT FOR THIS QUESTIONNAIRE: NAME: TITLE: TELEPHONE: EMAIL:	
LIST ALL OF THE VENDOR'S PRINCIPAL OWNERS:	
NAME:	TITLE:
NAME:	TITLE:

A DETAILED EXPLANATION IS RQUIRED FOR EACH QUESTION ANSWERED WITH A "YES", AND MUST BE PROVIDED AS ANO ATTACHMENT TO THE COMPLETE QUESTIONNAIRE. YOU MUST PROVIDE ADEQUATE DETAILS OR DOCUMENTS TO AID THE COUNTY IN MAKING A DETERMINATION OF VENDOR RESPONSIBILITY. YOU MUST NUMBER EACH RESPONSE TO MATCH THE QUESTION NUMBER.

1. DOES THE VENDOR USE, OR HAS IT USED IN THE PAST FIVE (5) YEARS, ANY OTHER BUSINESS NAME, FEIN, OR D/B/A OTHER THAN THOSE LISTED ABOVE? List all other business name(s), Federal Employer Identification Number(s) or D/B/A names and the dates that these names or numbers were/are in use. Explain the relationship to the vendor. □ YES □ NO

2. ARE THERE ANY INDIVIDUALS NOW SERVING IN A MANAGERIAL OR CONSULTING CAPACITY TO THE VENDOR, INCLUDING PRINCIPAL OWNERS AND OFFICERS, WHO NOW SERVE OR IN THE PAST ONE (1) YEARS HAVE SERVED AS:
   a) An elected or appointed public official or officer? □ YES □ NO
      List each individual's name, business title, the name of the organization and position elected or appointed to, and dates of service.
   b) An officer of any political party organization in Tompkins County, whether paid or unpaid?
      □ YES □NO
      List each individual's name, business title or consulting capacity and the official political position held with applicable service dates.

3. WITHIN THE PAST FIVE (5) YEARS HAS THE VENDOR, ANY INDIVIDUAL(S) SERVING IN A MANAGERIAL OR CONSULTING CAPACITY, PRINCIPAL OWNER(S), OFFICER(S), MAJOR STOCKHOLDER(S), AFFILIATE OR ANY PERSON INVOLVED IN THE BIDDING OR CONTRACTING PROCESS:

   a) 1. Been suspended or terminated by a local, state or federal authority in connection with a contract or contracting process;
   2. Been disqualified for cause as a Bidder on any permit, license, concession franchise or lease;
   3. Entered into an agreement to a voluntary exclusion from bidding/contracting;
   4. Been subject to an administrative proceeding or civil action seeking specific performance or restitution in connection with any local, state, or federal government contract;
   5. Been denied an award of a local, state, or federal government contract, had a contract suspended or had a contract terminated for non-responsibility; or
   6. Had a local, state, or federal government contract suspended or terminated for cause prior to the completion of the term of the contract? □YES □NO

   b) Been indicted, convicted, received a judgment against them or a grant of immunity for any business-related conducting constituting a crime under local, state or federal including but not limited to, fraud, extortion, bribery, racketeering, price-fixing, bid collusion or any crime related to truthfulness and/or business conduct? □ YES □ NO

   c) Been issued a citation, notice, violation order, or are pending an administrative hearing or proceeding or determination of violations of:
      1. Federal, state, or local health laws, rules or regulations. □ YES □ NO

4. IN THE PAST THREE (3) YEARS, HAS THE VENDOR OR ITS AFFILIATES HAD ANY CLAIMS, JUDGMENTS, INJUNCTIONS, LIENS, FINES OR PENALTIES SECURED BY ANY GOVERNMENTAL AGENCY?
   Indicate if this is applicable to the submitting vendor or affiliate. State whether the situation(s) was a claim, judgment, injunction, lien or other with an explanation. Provide the name(s) and address(es) of the agency, the amount of the original and outstanding balance. If any of these items are open, unsatisfied, indicate the status of each item as "open" or "unsatisfied". □ YES □ NO

5. DURING THE PAST THREE (3) YEARS, HAS THE VENDOR FAILED TO:
   a) File any returns or pay any applicable federal, state or city taxes?
   Identify the taxing jurisdiction, type of tax, liability year(s), and tax liability amount the vendor failed to file/pay and the current status of the liability. □ YES □ NO
   b) File returns or pay New York State unemployment insurance?
   Indicate the year(s) the vendor failed to file/pay the insurance and the current status of the liability. □ YES □ NO
   c) Property Tax
   Indicate the year(s) the vendor failed to file. □ YES □ NO

6. HAVE ANY BANKRUPTCY PROCEEDINGS BEEN INITIATED BY OR AGAINST THE VENDOR OR IT'S AFFILIATES WITHIN THE PAST SEVEN (7) YEARS (WHETHER OR NOT CLOSED) OR IS ANY BANKRUPTCY PROCEDDING PENDING BY OR AGAINST THE VENDOR OR IT'S AFFILIATES REGARDLESS OF THE DATE OF FILING?
   Indicate if this is applicable to the submitting vendor or affiliate. If it is an affiliate, include the affiliate's name and FEIN. Provide the court name, address, and docket number. Indicate if the proceedings have been initiated, remain pending, or have been closed. If closed, provide the date closed. □ YES □ NO

7. IS THE VENDOR CURRENTLY INSOLVENT, OR DOES VENDOR CURRENTLY HAVE REASON TO BELIEVE THAT AN INVOLUNTARY BANKRUPTCY PROCEEDING MAY BE BROUGHT AGAINST IT? Provide financial information to support the vendor's current position, for example, Current Ration, Debt Ration, Age of Accounts Payable, Cash Flow and any documents that will provide the agency with an understanding of the vendor's situation. □ YES □ NO
8. IN THE PAST FIVE (5) YEARS, HAS THE VENDOR OR ANY AFFILIATES: a) Defaulted or been terminated on, or had its surety called upon to complete any contract (public or private) awarded; **Indicate if this is applicable to the submitting vendor or affiliate. Detail the situation(s) that gave rise to the negative action, any corrective action taken by the vendor and the name of the contracting agency.** □ YES □ NO

TOMPKINS COUNTY
VENDOR RESPONSIBILITY QUESTIONNAIRE

FEIN#

CERTIFICATION:

The undersigned: recognizes that this questionnaire is submitted for the express purpose of assisting Tompkins County in making a determination regarding an award of Contract or approval of a subcontract; acknowledges that the County may in its discretion, by means which it may choose, verify the truth and accuracy of all statements made herein; acknowledges that intentional submission of false or misleading information may constitute a felony under Penal Law Section 210.40 or a misdemeanor under Penal Law Section 210.35 or Section 210.45, and may also be punishable by a fine and/or imprisonment of up to five years under 18 USC Section 1001 and may result in Contract termination; and states that the information submitted in this questionnaire and any attached pages is true, accurate and complete.

The undersigned certifies that they:

- Have not altered the content of the questions in the questionnaire in any manner;
- Have read and understands all of the items contained in the questionnaire and any pages attached by the submitting vendor;
- Have supplied full and complete responses to each item therein to the best of his/her knowledge, information and belief;
- Are knowledgeable about submitting vendor's business and operations;
- Understands that Tompkins County will rely on the information supplied in the questionnaire when entering into a Contract with the vendor;
- Are under duty to notify the Tompkins County Purchasing Division of any material changes to the vendor's responses.

Name of Business:

Signature of Owner: _____

Printed Name of Signatory: _____

Title: _____

Address: _____

City, State, Zip: _____

Sworn before me this ____ day of _____, 20 ;

_____
Notary Public

_____
Printed Name

_____
Signature

_____
Date

Attachment D

Tompkins County Business Demographic Survey

Purpose:
This survey aims to gather demographic data to ensure diversity, equity, and inclusion in our procurement processes and support MBEs, WBE's, DBEs, ACDBEs, and other underrepresented businesses.

Completion of this Business Demographic Survey is voluntary. Your choice whether to submit or not complete the survey will not be considered positively or negatively in evaluating your response to this RFP. Tompkins County procurement policies and practices do not discriminate among responders based on race, sex, or on any other characteristic prohibited by federal, state, or local law.

Instructions:
Please complete this survey as accurately as possible. Your responses will help us enhance our commitment to diversity, equity, and inclusion. All information will be kept confidential and used solely to evaluate and improve our procurement practices.

Business Information:

Business Name: _____

Contact Person: _____

Email Address: _____

Phone Number: _____

Business Address: _____

Website (if applicable): _____

1. Business Classification (Select all that apply):

- ❑ Minority-Owned Business Enterprise (MBE)
- ❑ Women-Owned Business Enterprise (WBE)
- ❑ Disadvantaged Business Enterprise (DBE)
- ❑ Airport Concession Disadvantaged Business Enterprise (ACDBE)
- ❑ Veteran-Owned Business Enterprise (VBE)
- ❑ Service-Disabled Veteran-Owned Business (SDVOB)
- ❑ Small Business Enterprise (SBE)
- ❑ Majority Minority Lead Business (51% or more of the business is owned by a minority identified persons)
- ❑ Other (Please Specify): _____

2. Certification Status

Is your business certified as an MWBE, DBE, ACDBE, or similar certification?

- ❑ Yes
- ❑ No
- ❑ If yes, please specify the certifying agency or organization:

3. Ownership Demographics (Please indicate the percentage of ownership by each demographic category)

Race/Ethnicity:

- ❑ African American/Black: ____%
- ❑ Hispanic/Latino: ____%
- ❑ Asian: ____%
- ❑ Native American/Alaska Native: ____%
- ❑ Native Hawaiian/Other Pacific Islander: ____%
- ❑ White: ____%
- ❑ Other (Please specify): _____%

Gender:

- ❑ Male: ____%
- ❑ Female: ____%
- ❑ Non-Binary: ____%
- ❑ Prefer not to say: ____%

Veteran Status:

- ❑ Veteran: ____%
- ❑ Non-Veteran: ____%

Disability Status:

- ❑ Disability: ____%
- ❑ Non-Disability: ____%
- ❑ Prefer not to say: ____%

4. Business Size

Number of Employees

- ❑ 1-10
- ❑ 11-50
- ❑ 51-200
- ❑ 201-500
- ❑ 501+

Annual Revenue:

- ❑ Less than $100,000
- ❑ $100,000 - $500,000
- ❑ $500,000 - $1 Million
- ❑ $1 Million - $5 Million
- ❑ $5 Million - $10 Million
- ❑ Over $10 Million

5. Type of Business

- ❑ Industry
- ❑ Construction
- ❑ Professional Service
- ❑ Information Technology
- ❑ Manufacturing
- ❑ Retail
- ❑ Health Services
- ❑ Other (Please specify): _____

6. Geographic Information

Is your business headquarters in New York State?

- ❑ Yes
- ❑ No
- ❑ If no, please specify the state: _____

7. Previous Experience with Tompkins County

Have you previously done business with Tompkins County?

- ❑ Yes
- ❑ No

If yes, please provide details on the type of contract or project:

8. Comments or Additional Information

Please Provide any additional information about your business that you believe is relevant to our diversity, equity, and inclusion efforts:

Thank you for completing this survey! Your responses are valuable in helping Tompkins County promote diversity, equity, and inclusion in our procurement processes.

Bid Form
Tompkins County
Tompkins County Recycling Center Phase 2
Contract No. 1 – General Construction

Date: _____

Company Information

Company Name: _____

Company Address: _____

Federal Tax ID (EIN) _____

Bidder's Certificate of Registration Number Per NYS Labor Law _____

Telephone: _____

Contact Person: _____

Cell Phone #: _____

Email Address: _____

Bid Information

The Owner Reserves the right to reject any and all bids.

The undersigned shall submit herewith, Bid Security in the form of certified check or bid bond, payable to Tompkins County, in the amount not less than 5% of the bid.

I the Contractor, hereby certify that I have carefully examined and fully comprehend the requirements and intent of the plans and specifications for this project and that I have personally inspected the actual location of the work, together with regional sources of supply, and are satisfied as to all the quantities and conditions, and understand that in signing this proposal, I waive all right to plead any misunderstanding regarding the same.

I the Contractor further understand and agree that I will do, perform and complete all work in accordance with the Contract Documents, and to accept in full compensation therefor the amount of the Total Bid, modified by such additive or deductive alternates, if any, as are accepted by the Owner.

The lump sum base bid cost item listed below shall include all costs necessary to complete the work as indicated on the project plans and specifications, and I agree, without reservation, to perform and complete all documented and specified Work of this Contract, for the Lump Sum of:

Total Bid for Tompkins County Recycling Center Phase 2 project

$_____

_____
(Written Amount of Total Bid)

In submitting this Bid I agree:

1. To hold my bid proposal open for 45 days after the actual date of the bid opening.
2. To accept the provisions of the Instruction to Bidders regarding disposition of Bid security.
3. To enter into and sign a Contract, if awarded, on the basis of this Bid and to furnish all bonds and insurances as required by the General Conditions and Instructions to Bidders.
4. To comply with all applicable labor laws.
5. To complete all Owner awarded Contract work, including all closeout Documents, by:
    a. Date: December 31, 2026.

<u>Addendums</u>

The Contractor acknowledges receipt of the following addendums but agrees that the Contractor is bound by all addenda issued, whether or not listed herewith:

Addendum No. _____ Dated: _____

Addendum No. _____ Dated: _____

Addendum No. _____ Dated: _____

SPECIAL NOTE
STATE PREVAILING WAGE RATES

The Contractor shall ensure that workers are paid the appropriate wages and supplemental (fringe) benefits. Throughout the contract, the Contractor shall obtain and pay workers in accordance with periodic wage rate schedule updates from the NYS Department of Labor (NYSDOL). Wage rate amendments and supplements are available on the NYSDOL web site at http://www.labor.state.ny.us. All changes or clarification of labor classification(s) and applicability of prevailing wage rates shall be obtained in writing from the Office of the Director, NYSDOL Bureau of Public Work.

The NYSDOL prevailing wage rate schedule for this contract has been determined and is available on the internet. The prevailing wage rate schedule is accessed by visiting the NYSDOL web site, navigating to the appropriate web page, and entering the Prevailing Rate Case Number (**PRC# 2026010759**).

A copy of the project specific prevailing wage rate schedule will be provided to the successful bidder upon award of the contract. Upon written request, the schedule will be provided by the Engineer to prospective bidders without internet access.

MATERIALS AND PERFORMANCE (TECHNICAL) SPECIFICATIONS

END OF SECTION

SECTION 02 41 19

SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Demolition and removal of selected portions of building or structure.
2. Salvage of existing items to be reused or recycled.

1.2 DEFINITIONS

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

B. Remove and Salvage: Detach items from existing construction, in a manner to prevent damage.

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

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

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

1.3 MATERIALS OWNERSHIP

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

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

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

1.4 INFORMATIONAL SUBMITTALS

A. Proposed Protection Measures: Submit report, including Drawings, that indicates the measures proposed for protecting individuals and property, for environmental protection, for dust control and, for noise control. Indicate proposed locations and construction of barriers.

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

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

1.5 CLOSEOUT SUBMITTALS

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

1.6 QUALITY ASSURANCE

1.7 FIELD CONDITIONS

A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.

B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.

C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

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

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

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

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

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

1.8 COORDINATION

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

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

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

B. Standards: Comply with ANSI/ASSP A10.6 and NFPA 241.

PART 3 - EXECUTION

3.1 EXAMINATION

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

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

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

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

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

1. Inventory and record the condition of items to be removed and salvaged.
2. Before selective demolition or removal of existing building elements that will be reproduced or duplicated in final Work, make permanent record of measurements, materials, and construction details required to make exact reproduction.

3.2 PREPARATION

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

3.3 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

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

1. Arrange to shut off utilities with utility companies.

2. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
3. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC systems, equipment, and components indicated on Drawings to be removed.
    a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
    b. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material and leave in place.
    c. Equipment to Be Removed: Disconnect and cap services and remove equipment.
    d. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
    e. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.
    f. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
    g. Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material and leave in place.

3.4 PROTECTION

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

1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
4. Cover and protect furniture, furnishings, and equipment that have not been removed.

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

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

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

3.5 SELECTIVE DEMOLITION, GENERAL

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

1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping. Temporarily cover openings to remain.
3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
5. Maintain fire watch during and for at least 0.5 hours after flame-cutting operations.
6. Maintain adequate ventilation when using cutting torches.
7. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
8. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
9. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
10. Dispose of demolished items and materials promptly.

B. Removed and Salvaged Items:

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

C. Removed and Reinstalled Items:

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

3.6 DISPOSAL OF DEMOLISHED MATERIALS

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

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

B. Burning: Do not burn demolished materials.

3.7 CLEANING

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

END OF SECTION

SECTION 06 10 00

ROUGH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Framing with dimension lumber.
2. Rooftop equipment bases and support curbs.

1.2 ACTION SUBMITTALS

A. Product Data:

1. For each type of process and factory-fabricated product.
2. For preservative-treated wood products.

1.3 INFORMATIONAL SUBMITTALS

A. Material Certificates:

1. For dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by the ALSC Board of Review.
2. For preservative-treated wood products. Indicate type of preservative used and net amount of preservative retained.

B. Evaluation Reports: For the following, from ICC-ES:

1. Wood-preservative-treated wood.
2. Fire-retardant-treated wood.
3. Engineered wood products.
4. Power-driven fasteners.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

A. Lumber: Comply with DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, comply with the applicable rules of any rules-writing

agency certified by the ALSC Board of Review. Grade lumber by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.

1. Factory mark each piece of lumber with grade stamp of grading agency.
2. For exposed lumber indicated to receive a stained or natural finish, **mark grade stamp on end or back of each piece or omit grade stamp and provide certificates of grade compliance issued by grading agency**.
3. Dress lumber, S4S, unless otherwise indicated.

B. Maximum Moisture Content:

1. Boards: **19** percent.
2. Dimension Lumber: **19 percent**.

C. Engineered Wood Products: Acceptable to authorities having jurisdiction and for which current model code research or evaluation reports exist that show compliance with building code in effect for Project.

1. Allowable design stresses, as published by manufacturer, are to meet or exceed those indicated. Manufacturer's published values are to be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

2.2 PRESERVATIVE TREATMENT

A. Preservative Treatment by Pressure Process: AWPA U1; **Use Category UC3b for exterior construction not in contact with ground.**

1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.

B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or that does not comply with requirements for untreated material.

C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.

D. Application: Treat **items indicated on Drawings, and the following:**

1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
2. Wood sills, sleepers, blocking, **furring, stripping,** and similar concealed members in contact with masonry or concrete.

2.3 FIRE-RETARDANT-TREATMENT

A. General: Where fire-retardant-treated materials are indicated, materials are to comply with requirements in this article, that are acceptable to authorities having jurisdiction, and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.

B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame-spread index of 25 or less when tested according to ASTM E84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.

1. Exterior Type: Treated materials are to comply with requirements specified above for fire-retardant-treated lumber and plywood by pressure process after being subjected to accelerated weathering according to ASTM D2898. Use for exterior locations and where indicated.
2. Interior Type A: Treated materials are to have a moisture content of 28 percent or less when tested according to ASTM D3201/D3201M at 92 percent relative humidity. Use where exterior type is not indicated.

C. Kiln-dry lumber after treatment to maximum moisture content of 19 percent.

D. Identify fire-retardant-treated wood with appropriate classification marking of qualified testing agency.

E. Application: Treat **items indicated on Drawings, and the following:**

1. Roof construction.
2. Plywood backing panels.

2.4 DIMENSION LUMBER FRAMING

A. Framing Other Than Non-Load-Bearing Partitions by Grade: **Construction, Stud, or No. 3** grade.

1. Application: Framing other than **interior partitions**.
2. Species:
   a. Southern pine or mixed southern pine; SPIB.

B. Exposed Framing: Hand-select material for uniformity of appearance and freedom from characteristics, on exposed surfaces and edges, that would impair finish appearance, including decay, honeycomb, knot-holes, shake, splits, torn grain, and wane.

1. Species and Grade: As indicated above for load-bearing construction of same type.

2.5 MISCELLANEOUS LUMBER

A. Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:

1. Blocking.
2. Rooftop equipment bases and support curbs.

B. Dimension Lumber Items: **Standard, Stud, or No. 3** grade lumber of any species.

C. Concealed Boards: **19** percent maximum moisture content and **any of** the following species and grades:

1. Mixed southern pine or southern pine; No. **3** grade; SPIB.

2.6 FASTENERS

A. General: Fasteners are to be of size and type indicated and comply with requirements specified in this article for material and manufacture. Provide nails or screws, in sufficient length, to penetrate not less than 1-1/2 inches into wood substrate.

1. Where rough carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners [**with hot-dip zinc coating complying with ASTM A153/A153M**.

B. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.

2.7 METAL FRAMING ANCHORS

A. Allowable design loads, as published by manufacturer, are to meet or exceed those **of products of manufacturers listed**. Manufacturer's published values are to be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency. Framing anchors are to be punched for fasteners adequate to withstand same loads as framing anchors.

B. Galvanized-Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A653/A653M, G60 coating designation.

1. Use for interior locations unless otherwise indicated.

C. Hot-Dip, Heavy-Galvanized Steel Sheet: ASTM A653/A653M; structural steel (SS), high-strength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G185 coating designation; and not less than 0.036 inch thick.

1. Use for wood-preservative-treated lumber and where indicated.

2.8 MISCELLANEOUS MATERIALS

A. Flexible Flashing: Composite, self-adhesive, flashing product consisting of a pliable, **butyl rubber or rubberized-asphalt** compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than 0.025 inch.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.

B. Framing with Engineered Wood Products: Install engineered wood products to comply with manufacturer's written instructions.

C. Set work to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry accurately to other construction. Locate **furring,** nailers, blocking, **grounds,** and similar supports to comply with requirements for attaching other construction.

D. Install shear wall panels to comply with manufacturer's written instructions.

E. Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.

F. Do not splice structural members between supports unless otherwise indicated.

G. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.

H. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.

I. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:

1. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code (IBC).
2. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in ICC's International Residential Code for One- and Two-Family Dwellings.
3. ICC-ES evaluation report for fastener.

3.2 PROTECTION

A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

B. Protect rough carpentry from weather. If, despite protection, rough carpentry becomes **wet**, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION

SECTION 06 16 00

SHEATHING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Roof sheathing.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product.

1.3 INFORMATIONAL SUBMITTALS

A. Evaluation Reports: For the following, from ICC-ES:

1. Wood-preservative-treated plywood.
2. Fire-retardant-treated plywood.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Resistance Ratings: As tested in accordance with ASTM E119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

2.2 WOOD PANEL PRODUCTS

A. Emissions: Products are to meet the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

2.3 PRESERVATIVE-TREATED PLYWOOD

A. Preservative Treatment by Pressure Process: AWPA U1; **Use Category UC3b for exterior construction not in contact with ground**.

B. Mark plywood with appropriate classification marking of an inspection agency acceptable to authorities having jurisdiction.

C. Application: Treat all plywood unless otherwise indicated.

2.4 FIRE-RETARDANT-TREATED PLYWOOD

A. General: Where fire-retardant-treated materials are indicated, use materials complying with requirements in this article that are acceptable to authorities having jurisdiction and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.

B. Fire-Retardant-Treated Plywood by Pressure Process: Products with a flame-spread index of 25 or less when tested in accordance with ASTM E84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.

1. Exterior Type: Treated materials are to comply with requirements specified above for fire-retardant-treated plywood by pressure process after being subjected to accelerated weathering in accordance with ASTM D2898. Use for exterior locations and where indicated.
2. Design Value Adjustment Factors: Treated lumber plywood is to be tested in accordance with ASTM D5516 and design value adjustment factors are to be calculated in accordance with ASTM D6305. Span ratings after treatment are to be not less than span ratings specified. For roof sheathing and where high-temperature fire-retardant treatment is indicated, span ratings for temperatures up to 170 deg F are to be not less than span ratings specified.

C. Kiln-dry material after treatment to a maximum moisture content of 15 percent.

D. Identify fire-retardant-treated plywood with appropriate classification marking of qualified testing agency.

E. Application: Treat plywood indicated on Drawings.

2.5 ROOF SHEATHING

A. Plywood Sheathing, Roofs: DOC PS 1, Exterior, Structural I sheathing.

2.6 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.

1. For roof sheathing, provide fasteners with hot-dip zinc coating complying with ASTM A153/A153M.
2. For roof sheathing, provide fasteners with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours in accordance with ASTM B117.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement. Arrange joints so that pieces do not span between fewer than three support members.

B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction unless otherwise indicated.

C. Securely attach to substrate by fastening as indicated, complying with the following:

1. Table 2304.10.1, "Fastening Schedule," in the ICC's International Building Code.
2. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in the ICC's International Residential Code for One- and Two-Family Dwellings.
3. ICC-ES evaluation report for fastener.

D. Coordinate roof sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.

E. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.

3.2 WOOD STRUCTURAL PANEL INSTALLATION

A. General: Comply with applicable recommendations in APA Form No. E30, "Engineered Wood Construction Guide," for types of structural-use panels and applications indicated.

B. Fastening Methods: Fasten panels as indicated below:

1. Wall and Roof Sheathing:
   a. Nail to wood framing. Apply a continuous bead of glue to framing members at edges of wall sheathing panels.
   b. Space panels 1/8 inch apart at edges and ends.

END OF SECTION

SECTION 07 21 00

THERMAL INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Glass-fiber blanket insulation.

1.2 ACTION SUBMITTALS

A. Product Data:

1. Glass-fiber blanket insulation.

1.3 INFORMATIONAL SUBMITTALS

A. Product Test Reports: For each product, for tests performed by a qualified testing agency.

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. Labeling: Provide identification of mark indicating R-value of each piece of insulation 12 inches and wider in width.

2.2 GLASS-FIBER BLANKET INSULATION

A. Glass-Fiber Blanket Insulation, Kraft-faced : ASTM C665, Type I; passing ASTM E136 for combustion characteristics.

1. CertainTeed CertaPro Sustainable Insulation.
2. Owens Corning Pink Next Gen Fiberglas Insulation.
3. An Approved Equal.

2.3 ACCESSORIES

A. Insulation for Miscellaneous Voids:

1. Glass-Fiber Insulation: ASTM C764, Type II, loose fill; with maximum flame-spread and smoke-developed indexes of 5, per ASTM E84.

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. Fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.

E. Provide sizes to fit applications and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units unless multiple layers are otherwise shown or required to make up total thickness or to achieve R-value.

3.3 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 metal-framed wall cavities where cavity heights exceed 96 inches, support unfaced blankets mechanically and support faced blankets by taping flanges of insulation to flanges of metal studs.
5. 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.
6. Vapor-Retarder-Faced Blankets: Tape joints and ruptures in vapor-retarder facings, and seal each continuous area of insulation to ensure airtight installation.
    a. Exterior Walls: Set units with facing placed toward .
    b. Interior Walls: Set units with facing placed .

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..

C. Loose-Fill Insulation: Apply in accordance with ASTM C1015 and manufacturer's written instructions.

1. Level horizontal applications to uniform thickness as indicated, lightly settle to uniform density, but do not compact excessively.
2. For cellulosic-fiber loose-fill insulation, comply with CIMA's Bulletin #2, "Standard Practice for Installing Cellulose Insulation."

D. Spray-Applied Cellulosic Insulation: Apply spray-applied insulation according to manufacturer's written instructions.

1. Do not apply insulation until installation of pipes, ducts, conduits, wiring, and electrical outlets in walls is completed and windows, electrical boxes, and other items not indicated to receive insulation are masked.
2. After insulation is applied, make flush with face of studs by using method recommended by insulation manufacturer.

3.4 INSTALLATION OF REFLECTIVE INSULATION

A. Install sheet reflective insulation in accordance with ASTM C727.

B. Install sheet radiant barriers in accordance with ASTM C1744.

C. Install interior radiation control coating system in accordance with ASTM C1321.

3.5 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

SECTION 07 41 13

METAL ROOF PANELS

PART 1 GENERAL

1.01 RELATED REQUIREMENTS

A. Section 06 10 00 - Rough Carpentry

B. Section 06 16 00 - Sheathing

C. Section 07 92 00 - Joint Sealants.

1.02 REFERENCE STANDARDS

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

B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2025a.

C. ASTM C1363 - Standard Test Method for Thermal Performance of Building Materials and Envelope Assemblies by Means of a Hot Box Apparatus; 2024.

D. ASTM D226/D226M - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing; 2025.

E. ASTM E1592 - Standard Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference; 2025.

F. ASTM E1646 - Standard Test Method for Water Penetration of Exterior Metal Roof Panel Systems by Uniform Static Air Pressure Difference; 1995 (Reapproved 2024).

G. ASTM E1680 - Standard Test Method for Rate of Air Leakage through Exterior Metal Roof Panel Systems; 2016 (Reapproved 2022).

H. UL 580 - Standard for Tests for Uplift Resistance of Roof Assemblies; Current Edition, Including All Revisions.

1.03 SUBMITTALS

A. See Division 01 – General Requirements for submittal procedures.

B. Product Data: Manufacturer's data sheets on each product used, including:
   1. Summary of test results, indicating conformance with specified requirements.
   2. Storage and handling requirements and recommendations.
   3. Installation methods.
   4. Specimen warranty.

C. Shop Drawings: Include layouts of roof panels, details of edge and penetration conditions, spacing and type of connections, flashings, underlayments, and special conditions.
   1. Show field-fabricated or field-assembled work.

D. Samples: For each roofing system specified, submit samples of minimum size 12 inches (305 mm) square, representing actual roofing metal, thickness, profile, color, and texture.
   1. Include typical panel joint in sample.
   2. Include typical fastening detail.

E. Test Reports: Indicate conformance of metal roofing system to specified requirements.

F. Manufacturer's instructions.

G. Manufacturer's qualification statement.

H. Installer's qualification statement.

I. Warranty: Submit specified manufacturer's warranty and complete forms in Owner's name and register with manufacturer.

1.04 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: Company specializing in performing work of type specified and with at least three years of documented experience.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Provide strippable plastic protection on prefinished roofing panels for removal after installation.

B. Store roofing panels on project site as recommended by manufacturer to minimize damage to panels prior to installation.

1.06 WARRANTY

A. See Division 01 – General Requirements for additional warranty requirements.

B. Special Warranty: Provide 20-year warranty for weathertightness of roofing system, including agreement to repair or replace metal roof panels that fail to keep out water, commencing on Date of Substantial Completion. Complete forms in Owner's name and register with warrantor.

C. Finish Warranty: Provide 5-year manufacturer warranty against excessive degradation of exterior finish. Include provision for replacement of units with excessive fading, chalking, or flaking. Complete forms in Owner's name and register with warrantor.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Structural Metal Roof Panel Manufacturers:
   1. Basis of Design: MBCI, a Cornerstone Building Brands Company; BattenLok HS Standing Seam Panel: www.mbci.com/#sle.
   2. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 PERFORMANCE REQUIREMENTS

A. Metal Roof Panels: Provide complete roofing assemblies, including roof panels, clips, fasteners, connectors, and miscellaneous accessories, tested for conformance with the following minimum standards:
   1. Structural Design Criteria: Provide panel assemblies designed to safely support design loads at support spacing indicated, with deflection not to exceed L/180 of span length (L) when tested in accordance with ASTM E1592.
      a. Dead Loads: Weight of roofing system.
      b. Live Loads: As required by ASCE 7.
   2. Overall: Complete weathertight system tested and approved in accordance with ASTM E1592.
   3. Wind Uplift: Class 90 wind uplift resistance of UL 580.
   4. Air Infiltration: Maximum 0.06 cfm/sq ft (1.1 cu m/hr/sq m) at air pressure differential of 6.24 lbf/sq ft (300 Pa), when tested according to ASTM E1680.
   5. Water Penetration: No water penetration when tested in accordance with procedures and recommended test pressures of ASTM E1646; perform test immediately following air infiltration test.
   6. Thermal Movement: System to accommodate without deformation anticipated thermal movement over ambient temperature range of 100 degrees F (56 degrees C).

7. Thermal Resistance: Provide throughout system, R-value (RSI-value) of 15 (2.6) at 2 inches (51 mm) thick, minimum, when tested in accordance with ASTM C1363.

2.03 STRUCTURAL METAL ROOF PANELS

A. General: Provide complete engineered system complying with specified requirements and capable of remaining weathertight while withstanding anticipated movement of substrate and thermally induced movement of roofing system.

B. Structural Metal Panels: Factory-formed panels with factory-applied finish.
1. Steel Panels:
a. Zinc-coated structural steel (SS) sheet complying with ASTM A653/A653M, G60/Z180 galvanizing.
b. Steel Thickness: Minimum 24 gauge, 0.024 inch (0.61 mm).
2. Texture: Smooth.
3. Length: Full length of roof slope, without lapped horizontal joints.
4. Width: Maximum panel coverage of 36 inches (914 mm).
5. Color: To match existing.

2.04 ATTACHMENT SYSTEM

A. Concealed System: Provide manufacturer's standard stainless steel or nylon-coated aluminum concealed anchor clips designed for specific roofing system and engineered to meet performance requirements, including anticipated thermal movement.

2.05 FABRICATION

A. Panels: Provide factory- or field-fabricated panels with applied finish and accessory items, using manufacturer's standard processes as required to achieve specified appearance and performance requirements.

B. Joints: Provide captive gaskets, sealants, or separator strips at panel joints to ensure weathertight seals, eliminate metal-to-metal contact, and minimize noise from panel movements.

2.06 MATERIALS

A. Precoated Steel Sheet: Hot-dip galvanized steel sheet, ASTM A653/A653M, Structural Steel (SS) with G90/Z275 coating; continuous-coil coated on exposed surfaces with specified finish coating and on panel back with specified panel back coating.

B. Non-Precoated Steel Sheet: Hot-dip galvanized steel sheet, ASTM A653/A653M, SS Grade 33/230 with G90/Z275 coating.

2.07 FINISHES

A. Mill-Finish Steel Panels: Treat with passivating chemical prior to shipment to inhibit formation of corrosion.

2.08 ACCESSORIES

A. Miscellaneous Sheet Metal Items: Provide flashings, trim, closure strips, caps, and equipment curbs of same material, thickness, and finish as used for roofing panels. Optionally, make items completely concealed after installation of stainless steel.

B. Rib and Ridge Closures: Provide prefabricated, close-fitting components of steel with corrosion-resistant finish or combination steel and closed-cell foam.

C. Sealants:
   1. Exposed Sealant: Elastomeric; silicone, polyurethane, or silyl-terminated polyether/polyurethane.
   2. Concealed Sealant: Non-curing butyl sealant or tape sealant; see Section 07 92 00.
   3. Seam Sealant: Factory-applied, nonskinning, nondrying type.

D. Fasteners: Manufacturer's standard type to suit application; with soft neoprene washers, steel, hot-dip galvanized. Fastener cap same color as exterior panel.

E. Field Touch-Up Paint: As recommended by panel manufacturer.

F. Underlayment for Wood Substrate: ASTM D226/D226M roofing felt, perforated type; covered by water-resistant, rosin-sized building paper.

PART 3 EXECUTION

3.01 EXAMINATION

A. Do not begin installation of preformed metal roof panels until substrates have been prepared as noted below.

B. Where another installer performs surface preparation, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

A. Broom-clean wood sheathing prior to installation of roofing system.

B. Coordinate roofing work with provisions for roof drainage, flashing, trim, penetrations, and other adjoining work to ensure that completed roof does not leak.

C. Remove protective film from surface of roof panels immediately prior to installation; strip film carefully to avoid damage to prefinished surfaces.

D. Separate dissimilar metals by applying a bituminous coating, self-adhering rubberized asphalt sheet, or other permanent method approved by metal roof panel manufacturer.

E. At locations where metal makes contact with wood or other absorbent material subject to wetting, seal joints with sealing compound and apply one coat of heavy-bodied bituminous paint.

3.03 INSTALLATION

A. Install roofing system in accordance with approved shop drawings and metal roof panel manufacturer's instructions and recommendations, as applicable to specific project conditions; securely anchor roofing system components in place, allowing for thermal and structural movement.
   1. Install roofing system with concealed clips and fasteners, except as otherwise recommended by manufacturer for specific circumstances.
   2. Minimize field cutting of panels. Where required, use methods that do not distort panel profiles. Use of torches for cutting prohibited.

B. Accessories: Install necessary components required for complete roofing assembly, including flashings, trim, closure strips, caps, equipment curbs, rib closures, ridge closures, and similar roof accessory items.

C. Install roofing felt and building paper slip sheet on roof sheathing before installing preformed metal roof panels; secure by methods acceptable to roof panel manufacturer, minimizing use of metal fasteners; apply from eaves to ridge in shingle fashion, overlapping horizontal joints at least 2 inches (50 mm) and side and end laps at least 3 inches (75 mm); offset seams in building paper and seams in roofing felt.

D. Roof Panels: Install metal roof panels in accordance with manufacturer's installation instructions, minimizing transverse joints except at junction with penetrations.
   1. Install sealant or sealant tape at end laps and side joints as metal roof panel manufacturer recommends.

3.04 CLEANING

A. Clean exposed sheet metal work at completion of installation. Remove grease and oil films, excess joint sealer, handling marks, and debris from installation, leaving work clean and unmarked, free from dents, creases, waves, scratch marks, or other damage to the finish.

3.05 PROTECTION

A. Do not permit storage of materials or roof traffic on installed roof panels. Provide temporary walkways or planks as necessary to avoid damage to completed work. Protect roofing until completion of project.

B. Touch up, repair, or replace damaged roof panels or accessories before Date of Substantial Completion.

END OF SECTION

SECTION 07 62 00

SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Roof-drainage sheet metal fabrications.
2. Low-slope roof sheet metal fabrications.
3. Wall sheet metal fabrications.
4. Miscellaneous sheet metal fabrications.

B. Related Requirements:

1. Section 06 10 00 "Rough Carpentry" for wood nailers, curbs, and blocking.

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 ACTION SUBMITTALS

A. Product Data:

1. Roof-drainage sheet metal fabrications.
2. Low-slope roof sheet metal fabrications.
3. Wall sheet metal fabrications.
4. Miscellaneous sheet metal fabrications.

B. Product Data Submittals:

1. Underlayment materials.
2. Elastomeric sealant.
3. Butyl sealant.
4. Epoxy seam sealer.

C. Shop Drawings: For sheet metal flashing and trim.

1. Include plans, elevations, sections, and attachment details.
2. Detail fabrication and installation layouts, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled work.
3. Include identification of material, thickness, weight, and finish for each item and location in Project.
4. Include details for forming, including profiles, shapes, seams, and dimensions.
5. Include details for joining, supporting, and securing, including layout and spacing of fasteners, cleats, clips, and other attachments. Include pattern of seams.
6. Include details of termination points and assemblies.
7. Include details of expansion joints and expansion-joint covers, including showing direction of expansion and contraction from fixed points.
8. Include details of roof-penetration flashing.
9. Include details of edge conditions, including eaves, ridges, valleys, rakes, crickets, flashings, and counterflashings.
10. Include details of special conditions.
11. Include details of connections to adjoining work.
12. Detail formed flashing and trim at scale of not less than 3 inches per 12 inches.

D. Samples: For each exposed product and for each color and texture specified, 12 inches long by actual width.

E. Samples for Initial Selection: For each type of sheet metal and accessory indicated with factory-applied finishes.

F. Samples for Verification: For each type of exposed finish.

1. Sheet Metal Flashing: 12 inches long by actual width of unit, including finished seam and in required profile. Include fasteners, cleats, clips, closures, and other attachments.
2. Trim, Metal Closures, Expansion Joints, Joint Intersections, and Miscellaneous Fabrications: 12 inches long and in required profile. Include fasteners and other exposed accessories.
3. Unit-Type Accessories and Miscellaneous Materials: Full-size Sample.
4. Anodized Aluminum Samples: Samples to show full range to be expected for each color required.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For fabricator.

B. Sample Warranty: For special warranty.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For sheet metal flashing and trim, and its accessories, to include in maintenance manuals.

B. Special warranty.

1.6 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 copings and roof edge flashings that are ANSI/SPRI/FM 4435/ES-1 tested and FM Approvals approved, shop is to be listed as able to fabricate required details as tested and approved.

1.7 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.

1.8 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. 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. Sheet Metal Standard for Copper: Comply with CDA's "Copper in Architecture Handbook." Conform to dimensions and profiles shown unless more stringent requirements are indicated.

D. FM Approvals Listing: Manufacture and install roof edge flashings that are listed in FM Approvals' "RoofNav" and approved for windstorm classification, Class 1-90. Identify materials with name of fabricator and design approved by FM Approvals.

E. 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. Protect mechanical and other finishes on exposed surfaces from damage by applying strippable, temporary protective film before shipping.

B. Aluminum Sheet: ASTM B209, 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: As selected by Architect/Owner from manufacturer's full range.
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.
4. Surface: Smooth, flat.
5. Exposed Coil-Coated Finish:
    a. Two-Coat Fluoropolymer: AAMA 621. 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.
6. Color: As selected by Architect from manufacturer's full range.
7. 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.

2.3 UNDERLAYMENT MATERIALS

A. Felt: ASTM D226/D226M, Type II (No. 30), asphalt-saturated organic felt; nonperforated.

B. Synthetic Underlayment: Laminated or reinforced, woven polyethylene or polypropylene, synthetic roofing underlayment; bitumen free; slip resistant; suitable for high temperatures over 220 deg F; and complying with physical requirements of ASTM D226/D226M for Type I and Type II felts.

1. Source Limitations: Obtain underlayment from single source from single manufacturer.

C. Self-Adhering, High-Temperature Sheet Underlayment: Minimum 30 mils thick, consisting of a slip-resistant polyethylene- or polypropylene-film top surface laminated to a layer of butyl- or SBS-modified asphalt adhesive, with release-paper backing; specifically designed to withstand high metal temperatures beneath metal roofing. Provide primer in accordance with underlayment manufacturer's written instructions.

1. Source Limitations: Obtain underlayment from single source from single manufacturer.
2. Low-Temperature Flexibility: ASTM D1970/D1970M; passes after testing at minus 20 deg F or lower.

D. Slip Sheet: Rosin-sized building paper, 3 lb/100 sq. ft. minimum.

2.4 MISCELLANEOUS MATERIALS

A. Provide materials and types of fasteners, 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 Copper, Zinc-Tin Alloy-Coated Copper, or Copper-Clad Stainless Steel Sheet: Copper, hardware bronze or passivated Series 300 stainless steel.
3. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.
4. Fasteners for Stainless Steel Sheet: Series 300 stainless steel.
5. Fasteners for Zinc-Coated (Galvanized) or Aluminum-Zinc Alloy-Coated Steel Sheet: Series 300 stainless steel or hot-dip galvanized steel in accordance with ASTM A153/A153M or ASTM F2329/F2329M.
6. Fasteners for Zinc Sheet: Series 300 stainless steel or hot-dip galvanized steel in accordance with ASTM A153/A153M or ASTM F2329/F2329M.

C. 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.

D. Elastomeric Sealant: ASTM C920, elastomeric silicone polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

E. Butyl Sealant: ASTM C1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.

F. Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.

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.

I. Reglets: Units of type, material, and profile required, formed to provide secure interlocking of separate reglet and counterflashing pieces, and compatible with flashing indicated with interlocking counterflashing on exterior face, of same metal as reglet.

1. Source Limitations: Obtain reglets from single source from single manufacturer.
2. Material: Aluminum, 0.024 inch thick.
3. Surface-Mounted Type: Provide with slotted holes for fastening to substrate, with neoprene or other suitable weatherproofing washers, and with channel for sealant at top edge.
4. Masonry Type: Provide with offset top flange for embedment in masonry mortar joint.
5. Accessories:
   a. Flexible-Flashing Retainer: Provide resilient plastic or rubber accessory to secure flexible flashing in reglet where clearance does not permit use of standard metal counterflashing or where Drawings show reglet without metal counterflashing.
   b. Counterflashing Wind-Restraint Clips: Provide clips to be installed before counterflashing to prevent wind uplift of counterflashing's lower edge.
6. Finish: With manufacturer's standard color coating.

2.5 FABRICATION, GENERAL

A. 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. Verify shapes and dimensions of surfaces to be covered and obtain field measurements for accurate fit before shop fabrication.
4. 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.
5. 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.
2. Fabricate sheet metal flashing and trim that is capable of installation to tolerances specified.

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 and by FM Global Property Loss Prevention Data Sheet 1-49 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. Fabricate nonmoving seams with flat-lock seams. Form seams and seal with elastomeric sealant unless otherwise recommended by sealant manufacturer for intended use. Rivet joints where necessary for strength.
3. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints where necessary for strength.

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 minimum 96-inch- long 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: To match existing.
6. Expansion Joints: Built in.
7. Accessories: Continuous, removable leaf screen with sheet metal frame and hardware cloth screen.
8. Gutters with Girth up to 15 Inches (380 mm): Fabricate from the following materials:
    a. Galvanized Steel: 0.022 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 elbows.

1. Manufactured Hanger Style: Fig. 1-34B in accordance with SMACNA's "Architectural Sheet Metal Manual."
2. Hanger Style: Hidden Hangers.
3. Fabricate from the following materials:
    a. Galvanized Steel: 0.022 inch thick.
    b. Aluminum-Zinc Alloy-Coated Steel: 0.022 inch thick.

2.7 WALL SHEET METAL FABRICATIONS

A. Through-Wall Flashing: Fabricate continuous flashings in minimum 96-inch- long, but not exceeding 12-foot- long, sections, under copings, and at shelf angles. Fabricate discontinuous lintel, sill, and similar flashings to extend 6 inches beyond each side of wall openings; and form with 2-inch- high, end dams. Fabricate from the following materials:

1. Copper: 16 oz./sq. ft..
2. Stainless Steel: 0.0156 inch thick.

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 Felt Underlayment: Install felt underlayment, wrinkle free, using adhesive to minimize use of mechanical fasteners under sheet metal flashing and trim.

1. Install in shingle fashion to shed water.
2. Lap joints not less than 2 inches.

B. Synthetic Underlayment: Install synthetic underlayment, wrinkle free, in accordance with manufacturers' written instructions, and using adhesive where possible to minimize use of mechanical fasteners under sheet metal.

1. Lap horizontal joints not less than 4 inches.
2. Lap end joints not less than 12 inches.

C. 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.
7. Cover underlayment within 14 days.

D. Install slip sheet, wrinkle free, directly on substrate before installing sheet metal flashing and trim.

1. Install in shingle fashion to shed water.
2. Lapp 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, 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 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.

E. 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.

F. 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.

G. Fasteners: Use fastener sizes that penetrate substrate not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.

H. 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.

I. 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 079200 "Joint Sealants."

J. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter.

1. Pretin edges of sheets with solder to width of 1-1/2 inches; however, reduce pretinning where pretinned surface would show in completed Work.
2. Do not solder metallic-coated steel sheet.
3. Do not pretin zinc-tin alloy-coated copper.
4. Do not use torches for soldering.
5. Heat surfaces to receive solder, and flow solder into joint.
   a. Fill joint completely.
   b. Completely remove flux and spatter from exposed surfaces.
6. 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.
7. Copper Soldering: Tin edges of uncoated sheets, using solder for copper.
8. Copper-Clad Stainless Steel Soldering: Tin edges of uncoated sheets, using solder for copper-clad stainless steel.

K. Rivets: Rivet joints in zinc where necessary for strength.

3.4 INSTALLATION OF ROOF-DRAINAGE SYSTEM

A. 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. Fasten gutter spacers to front and back of gutter.
7. Anchor and loosely lock back edge of gutter to continuous eave or apron flashing.
8. Anchor back of gutter that extends onto roof deck with cleats spaced not more than 24 inches apart.
9. Anchor gutter with gutter brackets spaced not more than 24 inches apart to roof deck unless otherwise indicated, and loosely lock to front gutter bead.
10. Anchor gutter with spikes and ferrules spaced not more than 24 inches apart.

11. Install gutter with expansion joints at locations indicated on Drawings, but not exceeding, 50 feet apart. Install expansion-joint caps.
12. Install continuous gutter screens on gutters with noncorrosive fasteners, removable for cleaning gutters.

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.
5. Connect downspouts to underground drainage system.

3.5 INSTALLATION OF ROOF FLASHINGS

A. Install sheet metal flashing and trim to comply with performance requirements, sheet metal manufacturer's written installation instructions, 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.
2. Anchor to resist uplift and outward forces in accordance with recommendations in cited sheet metal standard unless otherwise indicated. Interlock bottom edge of roof edge flashing with continuous cleat anchored to substrate at staggered 3-inch centers.
3. Anchor to resist uplift and outward forces in accordance with recommendations in FM Global Property Loss Prevention Data Sheet 1-49 for FM Approvals' listing for required windstorm classification.

C. Copings:

1. Install roof edge flashings in accordance with ANSI/SPRI/FM 4435/ES-1.
2. Anchor to resist uplift and outward forces in accordance with recommendations in cited sheet metal standard unless otherwise indicated.
    a. Interlock exterior bottom edge of coping with continuous cleat anchored to substrate at 24-inch centers.
    b. Anchor interior leg of coping with washers and screw fasteners through slotted holes at 24-inch centers.
3. Anchor to resist uplift and outward forces in accordance with recommendations in FM Global Property Loss Prevention Data Sheet 1-49 for specified FM Approvals' listing for required windstorm classification.

D. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending minimum of 4 inches over base flashing. Install stainless steel draw band and tighten.

E. Counterflashing: Coordinate installation of counterflashing with installation of base flashing.

1. Insert counterflashing in reglets or receivers and fit tightly to base flashing.
2. Extend counterflashing 4 inches over base flashing.
3. Lap counterflashing joints minimum of 4 inches.
4. Secure in waterproof manner by means of snap-in installation and sealant or lead wedges and sealant unless otherwise indicated.

F. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Seal with butyl sealant and clamp flashing to pipes that penetrate roof.

3.6 INSTALLATION OF WALL FLASHINGS

A. 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.

C. Reglets: Installation of reglets is specified in Section 04 20 00 "Unit Masonry."

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

SECTION 07 92 00

JOINT SEALANTS

PART 1 - GENERAL

1.01 DESCRIPTION

A. Under this Section, the Contractor shall furnish all labor, materials and equipment for Joint Sealants, as shown on the Plans, and/or as specified.

1.02 REFERENCES

A. The publications listed below and their latest revisions form a part of this Specification to the extent referenced. The publications are referred to in the text by the basic designation only.
   1. American Society for Testing and Materials (ASTM) Publication:
      a. C920 - Elastomeric Joint Sealants

1.03 SUBMITTALS

A. Submit the following.
   1. Manufacturer's Catalog Data:
      a. Sealants
      b. Primers
      c. Backstop materials
         1) Data for the sealants shall include shelf life, and recommended cleaning solvents.

1.04 ENVIRONMENTAL CONDITIONS

A. The ambient temperature shall be within the limits of 40 and 100 degrees F when sealant is applied.

1.05 DELIVERY AND STORAGE

A. Deliver materials to the job site in unopened manufacturers' external shipping containers, with brand names, date of manufacture, [color,] and material designation clearly marked thereon. Elastomeric sealant containers shall be labeled to identify type, class, grade, and use. Carefully handle and store materials to prevent inclusion of foreign materials or subjection to sustained temperatures exceeding 100 degrees F or less than 40 degrees F.

1.06 QUALITY ASSURANCE

A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.

B. Product Testing: Test joint sealants using a qualified testing agency.
   1. Testing Agency Qualifications: Qualified in accordance with ASTM C1021 to conduct the testing indicated.

C. Mockups: Install sealant in mockups of assemblies specified in other Sections that are indicated to receive joint sealants specified in this Section. Use materials and installation methods specified in the Section.

PART 2 - PRODUCTS

2.01 SEALANTS

A. Provide sealant that has been tested and found suitable for the substrates to which it will be applied.

B. Interior Sealant: ASTM C920, Type S or M, Grade NS, Class 12.5, Use NT]. Location(s) of sealant shall be as follows:
   1. LOCATION
      a. Small voids between walls or partitions and adjacent lockers, casework, shelving, door frames, built-in or surface-mounted equipment and fixtures, and similar items.
      b. Perimeter of frames at doors, windows, and access panels which adjoin exposed interior concrete and masonry surfaces.
      c. Joints of interior masonry walls and partitions which adjoin columns, pilasters, concrete walls, and exterior walls unless otherwise detailed.
      d. Joints between edge members for acoustical tile and adjoining vertical surfaces.
      e. Interior locations, not otherwise indicated or specified, where small voids exist between materials specified to be painted.

C. Exterior Sealant: For joints in vertical surfaces, provide ASTM C920, Type S or M, Grade NS, Class 25, Use NT. For joints in horizontal surfaces, provide ASTM C920, Type S or M, Grade P, Class 25, Use T. Location(s) of sealant shall be as follows:
   1. LOCATION
      a. Joints and recesses formed where frames and subsills of windows, doors, louvers, and vents adjoin masonry, concrete, or metal frames. Use sealant at both exterior and interior surfaces of exterior wall penetrations.
      b. Joints between new and existing exterior masonry walls.

c. Masonry joints where shelf angles occur.
d. Joints in wash surfaces of stonework.
e. Expansion and control joints.
f. Interior face of expansion joints in exterior concrete or masonry walls where metal expansion joint covers are not required.
g. Voids where items pass through exterior walls.
h. Metal reglets, where flashing is inserted into masonry joints, and where flashing is penetrated by coping dowels.
i. Metal-to-metal joints where sealant is indicated or specified.
j. Joints between ends of gravel stops, fascias, copings, and adjacent walls.

D. Floor Joint Sealant: ASTM C920, Type S or M, Grade P, Class 25, Use T. Location(s) of sealant shall be as follows:
1. LOCATION
a. Seats of metal thresholds for exterior doors.
b. Control and expansion joints in floors, slabs, ceramic tile, and walkways.

2.02 PRIMER FOR SEALANT

A. Provide a nonstaining, quick-drying type and consistency recommended by the sealant manufacturer for the particular application.

2.03 BOND BREAKERS

A. Provide the type and consistency recommended by the sealant manufacturer for the particular application.

2.04 BACKSTOPS

A. Provide glass fiber roving or neoprene, butyl, polyurethane, or polyethylene foams free from oil or other staining elements as recommended by sealant manufacturer. Backstop material shall be compatible with sealant. Do not use oakum and other types of absorptive materials as backstops.

2.05 CLEANING SOLVENTS

A. Provide type(s) recommended by the sealant manufacturer [except for aluminum and bronze surfaces that will be in contact with sealant].

2.06 COLOR

A. Sealants exposed to view shall match the color of adjacent finished surfaces.

PART 3 - EXECUTION

3.01 SURFACE PREPARATION

A. Surfaces shall be clean, dry to the touch, and free from dirt, frost, moisture, grease, oil, wax, lacquer, paint, or other foreign matter that would tend to destroy or impair adhesion. When resealing an existing joint, remove existing calk or sealant prior to applying new sealant.

B. Steel Surfaces: Remove loose mill scale by sandblasting or, if sandblasting is impractical or would damage finish work, scraping and wire brushing. Remove protective coatings by sandblasting or using a residue-free solvent.

C. Aluminum or Bronze Surfaces: Remove temporary protective coatings from surfaces that will be in contact with sealant. When masking tape is used as a protective coating, remove tape and any residual adhesive just prior to sealant application. For removing protective coatings and final cleaning, use nonstaining solvents recommended by the manufacturer of the item(s) containing aluminum or bronze surfaces.

3.02 SEALANT PREPARATION

A. Do add liquids, solvents, or powders to the sealant. Mix multi-component elastomeric sealants in accordance with manufacturer's instructions.

3.03 APPLICATION:

A. Joint Width-To-Depth Ratios:
1. Acceptable Ratios:

JOINT WIDTH	**JOINT DEPTH**	
	Minimum	Maximum
For metal, glass, or other nonporous surfaces:		
1/4 inch (minimum)	1/4 inch	1/4 inch
over 1/4 inch	1/2 of width	Equal to width
For wood, concrete, masonry, or stone,:		
1/4 inch (minimum)	1/4 inch	1/4 inch
Over 1/4 inch to 1/2 inch	1/4 inch width	Equal to width
Over 1/2 inch to 2 inches	1/2 inch	5/8 inch
Over 2 inches	(As recommended by sealant manufacturer)	

2. Unacceptable Ratios: Where joints of acceptable width-to-depth ratios have not been provided, clean out joints to acceptable depths and grind or cut to acceptable widths without damage to the adjoining work. Grinding shall not be required on metal surfaces.

B. Backstops: Install backstops dry and free of tears or holes. Tightly pack the back or bottom of joint cavities with backstop material to provide a joint of the depth specified. Install backstops in the following locations:
1. Where indicated.
2. Where backstop is not indicated but joint cavities exceed the acceptable maximum depths specified in paragraph entitled, "Joint Width-to-Depth Ratios".

C. Primer: Immediately prior to application of the sealant, clean out loose particles from joints. Where recommended by sealant manufacturer, apply primer to joints in concrete masonry units, wood, and other porous surfaces in accordance with sealant manufacturer's instructions. Do not apply primer to exposed finish surfaces.

D. Bond Breaker: Provide bond breakers to the back or bottom of joint cavities, as recommended by the sealant manufacturer for each type of joint and sealant used, to prevent sealant from adhering to these surfaces. Carefully apply the bond breaker to avoid contamination of adjoining surfaces or breaking bond with surfaces other than those covered by the bond breaker.

E. Sealants: Provide a sealant compatible with the material(s) to which it is applied. Do not use a sealant that has exceeded shelf life or has jelled and cannot be discharged in a continuous flow from the gun. Apply the sealant in accordance with the manufacturer's instructions with a gun having a nozzle that fits the joint width. Force sealant into joints to fill the joints solidly without air pockets. Tool sealant after application to ensure adhesion. Sealant shall be uniformly smooth and free of wrinkles. Upon completion of sealant application, roughen partially filled or unfilled joints, apply sealant, and tool smooth as specified.

3.04 PROTECTION AND CLEANING

A. Protection: Protect areas adjacent to joints from sealant smears. Masking tape may be used for this purpose if removed 5 to 10 minutes after the joint is filled.

B. Final Cleaning: Upon completion of sealant application, remove remaining smears and stains, and leave the work in a clean and neat condition.
1. Masonry and Other Porous Surfaces: Immediately scrape off fresh sealant that has been smeared on masonry, and rub clean with a solvent as recommended by the sealant manufacturer. Allow excess sealant to cure for 24 hours then remove by wire brushing or sanding.

2. Metal and Other Nonporous Surfaces: Remove excess sealant with a solvent-moistened cloth.

END OF SECTION

SECTION 08 06 71

DOOR HARDWARE SCHEDULE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section references specification sections relating to commercial door hardware for the following:

1. Swinging doors.
2. Other doors to the extent indicated.

B. Commercial door hardware includes, but is not necessarily limited to, the following:

1. Mechanical door hardware.
2. Electromechanical and access control door hardware.
3. Electromechanical and access control door hardware power supplies, back-ups and surge protection.
4. Automatic operators.
5. Cylinders specified for doors in other sections.

C. Related Sections:

1. Division 08 Section “Door Hardware”.

D. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.

1. ANSI A117.1 - Accessible and Usable Buildings and Facilities.
2. ICC/IBC - International Building Code.
3. NFPA 70 - National Electrical Code.
4. NFPA 80 - Fire Doors and Windows.
5. NFPA 101 - Life Safety Code.
6. NFPA 105 - Installation of Smoke Door Assemblies.
7. State Building Codes, Local Amendments.

E. Standards: Reference Related Sections for requirements regarding compliance with applicable industry standards.

1.3 SUBMITTALS

A. Product Data: Manufacturer's product data sheets including installation details, material descriptions, dimensions of individual components and profiles, operational descriptions and finishes.

B. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.

1. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."

2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening. Organize door hardware sets in same order as in the Door Hardware Sets at the end of Part 3. Submittals that do not follow the same format and order as the Door Hardware Sets will be rejected and subject to resubmission.

3. Content: Include the following information:

a. Type, style, function, size, label, hand, and finish of each door hardware item.
b. Manufacturer of each item.
c. Fastenings and other pertinent information.
d. Location of door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
e. Explanation of abbreviations, symbols, and codes contained in schedule.
f. Mounting locations for door hardware.
g. Door and frame sizes and materials.

4. Submittal Sequence: Submit the final Door Hardware Schedule at earliest possible date, particularly where approval of the Door Hardware Schedule must precede fabrication of other work that is critical in the Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the Door Hardware Schedule.

C. Keying Schedule: Prepared under the supervision of the Owner, separate schedule detailing final keying instructions for locksets and cylinders in writing. Include keying system explanation, door numbers, key set symbols, hardware set numbers and special instructions. Owner to approve submitted keying schedule prior to the ordering of permanent cylinders.

D. Product Test Reports: Indicating compliance with cycle testing requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified independent testing agency.

E. Operating and Maintenance Manuals: Provide manufacturers operating and maintenance manuals for each item comprising the complete door hardware installation in quantity as required in Division 01, Closeout Submittals. The manual to include the name, address, and contact information of the manufacturers providing the hardware and their nearest service representatives. The final copies delivered after completion of the installation test to include "as built" modifications made during installation, checkout, and acceptance.

F. Warranties and Maintenance: Special warranties and maintenance agreements specified in the Related Sections.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Inventory door hardware on receipt and provide secure lock-up and shelving for door hardware delivered to Project site. Do not store electronic access control hardware, software or accessories at Project site without prior authorization.

B. Tag each item or package separately with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.

C. Deliver, as applicable, permanent keys, cylinders, cores, access control credentials, software and related accessories directly to Owner via registered mail or overnight package service. Instructions for delivery to the Owner shall be established at the "Keying Conference".

1.5 WARRANTY

A. General Warranty: Reference Division 01, General Requirements. Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

1.6 MAINTENANCE SERVICE

A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

A. Refer to “PART 3 – EXECUTION” for required specification sections.

PART 3 - EXECUTION

3.1 DOOR HARDWARE SETS

A. The door hardware sets represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application and functionality.

1. Quantities listed are for each pair of doors, or for each single door.

2. The supplier is responsible for handing and sizing all products.

3. Where multiple options for a piece of hardware are given in a single line item, the supplier shall provide the appropriate application for the opening.

4. At existing openings with new hardware the supplier shall field inspect existing conditions prior to the submittal stage to verify the specified hardware will work as required. Provide alternate solutions and proposals as needed.

B. Products listed in the hardware sets shall be supplied by and in accordance with the requirements described in the specification section as noted for each item.

1. Section 08 71 00 – Door Hardware.

C. Manufacturer's Abbreviations:

1. YA - ASSA ABLOY ACCENTRA

2. OT - Other

3. HS - HES

4. RO – Rockwood

5. FA – Folger Adams

6. PE - Pemko

Hardware Sets

Set: 1.0 - Exterior

Doors: 101

1 Mullion	KRM200	600	YA 087100
2 Continuous Hinge	10BEFM__SLF-HD1		PE 087100
1 Rim Exit Device, Nightlatch	6100ED 121NL Temp Core	613E	YA 087100
1 Rim Exit Device, Exit Only	6100ED EO	613E	YA 087100
2 Permanent Core	To Match Existing System		OT
1 Rim Housing	1212/1212B	613E	YA 087100
1 Mullion Housing	2221	613E	YA 087100
2 Door Pull	BF157	10BE	RO 087100
2 Surface Closer	UNI4400	691	YA 087100
1 Balance of Hardware	To Remain		OT

Set: 2.0 - Interior

Doors: 102

2	Rim Exit Device	6170ED		YA	087100
2	Continuous Hinge	10BEFM__SLF-HD1		PE	087100
2	Permanent Core	To Match Existing System		OT	
1	Rim Housing	1212/1212B	613E	YA	087100
1	Mullion Housing	2221	613E	YA	087100
2	Electric Strike	310-4	613E	FA	087100
2	Door Pull	BF157	10BE	RO	087100
2	Surface Closer	UNI4400	691	YA	087100
1	Balance of Hardware	To Remain		OT	

Notes: ***Where existing doors and/or frames are to remain - field verify that the existing door and/or frame conditions are able to accommodate the above hardware items.***

Theory of operation:

- Exterior doors normally open during hours of operation.
- Interior doors normally closed and secure.
- Entering access code at keypad energizes interior door strikes, allowing ingress at both leaves.
- In the event of power failure, doors remain closed and secure.
- Manual key override provided at active leaf.
- Free egress allowed at all times.

END OF SECTION

SECTION 08 41 13

ALUMINUM FRAMED ENTRANCES AND STOREFRONTS

PART 1 - GENERAL

1.01 DESCRIPTION

A. Under this Section, the Contractor shall furnish all labor, materials and equipment for Aluminum Framed Entrances and Storefronts, as shown on the Plans, as specified, and/or directed.

B. Glass: Reference Section 08 80 00, “Glazing”.

C. Single Source Requirement: All products shall be by the same manufacturer.

1.02 REFERENCES

A. The publications identified herein and their latest revisions form a part of this Specification to the extent referenced. The publications are referred to in the text by the basic designation only.

1.03 PRODUCT QUALITY AND COMPATIBILITY

A. Coordinate all Division 08 products to ensure consistent product quality and compatability for a fully operting system.

1.04 LABORATORY TESTING AND PERFORMANCE REQUIREMENTS

A. Test Units:
   1. Air, water, and structural test unit size shall be a minimum of two stories high and three lites wide.
   2. Thermal test unit sizes shall be 80" (2032 mm) wide x 80" (2032 mm) high with one intermediate vertical mullion and two lites of glass.

B. Test Procedures and Performance:
   1. Air Infiltration Test:
      a. Test unit in accordance with ASTM E283 at a static air pressure difference of 6.24 psf (299 Pa).
      b. Air infiltration shall not exceed .06 cfm/SF (.30 l/s•m²) of unit.
   2. Water Resistance Test:
      a. Test unit in accordance with ASTM E331.
      b. There shall be no uncontrolled water leakage at a static test pressure of 12.0 psf (575 Pa).

3. Uniform Load Deflection Test:
   a. Test in accordance with ASTM E330.
   b. Deflection under design load shall not exceed L/175 of the clear span.
4. Uniform Load Structural Test:
   a. Test in accordance with ASTM E330 at a pressure 1.5 times the design wind pressure in 1.05.B.3.b.
   b. At conclusion of the test, there shall be no glass breakage, permanent damage to fasteners, storefront parts, or any other damage that would cause the storefront to be defective.
5. Condensation Resistance Test (CRF):
   a. Test unit in accordance with AAMA 1503.1.
   b. Condensation Resistance Factor (CRF) shall not be less than 56 (frame) when glazed with .29 center of glass U-Factor. (See chart at end of section).
6. Condensation Resistance (CR):
   a. With ventilators closed and locked, test unit in accordance with NFRC 500-2010.
   b. Condensation Resistance (CR) shall not be less than 37when glazed with .29 center of glass U-Factor. (See chart at end of section).
7. Thermal Transmittance Test (Conductive U-Factor):
   a. With ventilators closed and locked, test unit in accordance with NFRC 100-2010.
   b. Conductive thermal transmittance (U-Factor) shall not be more than .41 BTU/hr•ft^2•°F.
   (2.33 W/m²•K) when glazed with .29 center of glass U-Factor. (See chart at end of section.)

Glass Comparison Chart				
Glass	**C.O.G.[2] U-Factor**	**U-Factor[1]**	**Frame CRF[3]**	**CR[1]**
1**" IG**	0.47	0.56 BTU/hr•ft²•ºF (3.18 W/m²•K)	56	36
1**" IG**	0.29	0.41 BTU/hr•ft²•ºF (2.33 W/m²•K)	56	37
1**" IG**	0.24	0.37 BTU/hr•ft²•ºF (2.10 W/m²•K)	56	37

[1]U-Factor and Condensation Resistance (CR) are based on a nominal size of 47.25" (1200 mm) x 59" (1500 mm) with two lites of glass using NFRC-100, and 500 - 2010
[2]Intercept® Spacer
[3]Based on AAMA 1503.1

C. Project Wind Loads: The system shall be designed to withstand the following loads normal to the plane of the wall:
   1. Positive pressure of 30 psf at non-corner zones.
   2. Negative pressure of 30 psf at non-corner zones.
   3. Negative pressure of 30 psf at corner zones.

1.05 FIELD TESTING AND PERFORMANCE REQUIREMENTS

A. Test in accordance with AAMA 501.2 for spray test only or AAMA 503.92 for pressurized test.

1.06 QUALITY ASSURANCE

A. Provide test reports from AAMA accredited laboratories certifying the performance as specified in 1.6.

B. Test reports shall be accompanied by the storefront manufacturer's letter of certification stating that the tested storefront meets or exceeds the referenced criteria for the appropriate storefront type.

1.07 SUBMITTALS

A. Contractor shall submit shop drawings; finish samples, test reports, and warranties.
   1. Samples of materials as may be requested without cost to Owner, i.e., metal, glass, fasteners, anchors, frame sections, mullion section, corner section, etc.

B. An NFRC Component Modeling Approach (CMA) generated label certificate shall be provided by the manufacturer. The label certificate shall be project specific and will contain the thermal performance ratings of the manufacturer's framing combined with the specified glass, and the glass spacer used in the fabrication of the glass, at NFRC standard test size as defined in table 4-3 in NFRC 100-2010.

1.08 WARRANTIES

A. Total Storefront Installation:
   1. The responsible Contractor shall assume full responsibility and warrant for one year the satisfactory performance of the total storefront installation. This includes the glass (including insulated units), glazing, anchorage and setting system, sealing, flashing, etc., as it relates to air, water and structural adequacy as called for in the specifications and approved shop drawings.
   2. Any deficiencies due to such elements not meeting the specifications shall be corrected by the responsible Contractor at their expense during the warranty period.

B. Window Material and Workmanship: Provide written guarantee against defects in material and workmanship for 3 years from the date of final shipment.

C. Glass:
1. Provide written warranty for insulated glass units that they will be free from obstruction of vision as a result of dust or film formation on the internal glass surfaces caused by failure of the hermetic seal due to defects in material and workmanship.
2. Warranty period shall be for 10 (ten) years.

D. Finish: Warranty period shall be for 3 years from the date of final shipment. Provide clear anodized finish.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Aluminum: Extruded aluminum shall be 6063-T6 alloy and temper.

B. Glass: Ship open for 1” Insulated glass with a center of glass U-Factor of .29 constructed as shown on the drawings.

C. Thermal Barrier:
1. All exterior aluminum shall be separated from interior aluminum by a rigid, structural thermal barrier. For purposes of this specification, a structural thermal barrier is defined as a system that shall transfer shear during bending and, therefore, promote composite action between the exterior and interior extrusions.
2. Barrier material shall be poured-in-place, two-part polyurethane. A nonstructural thermal barrier is unacceptable.

2.02 FABRICATION

A. General:
1. All aluminum frame extrusions shall have a minimum wall thickness of .080" (2 mm).
2. All exposed work shall be carefully matched to produce continuity of line and design with all joints. System design shall be such that raw edges will not be visible at joints.

B. Frame:
1. Depth of frame shall not be less than 4 1/2" (114 mm).
2. Face dimension shall not be less than 2" (50 mm).
3. Frame components shall be screw spline construction.

C. Glazing: Comply with Division 08 Section “Glazing.”
   1. Glazing: All units shall be “dry glazed" with gaskets on both exterior and interior of the glass.
   2. Glazing Gaskets: Manufacturer’s standard sealed-corner pressure glazing system of black, resilient elastomeric glazing gaskets, setting blocks, and shims or spacers.
   3. Glazing Sealants: As recommended by manufacturer.
   4. Weatherseal Sealants: ASTM C 920 for Type S; Grade NS; Class 25; uses NT, G, A, and O; chemically curing silicone formulation that is compatible with structural sealant and other system components with which it comes in contact; recommended by structural-sealant, weatherseal-sealant, and structural-sealant-glazed storefront manufacturers for this use.
      a. Color: Match structural sealant.

D. Finish:
   1. Anodic : Finish all exposed areas of aluminum windows and components with electrolytically deposited color in accordance with Aluminum Association Designation AA-M10-C22-A41.

AA Description	Description	Arch. Class	AAMA Guide Spec.
AA-M10-C22-A41	Clear Anodized	1	611-98

   2. High-Performance Organic Finish: Two-coat fluoropolymer finish complying with AAMA 2604 and containing not less than 50 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturer’s written instructions.
      a. Color and Gloss: As selected by Engineer from manufacturer’s full range of finish options.

E. Entrance Door Systems:
   1. Entrance Doors: Manufacturer’s standard glazed entrance doors for manual swing operation.
      a. Door Construction: 1-3/4-inch overall thickness, with minimum 0.125-inch-thick, extruded-aluminum tubular rail and stile members. Mechanically festen corners with reinforcing brackets that are deeply penetrated and fillet welded or that incorporate concealed tie rods.
   2. Thermal Construction: High performance plastic connectors separate aluminum members exposed to tge exterior from members exposed to the interior.
   3. Glazing Stops and Gaskets: Beveled, snap-on, extruded-aluminum stops and preformed gaskets.
      a. Provide nonremovable glazing stops on outside of door.

F. Entrance Door Hardware:
   1. Entrance Door Hardware: Hardware not specified in this Section is specified in Division 08 Section “Door Hardware.”

PART 3 - EXECUTION

3.01 INSPECTION

A. Job Conditions: All openings shall be prepared by others to the proper size and shall be plumb, level and in the proper location and alignment as shown on the architect's drawings.

3.02 INSTALLATION

A. Use only skilled tradesmen with work done in accordance with approved shop drawings and specifications.

B. Storefront system shall be erected plumb and true, in proper alignment and relation to established lines and grades.

C. Entrance doors shall be securely anchored in place to a straight, plumb and level condition, without distortion. Weather stripping contact and hardware movement shall be checked and final adjustments made for proper operation and performance of units.

D. Furnish and apply sealing materials to provide a weather tight installation at all joints and intersections and at opening perimeters.

E. Sealing materials specified shall be used in strict accordance with the manufacturer‘s printed instructions, and shall be applied only by mechanics specially trained or experienced in their use. All surfaces must be clean and free of foreign matter before applying sealing materials. Sealing compounds shall be tooled to fill the joint and provide a smooth finished surface.

3.03 ANCHORAGE

A. Adequately anchor to maintain positions permanently when subjected to normal thermal movement, specified building movement, and specified wind loads.

3.04 PROTECTION AND CLEANING

A. The General Contractor shall protect the aluminum materials and finish against damage from construction activities and harmful substances. The General Contractor shall remove any protective coatings as directed by the Architect, and shall clean the aluminum surfaces as recommended for the type of finish applied.

END OF SECTION

SECTION 08 71 00

DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes commercial door hardware for the following:
   1. Swinging doors.

B. Door hardware includes, but is not necessarily limited to, the following:
   1. Mechanical door hardware.
   2. Electromechanical door hardware.
   3. Automatic operators.
   4. Cylinders specified for doors in other sections.

C. Related Sections:

   1. Division 08 Section “Door Hardware Schedule”.
   2. Division 08 Section “Aluminum-Framed Storefronts”.

D. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.
   1. ANSI A117.1 - Accessible and Usable Buildings and Facilities.
   2. ICC/IBC - International Building Code.
   3. NFPA 70 - National Electrical Code.
   4. NFPA 80 - Fire Doors and Windows.
   5. NFPA 101 - Life Safety Code.
   6. NFPA 105 - Installation of Smoke Door Assemblies.
   7. UL/ULC and CSA C22.2 - Standards for Automatic Door Operators Used on Fire and Smoke Barrier Doors and Systems of Doors.
   8. State Building Codes, Local Amendments.

E. Standards: All hardware specified herein shall comply with the following industry standards as applicable. Any undated reference to a standard shall be interpreted as referring to the latest edition of that standard:
   1. ANSI/BHMA Certified Product Standards - A156 Series.
   2. UL10C - Positive Pressure Fire Tests of Door Assemblies.
   3. ANSI/UL 294 - Access Control System Units.
   4. UL 305 - Panic Hardware.
   5. ANSI/UL 437- Key Locks.

1.3 SUBMITTALS

A. Product Data: Manufacturer's product data sheets including installation details, material descriptions, dimensions of individual components and profiles, operational descriptions and finishes.

B. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing, fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
   1. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."
   2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening. Organize door hardware sets in same order as in the Door Hardware Sets at the end of Part 3. Submittals that do not follow the same format and order as the Door Hardware Sets will be rejected and subject to resubmission.
   3. Content: Include the following information:
      a. Type, style, function, size, label, hand, and finish of each door hardware item.
      b. Manufacturer of each item.
      c. Fastenings and other pertinent information.
      d. Location of door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
      e. Explanation of abbreviations, symbols, and codes contained in schedule.
      f. Mounting locations for door hardware.
      g. Door and frame sizes and materials.
      h. Warranty information for each product.
   4. Submittal Sequence: Submit the final Door Hardware Schedule at earliest possible date, particularly where approval of the Door Hardware Schedule must precede fabrication of other work that is critical in the Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the Door Hardware Schedule.

C. Shop Drawings: Details of electrified access control hardware indicating the following:
   1. Wiring Diagrams: Upon receipt of approved schedules, submit detailed system wiring diagrams for power, signaling, monitoring, communication, and control of the access control system electrified hardware. Differentiate between manufacturer-installed and field-installed wiring. Include the following:
      a. Elevation diagram of each unique access controlled opening showing location and interconnection of major system components with respect to their placement in the respective door openings.
      b. Complete (risers, point-to-point) access control system block wiring diagrams.
      c. Wiring instructions for each electronic component scheduled herein.
   2. Electrical Coordination: Coordinate with related sections the voltages and wiring details required at electrically controlled and operated hardware openings.

D. Keying Schedule: After a keying meeting with the owner has taken place prepare a separate keying schedule detailing final instructions. Submit the keying schedule in electronic format. Include keying system explanation, door numbers, key set symbols, hardware set numbers and special instructions. Owner must approve submitted keying schedule prior to the ordering of permanent cylinders/cores.

E. Informational Submittals:
   1. Product Test Reports: Indicating compliance with cycle testing requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified independent testing agency.

F. Operating and Maintenance Manuals: Provide manufacturers operating and maintenance manuals for each item comprising the complete door hardware installation in quantity as required in Closeout Procedures.

1.4 QUALITY ASSURANCE

A. Manufacturers Qualifications: Engage qualified manufacturers with a minimum 5 years of documented experience in producing hardware and equipment similar to that indicated for this Project and that have a proven record of successful in-service performance.

B. Certified Products: Where specified, products must maintain a current listing in the Builders Hardware Manufacturers Association (BHMA) Certified Products Directory (CPD).

C. Installer Qualifications: A minimum 3 years documented experience installing both standard and electrified door hardware similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

D. Door Hardware Supplier Qualifications: Experienced commercial door hardware distributors with a minimum 5 years documented experience supplying both mechanical and electromechanical hardware installations comparable in material, design, and extent to that indicated for this Project. Supplier recognized as a factory direct distributor by the manufacturers of the primary materials with a warehousing facility in Project's vicinity. Supplier to have on staff a certified Architectural Hardware Consultant (AHC) available during the course of the Work to consult with Contractor, Architect, and Owner concerning both standard and electromechanical door hardware and keying.

E. Source Limitations: Obtain each type and variety of door hardware specified in this section from a single source unless otherwise indicated.
   1. Electrified modifications or enhancements made to a source manufacturer's product line by a secondary or third party source will not be accepted.
   2. Provide electromechanical door hardware from the same manufacturer as mechanical door hardware, unless otherwise indicated.

F. Each unit to bear third party permanent label indicating compliance with the referenced testing standards.

G. Keying Conference: Conduct keying conference to incorporate the following criteria into the final keying schedule document:
   1. Function of building, purpose of each area and degree of security required.
   2. Plans for existing and future key system expansion.
   3. Requirements for key control storage and software.
   4. Installation of permanent keys, cylinder cores and software.
   5. Address and requirements for delivery of keys.

H. Pre-Submittal Conference: Conduct coordination conference with attendance by representatives of Supplier(s), Installer(s), and Contractor(s) to review proper methods and the procedures for receiving, handling, and installing door hardware.
   1. Prior to installation of door hardware, conduct a project specific training meeting to instruct the installing contractors' personnel on the proper installation and adjustment of their respective products. Product training to be attended by installers of door hardware (including electromechanical hardware) for aluminum, hollow metal and wood doors. Training will include the use of installation manuals, hardware schedules, templates and physical product samples as required.
   2. Inspect and discuss electrical roughing-in, power supply connections, and other preparatory work performed by other trades.
   3. Review sequence of operation narratives for each unique access controlled opening.
   4. Review and finalize construction schedule and verify availability of materials.
   5. Review the required inspecting, testing, commissioning, and demonstration procedures

I. At completion of installation, provide written documentation that components were applied according to manufacturer's instructions and recommendations and according to approved schedule.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Inventory door hardware on receipt and provide secure lock-up and shelving for door hardware delivered to Project site. Do not store electronic access control hardware, software or accessories at Project site without prior authorization.

B. Tag each item or package separately with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.

C. Deliver, as applicable, permanent keys, cylinders, cores, access control credentials, software and related accessories directly to Owner via registered mail or overnight package service. Instructions for delivery to the Owner shall be established at the "Keying Conference".

1.6 COORDINATION

A. Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing standard and electrified hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing hardware to comply with indicated requirements.

B. Door Hardware and Electrical Connections: Coordinate the layout and installation of scheduled electrified door hardware and related access control equipment with required connections to source power junction boxes, low voltage power supplies, detection and monitoring hardware, and fire and detection alarm systems.

C. Door and Frame Preparation: Doors and corresponding frames are to be prepared, reinforced and pre-wired (if applicable) to receive the installation of the specified electrified, monitoring, signaling and access control system hardware without additional in-field modifications.

1.7 WARRANTY

A. General Warranty: Reference General Requirements. Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Warranty Period: Written warranty, executed by manufacturer(s), agreeing to repair or replace components of standard and electrified door hardware that fails in materials or workmanship within specified warranty period after final acceptance by the Owner. Failures include, but are not limited to, the following:
   1. Structural failures including excessive deflection, cracking, or breakage.
   2. Faulty operation of the hardware.
   3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
   4. Electrical component defects and failures within the systems operation.

C. Warranty Period: Unless otherwise indicated, warranty shall be one year from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

A. General: Provide door hardware for each door to comply with requirements in Door Hardware Sets and each referenced section that products are to be supplied under.

B. Designations: Requirements for quantity, item, size, finish or color, grade, function, and other distinctive qualities of each type of door hardware are indicated in the Door Hardware Sets at the end of Part 3. Products are identified by using door hardware designations, as follows:
   1. Named Manufacturer's Products: Product designation and manufacturer are listed for each door hardware type required for the purpose of establishing requirements. Manufacturers' names are abbreviated in the Door Hardware Schedule.

C. Please note that ASSA ABLOY is transitioning the Yale Commercial brand to Arrow. This affects only the brand name; the products and product numbers will remain unchanged. The brand transition is expected to be complete in or about August of 2024, and products shipping after that time will be branded Arrow.

D. Substitutions: Requests for substitution and product approval for inclusive mechanical and electromechanical door hardware in compliance with the specifications must be submitted in writing and in accordance with the procedures and time frames outlined in Substitution Procedures. Approval of requests is at the discretion of the architect, owner, and their designated consultants.

2.2 HANGING DEVICES

A. Continuous Geared Hinges: ANSI/BHMA A156.26 Grade 1-600 continuous geared hinge. with minimum 0.120-inch thick extruded 6063-T6 aluminum alloy hinge leaves and a minimum overall width of 4 inches. Hinges are non-handed, reversible and fabricated to template screw locations. Factory trim hinges to suit door height and prepare for electrical cut-outs.
   1. Manufacturers:.
      a. Ives (IV).
      b. Pemko (PE).

2.3 POWER TRANSFER DEVICES

A. Electric Door Wire Harnesses: Provide electric/data transfer wiring harnesses with standardized plug connectors to accommodate up to twelve (12) wires. Connectors plug directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Provide sufficient number and type of concealed wires to accommodate electric function of specified hardware. Provide a connector for through-door electronic locking devices and from hinge to junction box above the opening. Wire nut connections are not acceptable. Determine the length required for each electrified hardware component for the door type, size and construction, minimum of two per electrified opening.
   1. Provide one each of the following tools as part of the base bid contract:
      a. McKinney (MK) - Electrical Connecting Kit: QC-R001.
      b. McKinney (MK) - Connector Hand Tool: QC-R003.
   2. Manufacturers:
      a. McKinney (MK) - QC-C Series.

2.4 DOOR OPERATING TRIM

A. Door Push Plates and Pulls: ANSI/BHMA A156.6 door pushes and pull units of type and design specified in the Hardware Sets. Coordinate and provide proper width and height as required where conflicting hardware dictates.
   1. Push/Pull Plates: Minimum .050 inch thick, size as indicated in hardware sets, with beveled edges, secured with exposed screws unless otherwise indicated.
   2. Door Pull and Push Bar Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door unless otherwise indicated.
   3. Offset Pull Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door and offset of 90 degrees unless otherwise indicated.
   4. Pulls, where applicable, shall be provided with a 10” clearance from the finished floor on the push side to accommodate wheelchair accessibility.

5. Fasteners: Provide manufacturer's designated fastener type as indicated in Hardware Sets.
6. Manufacturers:
    a. Rockwood (RO).

2.5 CYLINDERS AND KEYING

A. General: Cylinder manufacturer to have minimum (10) years' experience designing secured master key systems and have on record a published security keying system policy.

1. Manufacturers:

    a. Match Existing, Field Verify.

B. Cylinder Types: Original manufacturer cylinders able to supply the following cylinder formats and types:

1. Threaded mortise cylinders with rings and cams to suit hardware application.
2. Rim cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.
3. Bored or cylindrical lock cylinders with tailpieces as required to suit locks.
4. Tubular deadlocks and other auxiliary locks.
5. Mortise and rim cylinder collars to be solid and recessed to allow the cylinder face to be flush and be free spinning with matching finishes.
6. Keyway: Match Facility Standard.

C. Large Format Interchangeable Cores: Provide removable cores (LFIC) as specified, core insert, removable by use of a special key, and for use with only the core manufacturer's cylinder and door hardware.

D. Keying System: Each type of lock and cylinders to be factory keyed.
1. Supplier shall conduct a "Keying Conference" to define and document keying system instructions and requirements.
2. Furnish factory cut, nickel-silver large bow permanently inscribed with a visual key control number as directed by Owner.
3. New System: Key locks to a new key system as directed by the Owner.

E. Key Quantity: Provide the following minimum number of keys:
1. Change Keys per Cylinder: Two (2)
2. Master Keys (per Master Key Level/Group): Five (5).
3. Construction Control Keys (where required): Two (2).
4. Permanent Control Keys (where required): Two (2).

F. Construction Keying: Provide temporary keyed construction cores.

G. Key Registration List (Bitting List):
1. Provide keying transcript list to Owner's representative in the proper format for importing into key control software.
2. Provide transcript list in writing or electronic file as directed by the Owner.

2.6 LOCK AND LATCH STRIKES

A. Strikes: Provide manufacturer's standard strike with strike box for each latch or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, unless otherwise indicated, and as follows:
   1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
   2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
   3. Aluminum-Frame Strike Box: Provide manufacturer's special strike box fabricated for aluminum framing.
   4. Double-lipped strikes: For locks at double acting doors. Furnish with retractable stop for rescue hardware applications.

B. Standards: Comply with the following:
   1. Strikes for Mortise Locks and Latches: BHMA A156.13.
   2. Strikes for Bored Locks and Latches: BHMA A156.2.
   3. Strikes for Auxiliary Deadlocks: BHMA A156.36.
   4. Dustproof Strikes: BHMA A156.16.

2.7 ELECTRIC STRIKES

A. Surface Mounted Rim Electric Strikes: Surface mounted rim exit device electric strikes conforming to ANSI/BHMA A156.31, Grade 1, and UL Listed for both Burglary Resistance and for use on fire rated door assemblies. Construction includes internally mounted solenoid with two heavy-duty, stainless steel locking mechanisms operating independently to provide tamper resistance. Strikes tested for a minimum of 500,000 operating cycles. Provide strikes with 12 or 24 VDC capability supplied standard as fail-secure unless otherwise specified. Option available for latchbolt and latchbolt strike monitoring indicating both the position of the latchbolt and locked condition of the strike. Strike requires no cutting to the jamb prior to installation.
   1. Manufacturers:
      a. Folger Adam (FO) - 310-4 Series.

B. Provide electric strikes with in-line power controller and surge suppressor by the same manufacturer as the strike with the combined products having a five year warranty.

2.8 CONVENTIONAL EXIT DEVICES

A. General Requirements: All exit devices specified herein shall meet or exceed the following criteria:
   1. Exit devices shall have a five-year warranty.
   2. At doors not requiring a fire rating, provide devices complying with NFPA 101 and listed and labeled for "Panic Hardware" according to UL305. Provide proper fasteners as required by manufacturer including sex nuts and bolts at openings specified in the Hardware Sets.
   3. Where exit devices are required on fire rated doors, provide devices complying with NFPA 80 and with UL labeling indicating "Fire Exit Hardware". Provide devices with the proper fasteners for installation as tested and listed by UL. Consult manufacturer’s catalog and template book for specific requirements.

4. Except on fire rated doors, provide exit devices with hex key dogging device to hold the pushbar and latch in a retracted position. Provide optional keyed cylinder dogging on devices where specified in Hardware Sets.
5. Devices must fit flat against the door face with no gap that permits unauthorized dogging of the push bar. The addition of filler strips is required in any case where the door light extends behind the device as in a full glass configuration.
6. Flush End Caps: Provide flush end caps made of architectural metal in the same finish as the devices as in the Hardware Sets. Plastic end caps will not be acceptable.
7. Lever Operating Trim: Where exit devices require lever trim, furnish manufacturer's heavy duty escutcheon trim with threaded studs for thru-bolts.
    a. Lock Trim Design: As indicated in Hardware Sets, provide finishes and designs to match that of the specified locksets.
    b. Where function of exit device requires a cylinder, provide a cylinder (Rim or Mortise) as specified in Hardware Sets.
8. Vertical Rod Exit Devices: Where surface or concealed vertical rod exit devices are used at interior openings, provide as less bottom rod (LBR) unless otherwise indicated. Provide dust proof strikes where thermal pins are required to project into the floor.
9. Narrow Stile Applications: At doors constructed with narrow stiles, or as specified in Hardware Sets, provide devices designed for maximum 2” wide stiles.
10. Dummy Push Bar: Nonfunctioning push bar matching functional push bar.
11. Rail Sizing: Provide exit device rails factory sized for proper door width application.
12. Through Bolt Installation: For exit devices and trim as indicated in Door Hardware Sets.

B. Conventional Push Rail Exit Devices (Heavy Duty): ANSI/BHMA A156.3, Grade 1 Certified Products Directory (CPD) listed panic and fire exit hardware devices furnished in the functions specified in the Hardware Sets. Exit device latch to be stainless steel, pullman type, with deadlock feature.
    1. Manufacturers:
        a. Accentra, formerly known as Yale (YA) - 6100 Series.

2.9 DOOR CLOSERS

A. All door closers specified herein shall meet or exceed the following criteria:
    1. General: Door closers to be from one manufacturer, matching in design and style, with the same type door preparations and templates regardless of application or spring size. Closers to be non-handed with full sized covers.
    2. Standards: Closers to comply with UL-10C for Positive Pressure Fire Test and be U.L. listed for use of fire rated doors.
    3. Size of Units: Comply with manufacturer's written recommendations for sizing of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Where closers are indicated for doors required to be accessible to the Americans with Disabilities Act, provide units complying with ANSI ICC/A117.1.
    4. Closer Arms: Provide heavy duty, forged steel closer arms unless otherwise indicated in Hardware Sets.
    5. Closers shall not be installed on exterior or corridor side of doors; where possible install closers on door for optimum aesthetics.
    6. Closer Accessories: Provide door closer accessories including custom templates, special mounting brackets, spacers and drop plates as required for proper installation. Provide through-bolt and security type fasteners as specified in the hardware sets.

B. Door Closers, Surface Mounted (Heavy Duty): ANSI/BHMA A156.4, Grade 1 Certified Products Directory (CPD) listed surface mounted, heavy duty door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be rack and pinion type, one piece cast iron or aluminum alloy body construction, with adjustable backcheck and separate non-critical valves for closing sweep and latch speed control. Provide non-handed units standard.
   1. Heavy duty surface mounted door closers shall have a 30-year warranty.
   2. Manufacturers:
      a. Accentra, formerly known as Yale (YA) - 4400 Series.
      b. Norton Rixson (NO) - 7500 Series.
      c. Sargent Manufacturing (SA) - 351 Series.

2.10 ARCHITECTURAL TRIM

A. Door Protective Trim
   1. General: Door protective trim units to be of type and design as specified below or in the Hardware Sets.
   2. Size: Fabricate protection plates (kick, armor, or mop) not more than 2" less than door width (LDW) on stop side of single doors and 1” LDW on stop side of pairs of doors, and not more than 1" less than door width on pull side. Coordinate and provide proper width and height as required where conflicting hardware dictates. Height to be as specified in the Hardware Sets.
   3. Where plates are applied to fire rated doors with the top of the plate more than 16” above the bottom of the door, provide plates complying with NFPA 80. Consult manufacturer’s catalog and template book for specific requirements for size and applications.
   4. Protection Plates: ANSI/BHMA A156.6 protection plates (kick, armor, or mop), fabricated from the following:
      a. Stainless Steel: 300 grade, 050-inch thick.
   5. Options and fasteners: Provide manufacturer's designated fastener type as specified in the Hardware Sets. Provide countersunk screw holes.
   6. Manufacturers:
      a. Rockwood (RO).

2.11 DOOR STOPS AND HOLDERS

A. General: Door stops and holders to be of type and design as specified below or in the Hardware Sets.

B. Door Stops and Bumpers: ANSI/BHMA A156.16, Grade 1 door stops and wall bumpers. Provide wall bumpers, either convex or concave types with anchorage as indicated, unless floor or other types of door stops are specified in Hardware Sets. Do not mount floor stops where they will impede traffic. Where floor or wall bumpers are not appropriate, provide overhead type stops and holders.
   1. Manufacturers:
      a. Rockwood (RO).

C. Overhead Door Stops and Holders: ANSI/BHMA A156.8, Grade 1 Certified Products Directory (CPD) listed overhead stops and holders to be surface or concealed types as indicated in Hardware Sets. Track, slide, arm and jamb bracket to be constructed of extruded bronze and

shock absorber spring of heavy tempered steel. Provide non-handed design with mounting brackets as required for proper operation and function.

1. Manufacturers:
    a. Norton Rixson (RF).
    b. Rockwood (RO).
    c. Sargent Manufacturing (SA).

2.12 ARCHITECTURAL SEALS

A. General: Thresholds, weatherstripping, and gasket seals to be of type and design as specified below or in the Hardware Sets. Provide continuous weatherstrip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated. At exterior applications provide non-corrosive fasteners and elsewhere where indicated.

B. Smoke Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke control ratings indicated, based on testing according to UL 1784.
    1. Provide smoke labeled perimeter gasketing at all smoke labeled openings.

C. Fire Labeled Gasketing: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to UL-10C.
    1. Provide intumescent seals as indicated to meet UL10C Standard for Positive Pressure Fire Tests of Door Assemblies, and NPFA 252, Standard Methods of Fire Tests of Door Assemblies.

D. Sound-Rated Gasketing: Assemblies that are listed and labeled by a testing and inspecting agency, for sound ratings indicated.

E. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.

F. Manufacturers:
    1. Pemko (PE).

2.13 ELECTRONIC ACCESSORIES

A. Keypad: Contractor to salvage existing keypad from inside vestibule during the demolition phase of the Project. Keypad is to be cleaned & re-installed inside new vestibule. Contractor is responsible for providing all wiring necessary for keypad to be fully functional on doors (102).
    1. Theory of operation:
        a. Entering access code at keypad energizes interior door strikes, allowing ingress a both leaves.

2.14 FABRICATION

A. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to manufacturers recognized installation standards for application intended.

2.15 FINISHES

A. Standard: Designations used in the Hardware Sets and elsewhere indicate hardware finishes complying with ANSI/BHMA A156.18, including coordination with traditional U.S. finishes indicated by certain manufacturers for their products.

B. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware

C. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine scheduled openings, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.

B. Notify architect of any discrepancies or conflicts between the door schedule, door types, drawings and scheduled hardware. Proceed only after such discrepancies or conflicts have been resolved in writing.

3.2 PREPARATION

A. Hollow Metal Doors and Frames: Comply with ANSI/DHI A115 series.

3.3 INSTALLATION

A. Install each item of mechanical and electromechanical hardware and access control equipment to comply with manufacturer's written instructions and according to specifications.
   1. Installers are to be trained and certified by the manufacturer on the proper installation and adjustment of fire, life safety, and security products including: hanging devices; locking devices; closing devices; and seals.

B. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:
   1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."

2. DHI TDH-007-20: Installation Guide for Doors and Hardware.
3. Where indicated to comply with accessibility requirements, comply with ANSI A117.1 "Accessibility Guidelines for Buildings and Facilities."
4. Provide blocking in drywall partitions where wall stops or other wall mounted hardware is located.

C. Retrofitting: Install door hardware to comply with manufacturer's published templates and written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.

D. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."

E. Storage: Provide a secure lock up for hardware delivered to the project but not yet installed. Control the handling and installation of hardware items so that the completion of the work will not be delayed by hardware losses before and after installation.

3.4 FIELD QUALITY CONTROL

A. Field Inspection (Punch Report): Reference Closeout Procedures. Produce project punch report for each installed door opening indicating compliance with approved submittals and verification hardware is properly installed, operating and adjusted. Include list of items to be completed and corrected, indicating the reasons or deficiencies causing the Work to be incomplete or rejected.
1. Organization of List: Include separate Door Opening and Deficiencies and Corrective Action Lists organized by Mark, Opening Remarks and Comments, and related Opening Images and Video Recordings.

3.5 ADJUSTING

A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

3.6 CLEANING AND PROTECTION

A. Protect all hardware stored on construction site in a covered and dry place. Protect exposed hardware installed on doors during the construction phase. Install any and all hardware at the latest possible time frame.

B. Clean adjacent surfaces soiled by door hardware installation.

C. Clean operating items as necessary to restore proper finish. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of owner occupancy.

3.7 DEMONSTRATION

A. Instruct Owner's maintenance personnel to adjust, operate, and maintain mechanical and electromechanical door hardware.

3.8 DOOR HARDWARE SETS

A. See Division 08 Section “Door Hardware Schedule”.

END OF SECTION

SECTION 08 80 00

GLAZING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Glass products.
   2. Insulating glass.
   3. Glazing sealants.
   4. Glazing tapes.
   5. Miscellaneous glazing materials.

1.2 DEFINITIONS

A. Glass Manufacturers: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.

B. Glass Thicknesses: Indicated by thickness designations in millimeters in accordance with ASTM C1036.

C. IBC: International Building Code.

D. Interspace: Space between lites of an insulating-glass unit.

1.3 COORDINATION

A. Coordinate glazing channel dimensions to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances to achieve proper safety margins for glazing retention under each design load case, load case combination, and service condition.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.
   1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
   2. Review temporary protection requirements for glazing during and after installation.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Glass Samples: For each type of glass product other than clear monolithic vision glass; 12 inches square.

C. Glazing Accessory Samples: For sealants and colored spacers, in 12-inch lengths. Install sealant Samples between two strips of material representative in color of adjoining framing system.

D. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.

E. Delegated Design Submittal: For glass indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by qualified professional engineer responsible for their preparation.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer, manufacturers of fabricated glass units, glass testing agency and sealant testing agency.

B. Product Certificates: For glass.

C. Product Test Reports: For fabricated glass and glazing sealants, for tests performed by a qualified testing agency.
   1. For glazing sealants, provide test reports based on testing current sealant formulations within previous 36-month period.

D. Preconstruction adhesion and compatibility test report.

E. Sample Warranties: For special warranties.

1.7 QUALITY ASSURANCE

A. Fabricated-Glass Manufacturer Qualifications: A qualified manufacturer of fabricated glass units who is approved and certified by primary glass manufacturer.

B. Installer Qualifications: A qualified glazing contractor for this Project who is certified under the North American Contractor Certification Program (NACC) for Architectural Glass & Metal (AG&M) contractors.

C. Glass Testing Agency Qualifications: A qualified independent testing agency accredited according to the NFRC CAP 1 Certification Agency Program.

D. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C1021 to conduct the testing indicated.

E. Mockups: Build mockups to demonstrate aesthetic effects and to set quality standards for materials and execution.
   1. Install glazing in mockups specified in Section 08 43 13 "Aluminum-Framed Entrances and Storefronts" to match glazing systems required for Project, including glazing methods.
   2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 PRECONSTRUCTION TESTING

A. Preconstruction Adhesion and Compatibility Testing: Test each glass product, tape sealant, gasket, glazing accessory, and glass-framing member for adhesion to and compatibility with elastomeric glazing sealants.
   1. Testing is not required if data are submitted based on previous testing of current sealant products and glazing materials matching those submitted.
   2. Use ASTM C1087 to determine whether priming and other specific joint-preparation techniques are required to obtain rapid, optimum adhesion of glazing sealants to glass, tape sealants, gaskets, and glazing channel substrates.
   3. Test no fewer than eight Samples of each type of material, including joint substrates, shims, sealant backings, secondary seals, and miscellaneous materials.
   4. Schedule enough time for testing and analyzing results to prevent delaying the Work.
   5. For materials failing tests, submit sealant manufacturer's written instructions for corrective measures including use of specially formulated primers.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Protect glazing materials in accordance with manufacturer's written instructions. Prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

B. Comply with insulating-glass manufacturer's written instructions for venting and sealing units to avoid hermetic seal ruptures due to altitude change.

1.10 FIELD CONDITIONS

A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.
   1. Do not install glazing sealants when ambient and substrate temperature conditions are outside limits permitted by sealant manufacturer or are below 40 deg F.

1.11 WARRANTY

A. Manufacturer's Special Warranty for Coated-Glass Products: Manufacturer agrees to replace coated-glass units that deteriorate within specified warranty period. Deterioration of coated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in coating.
   1. Warranty Period: 10 years from date of Substantial Completion.

B. Manufacturer's Special Warranty for Laminated Glass: Manufacturer agrees to replace laminated-glass units that deteriorate within specified warranty period. Deterioration of laminated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects

include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.
1. Warranty Period: 10 years from date of Substantial Completion.

C. Manufacturer's Special Warranty for Insulating Glass: Manufacturer agrees to replace insulating-glass units that deteriorate within specified warranty period. Deterioration of insulating glass is defined as failure of hermetic seal under normal use that is not attributed to glass breakage or to maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is obstruction of vision by dust, moisture, or film on interior surfaces of glass.
1. Warranty Period: 10 years from date of Substantial Completion.

D. Manufacturer's Special Warranty for Heat-Soaked Tempered Glass: Manufacturer agrees to replace heat-soaked tempered glass units that spontaneously break due to nickel sulfide (NiS) inclusions at a rate exceeding 0.3 percent (3/1000) within specified warranty period. Coverage for any other cause is excluded.
1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations for Glass: Obtain tinted and coated glass from single source from single manufacturer.

B. Source Limitations for Glazing Accessories: For each product and installation method, obtain from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. General: Installed glazing systems shall withstand normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.

B. Delegated Design: Engage a qualified professional engineer to design glazing.

C. Structural Performance: Glazing shall withstand the following design loads within limits and under conditions indicated determined in accordance with the IBC and ASTM E1300:
1. Design Wind Pressures: Determine design wind pressures applicable to Project in accordance with ASCE/SEI 7, based on heights above grade indicated on Drawings.
    a. Wind Design Data: As indicated on Drawings.
    b. Basic Wind Speed: 110 mph.
    c. Importance Factor: 1.0.
    d. Exposure Category: B.
2. Design Snow Loads: As indicated on Drawings.
3. Probability of Breakage for Sloped Glazing: For glass sloped more than 15 degrees from vertical, design glass for a probability of breakage not greater than 0.001.

4. Maximum Lateral Deflection: For glass supported on all four edges, limit center-of-glass deflection at design wind pressure to not more than 1/50 times the short-side length or 1 inch, whichever is less.
5. Thermal Loads: Design glazing to resist thermal stress breakage induced by differential temperature conditions and limited air circulation within individual glass lites and insulated glazing units.

D. Windborne-Debris-Impact Resistance: Exterior glazing shall pass ASTM E1886 missile-impact and cyclic-pressure tests in accordance with ASTM E1996 for Wind Zone 1 for basic protection.
1. Large-Missile Test: For glazing located within 30 feet of grade.
2. Small-Missile Test: For glazing located between 30 feet and 60 feet above grade.

E. Safety Glazing: Where safety glazing is indicated, provide glazing that complies with 16 CFR 1201, Category II.

F. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:
1. For monolithic-glass lites, properties are based on units with lites of thickness indicated.
2. For laminated-glass lites, properties are based on products of construction indicated.
3. For insulating-glass units, properties are based on units of thickness indicated for overall unit and for each lite.
4. U-Factors: Center-of-glazing values, in accordance with NFRC 100 and based on most current non-beta version of LBL's WINDOW computer program, expressed as Btu/sq. ft. x h x deg F.
5. SHGC and Visible Transmittance: Center-of-glazing values, in accordance with NFRC 200 and based on most current non-beta version of LBL's WINDOW computer program.
6. Visible Reflectance: Center-of-glazing values, in accordance with NFRC 300.

G. Acoustic Performance:
1. Exterior Glazing: 35 OITC.

2.3 GLASS PRODUCTS, GENERAL

A. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below unless more stringent requirements are indicated. See these publications for glazing terms not otherwise defined in this Section or in referenced standards.
1. NGA Publications: "Laminated Glazing Reference Manual" and "Glazing Manual."
2. AAMA Publications: AAMA GDSG-1, "Glass Design for Sloped Glazing," and AAMA TIR A7, "Sloped Glazing Guidelines."
3. IGMA Publication for Sloped Glazing: IGMA TB-3001, "Guidelines for Sloped Glazing."
4. IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."

B. Safety Glazing Labeling: Where safety glazing is indicated, permanently mark glazing with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction or manufacturer. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.

C. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of the IGCC.

D. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass that complies with performance requirements and is not less than thickness indicated.
   1. Minimum Glass Thickness for Exterior Lites: 1 inch.
   2. Thickness of Tinted Glass: Provide same thickness for each tint color indicated throughout Project.

E. Strength: Where annealed float glass is indicated, provide annealed float glass, heat-strengthened float glass, or fully tempered float glass as needed to comply with "Performance Requirements" Article. Where heat-strengthened float glass is indicated, provide heat-strengthened float glass or fully tempered float glass as needed to comply with "Performance Requirements" Article. Where fully tempered float glass is indicated, provide fully tempered float glass.

2.4 GLASS PRODUCTS

A. Clear Annealed Float Glass: ASTM C1036, Type I, Class 1 (clear), Quality-Q3.

B. Fully Tempered Float Glass: ASTM C1048, Kind FT (fully tempered), Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3.
   1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.

C. Heat-Strengthened Float Glass: ASTM C1048, Kind HS (heat strengthened), Type I, Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3.
   1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.

D. Reflective- and Low-E-Coated Vision Glass: ASTM C1376.

2.5 INSULATING GLASS

A. Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified in accordance with ASTM E2190.
   1. Sealing System: Dual seal, with manufacturer's standard primary and secondary sealants.
   2. Perimeter Spacer: Manufacturer's standard spacer material and construction
   3. Desiccant: Molecular sieve or silica gel, or a blend of both.

2.6 GLAZING SEALANTS

A. General:
   1. Compatibility: Compatible with one another and with other materials they contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.

2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
3. Colors of Exposed Glazing Sealants:As selected by Architect from manufacturer's full range of industry colors.

B. Neutral-Curing Silicone Glazing Sealant, Class 25: Complying with ASTM C920, Type S, Grade NS, Use NT.

2.7 GLAZING TAPES

A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C1281 and AAMA 800 for products indicated below:
1. AAMA 804.3 tape, where indicated.
2. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
3. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.

B. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; and complying with AAMA 800 for the following types:
1. AAMA 810.1, Type 1, for glazing applications in which tape acts as primary sealant.
2. AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

2.8 MISCELLANEOUS GLAZING MATERIALS

A. General: Provide products of material, size, and shape complying with referenced glazing standard, recommended in writing by manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.

B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.

C. Setting Blocks:
1. Silicone with Shore A durometer hardness of 85, plus or minus 5.
2. Type recommended in writing by sealant or glass manufacturer.

D. Spacers:
1. Neoprene blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
2. Type recommended in writing by sealant or glass manufacturer.

E. Edge Blocks:
1. Silicone with Shore A durometer hardness per manufacturer's written instructions.
2. Type recommended in writing by sealant or glass manufacturer.

F. Cylindrical Glazing Sealant Backing: ASTM C1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

2.9 FABRICATION OF GLAZING UNITS

A. Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.
   1. Allow for thermal movements from ambient and surface temperature changes acting on glass framing members and glazing components.
      a. Temperature Change: 120 deg F , ambient; 180 deg F , material surfaces.

B. Clean-cut or flat-grind vertical edges of butt-glazed monolithic lites to produce square edges with slight chamfers at junctions of edges and faces.

C. Grind smooth and polish exposed glass edges and corners.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine framing, glazing channels, and stops, with Installer present, for compliance with the following:
   1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
   2. Presence and functioning of weep systems.
   3. Minimum required face and edge clearances.
   4. Effective sealing between joints of glass-framing members.

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

3.2 PREPARATION

A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.

B. Examine glazing units to locate exterior and interior surfaces. Label or mark units as needed so that exterior and interior surfaces are readily identifiable. Do not use materials that leave visible marks in the completed Work.

3.3 GLAZING, GENERAL

A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.

B. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass includes glass with edge damage or other imperfections that, when installed, could weaken glass, impair performance, or impair appearance.

C. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.

D. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.

E. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.

F. Provide spacers for glass lites where length plus width is larger than 50 inches.
   1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
   2. Provide 1/8-inch- minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.

G. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and in accordance with requirements in referenced glazing publications.

H. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.

I. Set glass lites with proper orientation so that coatings face exterior or interior as specified.

J. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.

K. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended in writing by gasket manufacturer.

3.4 TAPE GLAZING

A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.

B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.

C. Cover vertical framing joints by applying tapes to heads and sills first, then to jambs. Cover horizontal framing joints by applying tapes to jambs, then to heads and sills.

D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.

E. Do not remove release paper from tape until right before each glazing unit is installed.

F. Apply heel bead of elastomeric sealant.

G. Center glass lites in openings on setting blocks, and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.

H. Apply cap bead of elastomeric sealant over exposed edge of tape.

3.5 GASKET GLAZING (DRY)

A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.

B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.

C. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended in writing by gasket manufacturer.

D. Installation with Pressure-Glazing Stops: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket. Install dense compression gaskets and pressure-glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended in writing by gasket manufacturer.

E. Install gaskets so they protrude past face of glazing stops.

3.6 SEALANT GLAZING (WET)

A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.

B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.

C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

3.7 CLEANING AND PROTECTION

A. Immediately after installation, remove nonpermanent labels and clean surfaces.

B. Protect glass from contact with contaminating substances resulting from construction operations. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains.

1. If, despite such protection, contaminating substances do contact with glass, remove substances immediately as recommended in writing by glass manufacturer. Remove and replace glass that cannot be cleaned without damage to coatings.

C. Remove and replace glass that is damaged during construction period.

D. Wash glass on both exposed surfaces not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

3.8 INSULATING GLASS SCHEDULE

A. Reflective-Coated Low-E Insulating Glass Type:
1. Basis-of-Design Product: Guardian SunGuard Advanced Architectural Glass, or approved equal.
2. Kind CV (coated vision glass), except that Kind CO (coated overhead glass) may be used where lower edge of glass is more than 6 feet above the adjacent floor level or cannot be approached closer than 10 feet.
3. Coating Type: Pyrolytic.
4. Coating Color: As selected by Architect.
5. Overall Unit Thickness: 1 inch
6. Minimum Thickness of Each Glass Lite: 6 mm.
7. Outdoor Lite: Tinted fully tempered float glass.
8. Tint Color: As selected by Architect.
9. Interspace Content: Air.
10. Coating Location: Third surface.
11. Low-Maintenance Coating: Pyrolytic coating on first surface.
12. Safety glazing required.

END OF SECTION

SECTION 09 21 16

GYPSUM BOARD ASSEMBLIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Gypsum wallboard.

B. Joint treatment and accessories.

1.02 RELATED REQUIREMENTS

A. Section 07 92 00 - Joint Sealants: Sealing acoustical gaps in construction other than gypsum board or plaster work.

1.03 REFERENCE STANDARDS

A. ASTM C475/C475M - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board; 2017 (Reapproved 2022).

B. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board; 2025.

C. ASTM C954 - Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness; 2022.

D. ASTM C1002 - Standard Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs; 2022.

E. ASTM C1047 - Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base; 2019.

F. ASTM C1396/C1396M - Standard Specification for Gypsum Board; 2024.

G. GA-216 - Application and Finishing of Gypsum Panel Products; 2024.

1.04 SUBMITTALS

A. See Division 01 – General Requirements for submittal procedures.

B. Product Data:
   1. Provide data on gypsum board, accessories, and joint finishing system.

C. Samples: Submit two samples of predecorated gypsum board, 12 by 12 inches in size, indicating finish color and texture.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

A. See Division 01 – General Requirements for packaging waste requirements.

B. Store gypsum products and accessories indoors and keep above freezing. Elevate boards above floor, on nonwicking supports, in accordance with manufacturer's recommendations.

C. Store metal products to prevent corrosion.

PART 2 PRODUCTS

2.01 BOARD MATERIALS

A. Manufacturers - Gypsum-Based Board:
1. American Gypsum Company: www.americangypsum.com/#sle.
2. CertainTeed Corporation: www.certainteed.com/#sle.
3. Gold Bond Building Products, LLC provided by National Gypsum Company: www.goldbondbuilding.com/#sle.
4. USG Corporation: www.usg.com/#sle.

B. Ceiling Board: Special sag resistant gypsum ceiling board as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
1. Application: Ceilings, unless otherwise indicated.
2. Thickness: 1/2 inch.
3. Edges: Tapered.

2.02 GYPSUM BOARD ACCESSORIES

A. Finishing Accessories: ASTM C1047, extruded aluminum alloy (6063 T5) or galvanized steel sheet ASTM A924/A924M G90, unless noted otherwise.
1. Types: As detailed or required for finished appearance.
2. Special Shapes: In addition to conventional corner bead and control joints, provide U-bead at exposed panel edges.
3. Products:
a. Phillips Manufacturing Co: www.phillipsmfg.com/#sle.
b. Stockton Products; Extruded Aluminum: www.stocktonproducts.com/#sle.
c. Trim-tex, Inc: www.trim-tex.com/#sle.

B. Decorative Metal Trim:
   1. Material: Extruded aluminum alloy 6063-T5 temper.
   2. Finish: Anodized, color as selected by architect..
   3. Type: Profile as selected from manufacturer's standard range.

C. Joint Materials: ASTM C475/C475M and as recommended by gypsum board manufacturer for project conditions.

D. Finishing Compound: Surface coat and primer, takes the place of skim coating.

E. Screws for Fastening of Gypsum Panel Products to Cold-Formed Steel Studs Less than 0.033 inches in Thickness and Wood Members: ASTM C1002; self-piercing tapping screws, corrosion-resistant.

F. Screws for Fastening of Gypsum Panel Products to Steel Members from 0.033 to 0.112 inch in Thickness: ASTM C954; steel drill screws, corrosion-resistant.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that project conditions are appropriate for work of this section to commence.

3.02 BOARD INSTALLATION

A. Comply with ASTM C840, GA-216, and manufacturer's instructions. Install to minimize butt end joints, especially in highly visible locations.

B. Single-Layer Nonrated: Install gypsum board in most economical direction, with ends and edges occurring over firm bearing.

3.03 INSTALLATION OF TRIM AND ACCESSORIES

A. Control Joints: Place control joints consistent with lines of building spaces and as directed.

B. Corner Beads: Install at external corners, using longest practical lengths.

C. Edge Trim: Install at locations where gypsum board abuts dissimilar materials.

D. Decorative Trim: Install at locations shown on drawings and in accordance with manufacturer's instructions.

3.04 JOINT TREATMENT

A. Glass Mat Faced Gypsum Board and Exterior Glass Mat Faced Sheathing: Use fiberglass joint tape, embed and finish with setting type joint compound.

B. Paper Faced Gypsum Board: Use paper joint tape, embed with drying type joint compound and finish with drying type joint compound.

C. Finish gypsum board in accordance with levels defined in ASTM C840, as follows:
   1. Level 5: Walls and ceilings to receive semi-gloss or gloss paint finish and other areas specifically indicated.
   2. Level 4: Walls and ceilings to receive paint finish or wall coverings, unless otherwise indicated.
   3. Level 3: Walls to receive textured wall finish.
   4. Level 2: In utility areas, behind cabinetry, and on backing board to receive tile finish.
   5. Level 1: Fire-resistance-rated wall areas above finished ceilings, whether or not accessible in the completed construction.

D. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.
   1. Feather coats of joint compound so that camber is maximum 1/32 inch.

E. Spray apply high build drywall surfacer over entire surface after joints have been properly treated; achieve a flat and tool mark-free finish.

3.05 TOLERANCES

A. Maximum Variation of Finished Gypsum Board Surface from True Flatness: 1/8 inch in 10 feet in any direction.

3.06 PROTECTION

A. Protect installed gypsum board assemblies from subsequent construction operations.

END OF SECTION

SECTION 09 91 00

PAINTING

PART 1 - GENERAL

1.01 DESCRIPTION

A. Under this Section, the Contractor shall furnish all labor, materials and equipment for Painting as shown on the Plans, as specified and/or directed.

1.02 REFERENCES

A. The publications listed below and their latest revisions form a part of this Specification to the extent referenced. The publications are referred to in the text by the basic designation only.
   1. Code of Federal Regulations (CFR) Publications:
      a. 29 1910.1000 - Occupational Safety and Health Standards
      b. 29 1910.1025 - Occupational Safety and Health Standards (Lead)
   2. Federal Standard (FED-STD):
      a. 313 - Material Safety Data Sheets Preparation and Submission of
   3. Steel Structures Painting Council (SSPC) Publications:
      a. Paint-1 - Shop, Field, and Maintenance Painting
      b. Paint-3 - A Guide to Safety in Paint Application
      c. Paint-20 - Zinc-Rich Primers (Type I, Inorganic, and Type II Organic)
      d. SP 1 - Solvent Cleaning
      e. SP 2 - Hand Tool Cleaning
      f. SP 3 - Power Tool Cleaning
      g. SP 6 - Commercial Blast Cleaning
      h. SP 7 - Brush-Off Blast Cleaning
      i. SP 10 - Near-White Blast Cleaning
      j. VIS1 - Pictorial Surface Preparation Standards for Painting Steel Surfaces

1.03 SUBMITTALS

A. Submit the following.
   1. Manufacturer's Instructions:
      a. Paint application instructions
      b. Manufacturer's material safety data sheets
         1) Submit Manufacturer's material safety data sheets for coatings, solvents, and other potentially hazardous materials, as defined in FED-STD-313.

1.04 REGULATORY REQUIREMENTS

A. Lead Content: Do not use coatings having a lead content over 0.06 percent by weight of nonvolatile content.

B. Chromate Content: Do not use coatings containing zinc-chromate or strontium-chromate.

C. Asbestos Content: Materials shall not contain asbestos.

1.05 DELIVERY AND STORAGE

A. Deliver materials in sealed, labeled containers bearing the manufacturer's name, brand designation, specification number, batch number, color, and date of manufacture. Restrict storage and mixing of materials to locations designated by the Engineer.

1.06 SAFETY METHODS

A. Apply coating materials using safety methods and equipment in accordance with the following:

B. Safety Methods Used During Coating Application: Comply with the requirements of SSPC Paint-3.

C. Toxic Materials: To protect personnel from overexposure to toxic materials, conform to the most stringent guidance of:
   1. The chemical manufacturer when using mineral spirits, or other chemicals. Use impermeable gloves, chemical goggles or face shield, and other recommended protective clothing and equipment to avoid exposure of skin, eyes, and respiratory system. Conduct work in a manner to minimize exposure of building occupants and the general public.
   2. The appropriate OSHA standard in 29 CFR 1910.1025 for surface preparation on painted surfaces containing lead, zinc-chromate, strontium-chromate, asbestos, or other toxic ingredients.
   3. 29 CFR 1910.1000.
   4. Threshold Limit Values (R) of the American Conference of Governmental Industrial Hygienists.
   5. Manufacturer's Material Safety Data Sheets (MSDS).

1.07 ENVIRONMENTAL CONDITIONS

A. Exterior Coatings: Do not apply coating to surfaces during foggy or rainy weather, or under the following surface temperature conditions:
   1. Less than 5 degrees F above the dew point;
   2. Below 40 degrees F (for oil-based paints), 50 degrees F (for latex paints), or over 95 degrees F, unless approved by the Engineer.

B. Interior Coatings: Apply coatings when surfaces to be painted are dry and the following surface temperatures can be maintained:
   1. Between 65 and 95 degrees F during the application of enamels and varnishes;
   2. Between 50 and 95 degrees F during the application of other coatings.

1.08 COLOR SELECTION

A. Colors of finish coats shall be as indicated or specified. Where not indicated or specified, colors shall be selected by the Engineer.

1.09 LOCATION AND SURFACE TYPE TO BE PAINTED

A. Painting Included: Where a space or surface is indicated to be painted, include the following unless indicated otherwise.
   1. Surfaces behind portable objects and surface mounted articles readily detachable by removal of fasteners, such as screws and bolts.
   2. New factory finished surfaces that require identification or color coding and factory finished surfaces that are damaged during performance of the work.
   3. Existing coated surfaces that are damaged during performance of the work.

B. Painting Excluded: Do not paint the following unless indicated otherwise.
   1. Surfaces concealed and made inaccessible by panelboards, fixed ductwork, machinery, and equipment fixed in place.
   2. Surfaces in concealed spaces. Concealed spaces are defined as spaces above suspended ceilings, furred spaces, attic spaces, crawl spaces, and chases.
   3. Steel to be embedded in concrete.
   4. Copper, stainless steel, aluminum, brass, and lead except existing coated surfaces.

C. Exterior Painting: Includes new surfaces, existing coated surfaces,and existing uncoated surfaces, of the buildings site work items and appurtenances. Also included are existing coated surfaces made bare by cleaning operations.

D. Interior Painting: Includes new surfaces, existing uncoated surfaces, and existing coated surfaces of the buildings and appurtenances as indicated and existing coated surfaces made bare by cleaning operations. Where a space or surface is indicated to be painted, include the following items, unless indicated otherwise.
   1. Exposed columns, girders, beams, joists, and metal deck; and
   2. Other contiguous surfaces.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS OF PAINT MATERIALS:

A. Products shall comply with MPI standards indicated and shall be listed in the "MPI Approved Product List."

2.02 MATERIALS

A. Provide as far as practical, pretreatments, primers and top coats from one coating manufacturer. Coatings shall be applied as a complete system and must be compatible with the substrate and each coating component. Coating systems shall be the manufacturer's industrial or commercial systems and are specified by generic type only. Residential coating systems shall not be permitted.

B. See painting schedule at the end of this Section.

C. Provide brands and qualities of materials for use on work exactly as specified, or an approved equal.

D. Coordination: Provide finish coats which are compatible with prime paints used. Provide barrier coats over incompatible primers where required. Submit written notification of anticipated problems using specified coatings with substrates primed by others.

E. Paint Colors:
   1. Provide colors as indicated or selected by Owner.
   2. Paint area of each color for observation, review and revisions before batch mixing of colors, or shipping large quantities of that color to job. Allow revisions to approved colors and textures after review of initial area of each color.
      a. Vary top coats in shade from preceding coat without affecting finish color.

F. Mixing and Tinting:
   1. Job mix or job tint only if approved. Mix only in pails in suitably sized non-ferrous or oxide-resistant metal pans.
   2. Strain to remove lumps and specks.
   3. Use tinting colors recommended by manufacturer for the specific type of finish.
   4. Add non-mercuric fungicidal agent to exterior finishes by manufacturer.

PART 3 - EXECUTION

3.01 PROTECTION OR AREAS AND SPACES

A. Prior to surface preparation and coating applications, remove, mask, or otherwise protect, hardware, hardware accessories, machined surfaces, radiator covers, plates, lighting fixtures, public and private property, and other such items not to be coated that are in contact with surfaces to be coated. Following completion of painting, workmen skilled in the trades involved shall reinstall removed items. Restore surfaces contaminated by coating materials, to original condition and repair damaged items.

3.02 SURFACE PREPARATION

A. Remove dirt, splinters, loose particles, grease, oil, disintegrated coatings, and other substances deleterious to coating performance as specified for each substrate.

B. Existing Coating Surfaces With No Defects: Before application of coatings, perform the following on surfaces covered by soundly-adhered coatings, defined as those which cannot be removed with a putty knife:
   1. Wipe previously painted surfaces to receive solvent-based coatings, except stucco and similarly rough surfaces clean with a clean, dry cloth saturated with mineral spirits, FS TT-T-291. Allow surface to dry. Wiping shall immediately precede the application of the first coat of any coating, unless specified otherwise.
   2. Sand existing enamel and other glossy surfaces to remove gloss. Brush and wipe clean with a dry cloth.
   3. The requirements specified are minimum. Comply also with the instructions and recommendations of the paint manufacturer for preparation and application.

C. Existing Coated Surfaces with Minor Defects: Sand, spackle, and treat minor defects to render them smooth. Minor defects are defined as scratches, nicks, cracks, gouges, spalls, alligatoring, chalking, and irregularities due to partial peeling of previous coatings.

D. Removal of Existing Coatings: Remove existing coatings from the following surfaces:
   1. Surfaces containing large areas of minor defects;
   2. Surfaces containing more than 20 percent peeling area; and
   3. Surfaces designated by the Engineer, such as surfaces where rust shows through existing coatings.

E. Substrate Repair:
1. Repair substrate surface damaged during coating removal;
2. Sand edges of adjacent soundly-adhered existing coatings so they are tapered as smooth as practical to areas involved with coating removal; and
3. Clean and prime the substrate as specified.

3.03 PREPARATION OF METAL SURFACES

A. Existing and New Ferrous Surfaces:
1. Shop-coated Surfaces and Small Areas That Contain Rust, Mill Scale and Other Foreign Substances: Solvent clean in accordance with SSPC SP 1 to remove oil and grease. Where shop coat is missing or damaged, clean according to SSPC SP 2 or SSPC SP 3.
2. Surfaces With More Than 20 Percent Rust, Mill Scale, and Other Foreign Substances: Clean entire surface in accordance with SSPC SP 6.
3. Galvanized steel shall be prepared for painting in accordance with ASTM D6386.

B. Final Ferrous Surface Condition: Cleaned surface shall be similar to photographs in SSPC VIS1 as follows:

DEGREE OF CLEANING	ADHERENT MILL SCALE	RUSTING MILL SCALE	RUSTED	PITTED AND RUSTED
Hand Tool Cleaning SSPC SP 2	(1)	B St 2	C St 2	D St 2
Power Tool Cleaning SSPC SP 3	(1)	B St 3	C St 3	D St 3
Commercial Blast Cleaning SSPC SP 6	(1)	(1)	C Sa 2	D Sa 2
Brush-Off Blast Cleaning SSPC SP 7	(1)	B Sa 1	C Sa 1	D Sa 1
Near White Blast Cleaning SSPC SP 10	A Sa 2-1/2	B Sa 2-1/2	C Sa 2-1/2	D Sa 2-1/2]
Note: (1) No photograph is available or recommended for comparison.				

3.04 PREPARATION OF CONCRETE AND CEMENTITIOUS SURFACE

A. Concrete and Masonry:
1. Surface Cleaning: Remove the following deleterious substances.
a. Dirt, Chalking, Grease, and Oil: Wash new and existing uncoated surfaces with a solution composed of 3 ounces (2/3 cup) trisodium phosphate, 1 ounce (1/3 cup) household detergent, and 3 quarts of warm water. Then rinse thoroughly with fresh water. Wash

existing coated surfaces with a suitable detergent and rinse thoroughly. For large areas, water blasting may be used.

b. Fungus and Mold: Wash , existing coated, and existing uncoated surfaces with a solution composed of 3 ounces (2/3 cup) trisodium phosphate, 1 ounce (1/3 cup) household detergent, 1 quart 5 percent sodium hypochlorite solution and 3 quarts of warm water. Rinse thoroughly with fresh water.

c. Glaze and Loose Particles: Remove by wire brushing.

d. Efflorescence: Remove by scraping or wire brushing followed by washing with a 5- to 10-percent by weight aqueous solution of hydrochloric (muriatic) acid. Do not allow acid to remain on the surface for more than five minutes before rinsing with fresh water. Do not acid clean more than 4 square feet of surface, per workman, at one time.

e. Removal of Existing Coatings: For surfaces to receive textured coating FS TT-C-555, remove existing coatings including soundly adhered coatings if recommended by textured coating manufacturer.

1) Cosmetic Repair of Minor Defects: Repair or fill mortar joints and minor defects, including but not limited to spalls, in accordance with manufacturer's recommendations and prior to coating application.

B. Gypsum Board:

1. Surface Cleaning: Gypsum board shall be dry. Remove loose dirt and dust by brushing with a soft brush or rubbing with a dry cloth prior to application of the first coat material.

2. Repair of Minor Defects: Prior to painting, repair joints, cracks, holes, surface irregularities, and other minor defects with spackling compound and sand smooth.

3.05 APPLICATION

A. Coating Application: Apply coating materials in accordance with SSPC Paint-1. SSPC Paint-1 methods are applicable to all substrates, except as modified herein. Thoroughly work coating materials into joints, crevices, and open spaces. Touch up damaged coatings before applying subsequent coats. Interior areas shall be broom clean and dust free before and during the application of coating material.

1. Drying Time: Allow time between coats, as recommended by the coating manufacturer, to permit thorough drying. Provide each coat in specified condition to receive the next coat.

2. Primers, and Intermediate Coats: Do not allow primers or intermediate coats to dry more than 30 days, or longer than recommended by the manufacturer, before applying subsequent coats. Follow manufacturer's recommendations for surface preparation if primers or intermediate coats

are allowed to dry longer than recommended by manufacturers of subsequent coatings. Each coat shall cover the surface of the preceding coat or surface completely, and there shall be a visually perceptible difference in shades of successive coats.

3. Finished Surfaces: Provide finished surfaces free from runs, drops, ridges, waves, laps, brush marks, and variations in colors.

B. Equipment: Apply coatings with approved brushes, approved rollers, or approved spray equipment, unless specified otherwise. Spray areas made inaccessible to brushing by items such as ducts and other equipment.

C. Thinning of Paints: Reduce paints to proper consistency by adding fresh paint, except when thinning is mandatory for the type of paint being used. Obtain written permission from the Engineer to use thinners. The written permission shall include quantities and types of thinners to use.

D. Coating Systems:

1. Systems by Substrates: Apply coatings that conform to the respective specifications listed in the following Tables:

Table	
I	Exterior Metal Surfaces
II	Interior Metal Surfaces
III	Exterior Concrete Surfaces
IV	Interior Concrete Surfaces
V	Exterior Masonry Surfaces
VI	Interior Masonry Surfaces
VII	Interior Gypsum Wallboard Surfaces
VIII	Exterior and Interior Wood Surfaces

2. Minimum Dry Film Thickness (DFT): Apply paints, primers, varnishes, enamels, undercoats, and other coatings to a minimum dry film thickness of 1.5 mil each coat unless specified otherwise in the Tables. Coating thickness where specified, refers to the minimum dry film thickness.
3. Coatings for Surfaces Not Specified Otherwise: Coat surfaces which have not been specified, the same as surfaces having similar conditions of exposure.
4. Existing Surfaces Damaged During Performance of the Work, Including New Patches In Existing Surfaces: Coat surfaces with the following:
   a. One coat of primer.
   b. One coat of undercoat or intermediate coat.
   c. One top coat to match adjacent surfaces.
5. Existing Coated Surfaces To Be Painted: Apply coatings conforming to the respective specifications listed in the Tables herein, except that pretreatments, sealers, fillers, and primers need not be provided on

surfaces where existing coatings are soundly adhered and in good condition.

3.06 COATING SYSTEMS FOR METAL

A. Primer: Apply specified ferrous metal primer on the same day that surface is cleaned. If flash rusting occurs, re-clean the surface prior to application of primer.
   1. Inaccessible Surfaces: Prior to erection, use two coats of the specified primer on metal surfaces that will be inaccessible after erection.
   2. Shop-primed Surfaces: Touch up exposed substrates and damaged coatings to protect from rusting prior to applying field primer.
   3. Pipes and Tubing: The semitransparent film applied to pipes and tubing at the mill is not to be considered a shop coat. Apply specified ferrous metal primer prior to application of subsequent coats.
   4. Exposed Nails, Screws, Fasteners, and Miscellaneous Ferrous Surfaces: On surfaces to be coated with water thinned coatings, spot prime exposed nails and other ferrous metal with latex primer.
      a. Apply coatings of Tables I and II. "DFT" means dry film thickness in mils.

3.07 INSPECTION AND ACCEPTANCE

A. In addition to meeting the previously specified requirements, demonstrate the mobility of moving components, including but not limited to swinging and sliding doors, cabinets, and windows with operable sash, for inspection by the Engineer. Perform this demonstration after appropriate curing and drying times of the coatings have elapsed and prior to invoicing for final payment.

TABLE I
EXTERIOR METAL SURFACES

CONDITION	PREPARATION	FIRST COAT	DFT	SECOND COAT	DFT	THIRD COAT	DFT
Severe	SSPC SP 6	Epoxy-Polyamide	4.0	Aliphatic Polyester Polyurethane	1.5	-	-
Mild	SSPC SP 6	Alkyd-Phenolic Primer	2.0	Alkyd	1.5	Alkyd	1.5

TABLE II
INTERIOR METAL SURFACES

CONDITION	PREPARATION	FIRST COAT	DFT	SECOND COAT	DFT	THIRD COAT	DFT
Severe	SSPC SP 6	Epoxy-Polyamide Primer	3.0	Epoxy-Polyamide	4.0	-	-
Mild	SSPC SP 6	Alkyd-Phenolic Primer	2.0	Alkyd	1.5	Alkyd	1.5
Immersion	SSPC SP 10	Coal-Tar Epoxy	14.0	-	-	-	-

TABLE III
EXTERIOR CONCRETE SURFACES

CONDITION	PREPARATION	FIRST COAT	DFT	SECOND COAT	DFT	THIRD COAT	DFT
Severe	Clean and Dry	Modified Epoxy	8.0	-	-	-	-
Mild	Clean and Dry	Emulsified Acrylic	2.0	Emulsified Acrylic	2.0	-	-

TABLE IV
INTERIOR CONCRETE SURFACES

CONDITION	PREPARATION	FIRST COAT	DFT	SECOND COAT	DFT	THIRD COAT	DFT
Severe	Brush Blast	Epoxy-Polyamide Water-Borne	4.0	Epoxy-Polyamide Water-Borne	4.0	-	-
Moderate	Brush Blast	Acrylic-Epoxy	2.0	Acrylic-Epoxy	2.0	--	-
Mild	Clean and Dry	Emulsified Acrylic	2.0	Emulsified Acrylic	2.0	-	
Concrete Floors	Acid Etch or Brush Blast	Epoxy-Polyamide (skid resistant)	2.0	Epoxy-Polyamide	2.0	-	-

TABLE V
EXTERIOR MASONRY SURFACES

CONDITION	PREPARATION	FIRST COAT	DFT	SECOND COAT	DFT	THIRD COAT	DFT
All	Clean and Dry	Modified Epoxy	60 sf/gal	Modified Epoxy	8.0	-	-

TABLE VI
INTERIOR MASONRY SURFACES

CONDITION	PREPARATION	FIRST COAT	DFT	SECOND COAT	DFT	THIRD COAT	DFT
Severe	Clean and Dry	Epoxy-Polyamide Filler	75 sf/gal	Epoxy-Polyamide	4.0	Epoxy-Polyamide	4.0
Mild	Clean and Dry	Modified Epoxy Filler	60 sf/gal	Emulsified Acrylic	2.0	Emulsified Acrylic	2.0

TABLE VII
INTERIOR GYPSUM WALL BOARD SURFACES

CONDITION	PREPARATION	FIRST COAT	DFT	SECOND COAT	DFT	THIRD COAT	DFT
Severe	Clean and Dry	Vinyl-Acrylic Latex Sealer	1.0	Epoxy-Polyamide	4.0	Epoxy-Polyamide	4.0
Moderate	Clean and Dry	Vinyl-Acrylic Latex Sealer	1.0	Water-Borne Acrylic-Epoxy	2.0	Water-Borne Acrylic-Epoxy	2.0
Mild	Clean and Dry	Emulsified-Acrylic	2.0	Emulsified-Acrylic	2.0	-	-

TABLE VIII EXTERIOR AND INTERIOR WOOD SURFACES							
CONDITION	PREPARATION	FIRST COAT	DFT	SECOND COAT	DFT	THIRD COAT	DFT
All	Clean and Dry	Alkyd Primer	2.0	Alkyd	1.5	Alkyd	1.5

END OF SECTION

SECTION 23 05 00

MECHANICAL GENERAL REQUIREMENTS

PART 1 - GENERAL

1.01 SUMMARY

A. Under this Section, the Contractor shall furnish all labor, materials and equipment for Mechanical General Requirements, as shown on the Plans, as specified and/or directed.

B. Related work specified elsewhere:
   1. Division 1, “General Requirements”
   2. Division 22, “Plumbing”
   3. Division 23, “Mechanical”
   4. Division 26, “Electrical”

1.02 REFERENCE STANDARDS

A. The following is a list of standards that may be referenced in this section:
   1. Code of Federal Regulations (CFR) Publications:
      a. 29-1910 SUBPART O - Machinery and Machine Guarding
      b. 29-1910.219 - Mechanical Power Transmission Apparatus

1.03 SUBMITTALS

A. Submit shop drawings, manufacturer's data, publication compliance, certified test reports, and manufacturer's certificates of compliance for equipment, materials and finish, and pertinent details for each system where specified in each individual section, and have them approved before procurement, fabrication or delivery of the items to the job site. Shop drawings shall be accompanied by a letter of transmittal in duplicate, and all shop drawings shall be suitably identified with the name of the project, contract number, Contractor's name, date and initials indicating approval of such submittal by the Contractor under the applicable specification. Partial submittals will not be acceptable and will be returned without review. Submittals shall include the manufacturer's name, trade name, catalog model or number, nameplate data, size, layout dimensions, capacity, project specification and the specific technical paragraph reference which specifies each item, applicable industry and technical society publication references, and other information necessary to establish contract compliance of each item to be furnished.
   1. Manufacturer's Data: Submittals for each manufactured item shall be current manufacturer's descriptive literature of cataloged products, equipment drawings, diagrams, performance and characteristic curves, and catalog cuts.

2. Shop Drawings: Drawings shall be a minimum of 8.5 inches by 11 inches in size, except as specified otherwise. Drawings shall include floor plans, sectional views, wiring diagrams, and installation details of equipment; and equipment spaces identifying and indicating proposed location, layout and arrangement of items of equipment, control panels, accessories, piping, ductwork, and other items that must be shown to ensure a coordinated installation. Wiring diagrams shall identify circuit terminals, and indicate the internal wiring for each item of equipment and the interconnection between each item of equipment. Drawings shall indicate adequate clearance for operation, maintenance, and replacement of operating equipment devices.

3. Manufacturer's Certificates of Compliance: Submit certification from manufacturer attesting that materials and equipment to be furnished for this project comply with the requirements of this specification and of the reference publications. Pre-printed certifications will not be acceptable; certifications shall be the manufacturer's original; certifications shall be not more than one year old. The certification shall not contain statements that could be interpreted to imply that the product does not meet all requirements specified, such as "as good as"; "achieve the same end use and results as materials formulated in accordance with the referenced publications"; "equal or exceed the service and performance of the specified material". The certification shall simply state that the product conforms to the requirements specified. Certificates shall be signed by the manufacturer's official authorized to sign certificates of compliance.

4. Reference Standards Compliance: Where equipment or materials are specified to conform to industry and technical society reference standards of organizations such as the American National Standards Institute (ANSI), American Society for Testing and Materials (ASTM), National Electrical Manufacturers Association (NEMA), American Society of Mechanical Engineers (ASME), American Gas Association (AGA), American Refrigeration Institute (ARI), and Underwriters' Laboratories (UL), proof of such conformance shall be submitted. If an organization uses a label or listing to indicate compliance with a particular reference standard, the label or listing will be acceptable evidence, unless otherwise specified in the individual sections.

B. Independent Testing Organization Certificate: In lieu of the label or listing, submit a certificate from an independent testing organization, competent to perform testing and approved by the Engineer. The certificate shall state that the item has been tested in accordance with the specified organization's test methods and that the item complies with the specified organization's reference standard.]

1.04 OPERATION AND MAINTENANCE MANUAL

A. Furnish an operation and maintenance manual for each item of equipment. Furnish three copies of the manual bound in hardback binders or an approved equivalent. Furnish one complete manual to the Owner's Representative for

review and approval not more than 90 calendar days after an item is approved, but at least 60 calendar days prior to field acceptance testing of the item. Furnish the remaining manuals at least 60 days prior to contract completion. Inscribe the following identification on the cover: the words "OPERATION AND MAINTENANCE MANUAL", the name and location of the equipment or the building, the name of the Contractor, and the contract number. The manual shall include the names, addresses, and telephone numbers of each subcontractor installing equipment, and of the local representatives for each item of equipment. The manual shall have a table of contents and be assembled to conform to the table of contents with the tab sheets placed before instructions covering the subject. The instructions shall be legible and easily read, with large sheets of drawings folded in. The manual shall include: wiring and control diagrams with data to explain detailed operation and control of each item of equipment; a control sequence describing start up, operation and shut down; description of the function of each principal item of equipment; the procedure for starting; the procedure for operating; shut down instructions; installation instructions; maintenance instructions; lubrication schedule including type, grade, temperature range, and frequency; safety precautions, diagrams, and illustrations; test procedures; performance data; and parts list. The parts lists for equipment shall indicate the sources of supply, recommended spare parts, and the service organization which is reasonably convenient to the project site. The manual shall be complete in all respects for equipment, controls, accessories, and associated appurtenances provided.

1.05 CATALOGED PRODUCTS

A. Materials and equipment shall be cataloged products of manufacturers regularly engaged in production of such materials or equipment and shall be manufacturer's latest design that complies with the specification requirements. Materials and equipment shall duplicate items that have been in satisfactory commercial or industrial use. Where two or more items of the same class of equipment are required, these items shall be products of a single manufacturer; however, the component parts of the items need not be the products of the same manufacturer. Each item of equipment shall have the manufacturer's name, address, model number and serial number on the nameplate securely affixed in a conspicuous place; the nameplate of the distributing agent will not be acceptable.

1.06 MANUFACTURER'S RECOMMENDATIONS

A. Unless otherwise stated in the Contract Specifications, all new equipment items, and specialties shall be installed in strict accordance with the recommendations of the manufacturer of the items being installed. Prior to the installation of new items, the Contractor shall submit to the Owner's representative printed copies of the manufacturer's installation recommendations. Installation of the item will not be allowed to proceed until the recommendations are received. Failure to furnish these recommendations can be cause for rejection of the material. Failure to

install items in accordance with manufacturer's recommendations can be cause for rejection of the work items installed.

1.07 LAYOUT OF THE WORK

A. Coordinate the proper relation of the work to the building structure, existing utilities and to the work of all trades. The Contractor shall advise the Owner's Representative of any discrepancy before performing any work.

1. Contract Drawings: The Contract Drawings represent the general intent as to piping and equipment arrangements. All locations and dimensions shown shall be field verified and minor alterations made if so required. Where dimensions are not given for the location and arrangement of mechanical systems, locations may be assumed to be approximate, and may be altered if required. Major modifications to the indicated arrangements shall be approved by the Owner's Representative prior to the installation of mechanical systems. Schematic diagrams represent the overall system requirements and do not necessarily indicate the physical orientation, location or dimensions of that system.
2. Record Drawings: The Contractor shall maintain a record of the progress of the work and shall submit three (3) sets of As-Built Drawings upon completion of the project.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Properly store, adequately protect, and carefully handle equipment and materials to prevent damage before and during installation in accordance with the manufacturer's recommendations, and as approved by the Engineer. Replace damaged or defective items.

1.09 SAFETY REQUIREMENTS

A. Equipment Safety: Fully enclose or properly guard in accordance with 29 CFR 1910.219 belts, pulleys, chains, gears, couplings, projecting setscrews, keys, rotating parts, and other power transmission apparatus, located where persons can come in close proximity thereto. Points of operation, ingoing nip points, and machinery producing flying chips and sparks shall be guarded in accordance with the applicable portions of 29 CFR 1910 SUBPART O. Provide positive means of locking out equipment so that equipment cannot be accidentally started during maintenance procedures. High temperature equipment and piping so located as to endanger personnel or create a fire hazard shall be properly guarded or covered with insulation of the type specified. Provide catwalks, maintenance platforms, and guardrails where required for safe operation and maintenance of equipment. Provide ladders or stairways to reach catwalks and maintenance platforms. Ensure that access openings leading to equipment are large enough to carry through routine maintenance items such as filters and tools.

1.10 INSTRUCTION TO OWNER'S PERSONNEL

A. When specified in other sections, furnish the services of competent instructors to give full instruction to the designated Owner's personnel in the adjustment, operation, and maintenance, including pertinent safety requirements, of the specified equipment or system. Instructors shall be thoroughly familiar with all parts of the installation and shall be trained in operating theory as well as practical operation and maintenance work. Instruction shall be given during the first regular work week after the equipment or system has been accepted and turned over to the Owner for regular operation. The number of days (8 hours per day) of instruction furnished shall be as specified in the individual section. When more than 4 days of instruction are specified, use approximately half of the time for classroom instruction. Use other time for instruction with the equipment or system. When significant changes or modifications in the equipment or system are made under the terms of the Contract, provide additional instruction to acquaint the operating personnel with the changes or modifications.

1.11 INSPECTIONS AND CERTIFICATIONS

A. The Contractor shall provide and pay for any third party inspections or certifications required by applicable regulatory agencies for boilers and other mechanical equipment components modified, or furnished and installed as a part of the Contract work.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

3.01 FIELD PAINTING

A. Painting of New Equipment:
   1. Equipment painting, factory applied or shop applied, shall be as specified herein, and provided under each individual section of this Specification.
      a. Factory Painting Systems: Manufacturer's standard factory painting systems may be provided.
      b. Shop Painting Systems: Clean, pretreat, prime and paint metal surfaces; except aluminum surfaces shall not be painted. Apply coatings to clean dry surfaces. Clean the surfaces to remove dust, dirt, rust, oil and grease by wire brushing and solvent degreasing prior to application of paint, except metal surfaces subject to temperatures in excess of 120 degrees Fahrenheit (F) shall be cleaned to bare metal. Where more than one coat of paint is specified, apply the second coat after the preceding coat is thoroughly dry. Lightly sand damaged painting and retouch before

applying the succeeding coat. Color of finish coat shall be aluminum or light gray.

c. Metal Surfaces Subject to Temperatures Less Than 120 Degrees F: Immediately after cleaning, the metal surfaces shall receive one coat of pretreatment primer applied to a minimum dry film thickness of 0.3 mil, one coat of primer applied to a minimum dry film thickness of one mil; and two coats of enamel applied to a minimum dry film thickness of one mil per coat.

d. Metal Surfaces Subject to Temperatures Between 120 and 400 Degrees F: Surfaces shall receive two coats of 400 degrees F heat-resisting enamel applied to a total minimum thickness of 2 mils.

e. Metal Surfaces Subject to Temperatures Greater Than 400 Degrees F: Surfaces shall receive two coats of 600 degrees F heat-resisting paint applied to a total minimum dry film thickness of 2 mils.

END OF SECTION

SECTION 23 07 00

HVAC INSULATION

PART 1 - GENERAL

1.01 SUMMARY

A. Under this Section, the Contractor shall furnish all labor, materials and equipment for HVAC Insulation as shown on the Plans, as specified and/or directed.

B. Related work specified elsewhere:
   1. Section 23 05 00 – Mechanical General Requirements
   2. Section 23 31 13 – Ductwork and Ductwork Accessories

1.02 REFERENCE STANDARDS

A. The following is a list of standards that may be referenced in this section:
   1. American Society for Testing and Materials (ASTM) Publication:
      a. A167 - Stainless and Heat Resisting Chromium Nickel Steel Plate, Sheet and Strip
      b. C177 - Steady State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded Hot Plate Apparatus, Test Method
      c. C195 - Mineral Fiber Thermal Insulating Cement
      d. C533 - Calcium Silicate Block and Pipe Thermal Insulation
      e. C534 - Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form
      f. C547 - Mineral Fiber Pipe Insulation
      g. C552 - Cellular Glass Thermal Insulation
      h. C553 - Mineral Fiber Blanket and Felt Insulation for Commercial and Industrial Applications
      i. C592 - Mineral Fiber Blanket Insulation and Blanket Type Pipe Insulation (Metal Mesh Covered) (Industrial Type)
      j. C612 - Mineral Fiber Block and Board Thermal Insulation
      k. C795 - Thermal Insulation for Use in Contact with Austenitic Stainless Steel
      l. C916 - Adhesives for Duct Thermal Insulation
      m. C921 - Properties of Jacketing Materials for Thermal Insulation
      n. D227 - Coal Tar Saturated Organic Felt Used in Roofing and Waterproofing
      o. E84 - Surface Burning Characteristics of Building Materials
      p. E96 - Water Vapor Transmission of Materials
   2. Manufacturer's Standardization Society of the Valves and Fittings Industry (MSS) Publication:

a. SP58 - Pipe Hangers and Supports Materials, Design, and Manufacture
b. SP69 - Pipe Hangers and Supports Selection and Application

3. National Fire Protection Association (NFPA) Publication:
   a. 255 - Surface Burning Characteristics of Building Materials
4. Underwriters Laboratories, Inc. (UL) Publication:
   a. 723 - Tests for Surface Burning Characteristics of Building Materials
5. Uniform Fire Prevention and Building Code of New York State Publication:
   a. 2020 Energy Conservation Construction Code

1.03 SUBMITTALS

A. Manufacturer's Data:
   1. Insulation
   2. Casings
   3. Vapor barrier materials
   4. Accessory materials

B. Standards Compliant: Standards compliance labels are required on each container or package:
   1. Insulation
   2. Casings
   3. Vapor barrier materials
   4. Accessory materials

1.04 DEFINITIONS

A. Finished Spaces: Spaces used for habitation or occupancy where rough surfaces are plastered, paneled, or otherwise treated to provide a pleasing appearance.

B. Unfinished Spaces: Spaces used for storage or work areas where appearance is not a factor, such as unexcavated spaces and crawl space.

C. Concealed Spaces: Spaces out of sight. For example, above ceilings; below floors; between double walls; furred in areas; pipe and duct shafts; and similar spaces.

D. Exposed: Open to view. For example, pipe running through a room and not covered by other construction.

E. Fugitive Treatments: Treatments subject to deterioration due to aging, moisture, high humidity, oxygen, ozone, and heat. Fugitive materials are entrapped materials that can cause deterioration, such as solvents and water vapor.

F. Outside: Open to view up to 5 feet beyond the exterior side of walls, above the roof, and unexcavated or crawl spaces.

1.05 MANUFACTURER'S STAMP OR LABEL

A. Every package or standard container of insulation, jackets, cements, adhesives, and coatings delivered to the project site for use must have the manufacturer's stamp or label attached giving name of manufacturer, brand, and description of material. Insulation packages and containers shall be asbestos free.

1.06 FLAME SPREAD AND SMOKE DEVELOPED RATINGS

A. In accordance with NFPA 255, ASTM E84 or UL 723, the materials shall have a flame spread rating of not more than 25 and a smoke developed rating of not more than 50.
   1. Materials Tests: Test factory applied materials as assembled. Field applied materials may be tested individually. Use no fugitive or corrosive treatments to impart flame resistance. UL label or satisfactory certified test report from a testing laboratory will be required to indicate that fire hazard ratings for materials proposed for use do not exceed those specified. Flame proofing treatments subject to deterioration due to effects of moisture or high humidity are not acceptable.
   2. Materials Exempt From Fire Resistant Rating: Nylon anchors.
   3. Materials Exempt from Fire Resistant Rating When Installed In Outside Locations, Buried, or Encased In Concrete: PVC casing and glass fiber reinforced plastic casing.

PART 2 - PRODUCTS

2.01 DUCTS PLENUMS (HEATING, VENTILATING AND AIR CONDITIONING SYSTEMS (HVAC)) INSULATION

A. Duct Insulation in Concealed Spaces: Two inch thick mineral fiber flexible resilient blanket insulation with a maximum insulation rating (installed) of R-6, and a maximum conductivity of 0.31 btu in/per hr sq. ft. degree F at 75 degrees F mean temperature as tested in accordance with ASTM C518.

B. Duct Insulation Not in Concealed Spaces: Mineral fiber per ASTM C612, Class 2 (maximum surface temperature 400 degrees F), 3 pcf (pounds per cubic foot) average, 1-1/2 inch thick, inside the building, and a minimum insulation rating (installed) of R-6.

C. Wicking Type Insulation: ASTM C795. Use over austenitic stainless steel surfaces.

D. Insulation Thickness for All Types of Ductwork Located Outside: Provide insulation one inch thicker than specified herein.

E. Duct Insulation Finishes:

1. All Purpose Jacket: Provide a factory applied all-purpose jacket with or without integral vapor barrier as required by the service. Provide jackets in exposed locations with a white surface suitable for field painting. All purpose jacket shall have a maximum water vapor permeance of 0.05 perm per ASTM E96; a puncture resistance of not less than 50 Beach units; and a tensile strength of not less than 35 pounds force per inch of width.
2. Vapor Barrier Material: Material shall be resistant to flame, moisture penetration, and shall not support mold growth. Provide vapor barrier on all HVAC duct insulation, on except insulation for heating only.

2.02 ADHESIVES, SEALANTS, AND COATING COMPOUNDS

A. Adhesive for Securing Insulation to Metal Surfaces and Vapor Barrier Lap Adhesive (For Use in Building Interior Only): ASTM C916, Type I (an adhesive in which the vehicle is nonflammable in liquid (wet) state and which will pass the edge burning test), or Type II (An adhesive in which the vehicle is nonflammable in the liquid (wet) state and which will not pass the edge burning test).

B. Mineral Fiber Insulation Cement: ASTM C195, thermal conductivity 0.85 maximum at 200 degrees F mean when tested per ASTM C177.

C. Weatherproof Coating: For outside applications use a weatherproof coating recommended by the manufacturer of the insulation and jackets.

2.03 ACCESSORIES

A. Staples: ASTM A167, Type 304 stainless steel outside clinch type.

B. Insulation Bands: 3/4 inch wide0.20-inch aluminum.

C. Bands for Metal Jackets: 3/8-inch minimum width; 0.020-inch aluminum.

D. Anchor Pins: Provide anchor pins and speed washers recommended by the insulation manufacturer.

E. Glass Cloth and Tape: Tape shall be 4 inch wide rolls. Class 3 tape shall be 4.5 ounces per square yard. In lieu of glass cloth and tape, open weave glass membrane may be used.

F. Coal Tar Saturated Organic Felt: ASTM D227, minimum weight of 13 pounds per 100 square feet.

G. Wire: Soft annealed stainless steel, 0.047 inch nominal diameter.

PART 3 - EXECUTION

3.01 PREPARATION

A. Do not insulate materials until all system tests have been completed and surfaces to be insulated have been cleaned of dirt, rust, and scale and dried. Insulate return ducts, outside air intakes and supply ducts to the room outlets, flexible runouts, plenums, casings, mixing boxes, filter boxes, coils, fans, and the portion of air terminals not in the conditioned spaces. Ensure full range of motion of equipment actuators. Modify insulation to avoid obstruction with valve handle, safety relief, etc. Allow adequate space for pipe expansion. Conditioned space shall be defined as an area, room or space normally occupied and being heated or cooled for human habitation by any equipment. Install insulation with jackets drawn tight and cement down on longitudinal and end laps. Do not use scrap pieces where a full length section will fit. Insulation shall be continuous through sleeves, wall and ceiling openings, except at fire dampers in duct systems. Extend all surface finishes to protect all surfaces, ends, and raw edges of insulation. Apply coatings and adhesives at the manufacturer's recommended coverage per gallon. Individually insulate piping and ductwork. Provide a moisture and vapor seal where insulation terminates against metal hangers, anchors and other projections through the insulation on surfaces for which a vapor seal is specified. Keep insulation dry during the application of any finish. Bevel and seal the edges of exposed insulation. Unless otherwise indicated, do not insulate the following:
   1. Exposed air conditioning supply and return ducts in air conditioned space that furnish conditioned air 24 hours each day of the cooling season.
   2. Exposed heating supply and return ducts in spaces that are heated 24 hours each day of the heating season.
   3. Fibrous glass ductwork.
   4. Factory preinsulated flexible ductwork.
   5. Factory insulated ductwork, plenums, casings, mixing boxes, filter boxes.
   6. Vibration isolating connections.
   7. Adjacent insulation.
   8. ASME stamps.
   9. Fan name plates.
   10. Access plates in fan housings.

3.02 DUCTS PLENUMS (HVAC) INSULATION

A. Rigid Insulation: Secure rigid insulation by impaling over pins or anchors located not more than 3 inches from joint edges of boards, spaced not more than 12 inches on centers and secure with washers and clips. Spot weld anchor pins or attach with a waterproof adhesive especially designed for use on metal surfaces. Apply insulation with joints tightly butted. Neatly bevel insulation around name plates and access plates and doors. Each pin or anchor shall be

capable of supporting a 20 pound load. Cut off protruding ends of pins, after clips are sealed with coating compound for inside work or manufacturer's recommended weatherproof coating for outside work, and reinforced with open weave glass membrane.

B. Flexible Blanket Insulation: Apply insulation with all joints tightly butted. Secure insulation to ductwork with adhesive in 6 inch wide strips on 12 inch centers. Staple laps of jacket with outward clinching staples and seal with foil scrim kraft (FSK) tape. For ductwork over 24 inches on horizontal duct runs, provide pins, washers and clips. Use pins on sides of vertical ductwork being insulated. Space pins and clips on 18 inch centers and not more than 18 inches from duct corners. Carry insulation over standing seams and trapeze type hangers. Install speed washers with pins and pin trimmed to washer. Sagging of flexible duct insulation will not be permitted. Cut off protruding ends of pins after clips are secured and sealed with coating compound for inside work. For warm air ducts, overlap insulation not less than 2 inches at joints and secure the laps with outward clinch staples on 4 inch centers. In cold air ducts, vapor seal all joints and staple as specified.

C. Insulation Finishes and Joint Sealing: Fill all breaks, punctures, and voids with vapor barrier coating compound for inside work or manufacturers recommended weatherproof coating for outside service. Vapor seal all joints by embedding a single layer of 3 inch wide open weave glass membrane, 20 by 20 mesh maximum size between two 1/16 inch wet film thickness coats of vapor barrier coating compound. Draw glass fabric smooth and tight with a 1-1/2 inch overlap. At jacket penetrations such as hangers, thermometers, and damper operating rods, fill voids in the insulation with vapor barrier coating. Brush a coat of vapor barrier coating where required on HVAC ducts. Provide vapor barrier jacket continuous across seams, reinforcing, and projections. Where height of projections is greater than insulation thickness, carry insulation and jacket over the projection. For joints for heating only systems, provide insulation with two coats of fire resistant adhesive with glass fabric 20 by 20 maximum size mesh embedded between coats.

D. Access Plates and Doors: On acoustically lined ducts, plenums, and casings, provide insulation on access plates and doors. On externally insulated ducts, plenums, and casings, provide insulation filled hollow steel panels and doors for access openings. Bevel insulation around access plates and doors.

3.03 FIELD INSPECTION

A. Visually inspect to ensure that materials used conform to specifications. Inspect installations progressively for compliance with requirements.

END OF SECTION

SECTION 23 31 13

DUCTWORK AND DUCTWORK ACCESSORIES

PART 1 - GENERAL

1.01 SUMMARY

A. Under this Section, the Contractor shall furnish all labor, materials and equipment for Ductwork and Ductwork Accessories, as shown on the Plans, as specified and/or directed.

B. Related work specified elsewhere:
   1. Division 1 – General Requirements
   2. Section 23 05 00 – General Mechanical Requirements
   3. Section 23 37 13 – Diffusers, Registers and Grilles

1.02 REFERENCE STANDARDS

A. The following is a list of standards that may be referenced in this Section:
   1. Air Diffusion Control (ADC) Publication:
      a. 1062-R4 – Certification, Rating and Test Manual
      b. AD – Measurement of Room to Room Sound Transmissions Through Plenum Air Systems
   2. Air Movement and Control Association, Inc. (AMCA) Publication:
      a. 500 – Test Methods for Louvers, Dampers and Shutters
   3. American Society for Testing and Materials (ASTM) Publication:
      a. A123 – Zinc (Hot Dip Galvanized) Coatings on Iron and Steel Products
      b. A167 – Stainless and Heat Resisting Chromium Nickel Steel Plate, Sheet, and Strip
      c. A653 – Steel Sheet, Zinc-Iron Alloy coated (Galvanized) by the Hot Dip Process
      d. B117 – Salt Spray (Fog) Testing
      e. B127 – Nickel Copper Alloy (UNS N04400) Plate, Sheet, and Strip
      f. B209 – Aluminum and Aluminum-Alloy Sheet and Plate
      g. C423 – Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method
      h. C553 – Mineral Fiber Blanket and Felt Insulation (Industrial Type)
      i. D822 – Operating Light and Water Exposure Apparatus (Carbon Arc Type) for Testing Paint, Varnish, Lacquer, and Related Products
      j. D1654 – Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments
      k. E84 – Test Method for Surface Burning Characteristics of Building Materials

l. E90 – Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions
m. E96 – Water Vapor Transmission of Materials

4. National Fire Protection Association (NFPA) Publication:
   a. 90A – Installation of Air Conditioning and Ventilating Systems
5. Sheet Metal and Air Conditioning Contractors' National Association, Inc. (SMACNA) Publication:
   a. HVACTAB – HVAC Systems Testing, Adjusting and Balancing (HVACTAB)
   b. HVACDCS – HVAC Duct Construction Standards Metal and Flexible (HVACDCS)
   c. HVACALTM – HVAC Air Duct Leakage Test Manual (HVACALTM)
6. Underwriters Laboratories, Inc. (UL) Publications:
   a. 181 – Factory Made Air Duct Connectors
   b. 555 – Fire Dampers and Ceiling Dampers
   c. 555S – Leakage Rated Dampers for Use in Smoke Control Systems
   d. 586 – High Efficiency, Particulate, Air Filter Units
   e. 723 – Test for Surface Burning Characteristics of Building Materials
7. Uniform Fire Prevention and Building Code of New York State Publication:
   a. 2020 Mechanical Code
   b. 2020 Energy Conservation Construction Code

1.03 SUBMITTALS

A. Manufacturer’s Catalog Data:
   1. Dampers
   2. Flexible ducts and connectors
   3. Duct liner adhesives
   4. Sheet Metals
   5. Test Holes

B. Drawings:
   1. Ductwork Layout Plan
   2. Location of test holes

C. Test Reports:
   1. Sound Pressure level rating
   2. Corrosion protection

D. Factory Test Reports:
   1. Sound attenuators and attenuator ducts acoustical tests
      a. Submit certified test data from an independent acoustical testing laboratory, listing sound noise reduction characteristics, static pressure drop, air flow velocity capacity, and insertion loss data.

E. Field Test Reports:
   1. Air duct leakage tests
   2. Testing and balancing of air systems

1.04 QUALITY ASSURANCE

A. SMACNA Duct Construction Manuals: The SMACNA recommendations shall be considered as mandatory requirements. Substitute the word "shall" for the word "should" in these manuals. No negative pressure construction for 4 inch, 6 inch, or 10 inch water gauge is provided herein.

1.05 TESTING FOR CORROSION PROTECTION

A. Comply with ASTM A123 or protect the equipment with a corrosion inhibiting coating or paint system that has proved capable of satisfactorily withstanding corrosion in accordance with ASTM B117. Test 125 hours for equipment installed indoors and 500 hours for equipment installed outdoors or subjected to marine atmosphere. Each specimen shall have a standard scratch as defined in ASTM D1654.
   1. Corrosion Criteria: Upon completion of exposure, coating or paint shall show no indication of deterioration or loss of adhesion, nor shall there be indication of rust or corrosion extending further than 1/8 inch on either side of original scratch.
   2. Thickness of Coating: Thickness of coating or paint system on the actual equipment shall be identical to that on the test specimens with respect to materials, conditions of application, and dry film thickness.

1.06 PRESSURE VELOCITY CLASSIFICATION

A. SMACNA HVACDCS, Section 1, and as indicated.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Galvanized Steel Sheets: ASTM A653; coating designation G90.

B. Galvanized Steel Hot Dipped After Fabrication: ASTM A123.

C. Aluminum Alloy Sheets: ASTM B209

D. Corrosion Resisting (Stainless) Steel Sheets: ASTM A167.

E. Duct Liner Adhesives: SMACNA HVACDCS, fire resistant adhesive.

2.02 DUCTS OF PRESSURE CLASSES 2-INCH OR LESS WATER GAUGE

A. Construction, metal gauge, hangars and supports, and reinforcements shall conform with SMACNA HVACDCS. Ductwork shall be airtight and shall not vibrate or pulsate when system is in operation. Air leakage shall be less than 5 percent of the system capacity. Construct ductwork of galvanized steel.
   1. Curved Elbows: Make a center line radius not less than 1-1/2 times the width or diameter of the duct.
   2. Joints: Make airtight. No dust marks from air leaks shall show at duct joints or connections to grilles, registers, and diffusers.
   3. Laps: Make laps at joints in the direction of airflow. Space button punch or bolt connection in standing seams at fixed centers not greater than 6 inches. Longitudinal locks or seams, known as "Button Punch Snap Lock" may be used in lieu of Pittsburg Lock.
   4. Fittings: Elbows, vaned elbows, take offs, branch connections, transitions, splitters, volume dampers, fire dampers, flexible connections, and access door shall conform with SMACNA HVACDCS, Section 2. Factory fabricate test holes to be airtight and noncorrosive with screw cap and gasket.

2.03 FLEXIBLE DUCTS

A. UL 181, Class I, UL listed, SMACNA HVACDCS, and additional requirements herein specified. Use to connect between rigid ducts and outlets or terminals. There shall be no erosion, delamination, loose fibers, or odors from the ducts into the air stream. At 250 degrees F, minimum rating pressures shall be 2 inches water positive and 1-1/2 inches negative up to 2500 cfm flexible ducts. Flexible ducts shall be maximum 3 feet in length. Minimum bend radius shall be twice of the duct diameter.
   1. Materials: Interlocking spiral or helically corrugated type constructed of noncollapsible fire retardant, chloroprene or chlorosulphonated polyethylene impregnated, minimum 30 ounces per square yard woven mineral fabric.
   2. Insulation and Vapor Barrier: ASTM C553; minimum one inch nominal thickness and one lb./cu. ft. density. The insulation shall be sheathed with a vapor barrier having a maximum water vapor permeance of 0.02 perm per ASTM E96, Procedure C. Coat ends of insulation with cement to prevent erosion and delamination.
   3. Joints: Make airtight slip joints, seal with pressure sensitive vapor seal adhesive tape or duct sealer, and secure with sheet metal screws. To prevent insulation compression, place 2 inch wide by one inch thick closed cell foam plastic spacers over the joints under vapor barriers. To provide a vapor-tight joint, use a zinc coated steel clamp over such spacers.

2.04 FLEXIBLE CONNECTORS

A. UL 181, Class I, UL listed, SMACNA HVACDCS, and additional requirements herein specified. Connectors to be ASTM A653, 24-gauge galvanized steel, with commercial neoprene fire retardant coating meeting NFPA 701 with 500 lb tensile strength at a temperature range of -40ºF to 200ºF. Use to connect between rigid ducts and equipment inlets and outlets as indicated. There shall be no erosion, delamination, loose fibers, or odors from the ducts into the air stream.

2.05 DUCT SLEEVES AND PREPARED OPENINGS

A. Duct Sleeves and Closure Collars: Fabricate from minimum 20 gauge galvanized steel. Where sleeves are installed in bearing walls, provide structural steel sleeves as indicated.

B. Prepared Openings: Provide one inch clearance between the duct and the sleeve.

2.06 DEFLECTORS

A. Factory fabricated and factory or field assembled units consisting of curved turning vanes for uniform air distribution and change of direction with minimum turbulence and pressure loss. Provide curved vanes for square elbows.

B. For round ducts taking off from rectangular ducts, provide factory fabricated, galvanized sheet metal, spin in fittings. These fittings shall have scoop extractors, butterfly dampers, and locking quadrant operators.

2.07 ACCESS DOORS

A. Weld door frame in place. Door shall be rigid and airtight with neoprene gaskets and two or more galvanized steel hinges and tension fasteners. Provide doors as large as practical. Mount doors, if possible, so that air pressure holds them closed.

2.08 DAMPERS AND LOUVERS

A. Manual Volume Dampers: Balancing, factory fabricated type. Equip dampers with accessible mechanism such as quadrant operators or 3/16 inch rods brought through the side of ducts with locking setscrew and bushing. Where quadrant operators are used, they shall be chrome plated or enamel painted with all exposed edges rounded.

2.09 DUCTWORK AND EQUIPMENT INSULATION

A. Section 23 07 00, “HVAC Insulation”.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Installation shall conform to NFPA 90A, SMACNA HVACDCS. Provide mounting and supporting of ductwork and accessories including, but not limited to, structural supports, hangers, vibration isolators, stands, clamps and brackets, access doors, and dampers. Use electrical isolation between dissimilar metals. Electrical isolation may be fluorinated elastomers or sponge rubber gaskets. Install ductwork accessories as indicated in accordance with the manufacturer's printed instruction. Allow clearance for inspection, repair, replacement, and service.

1. Ductwork: When air distribution systems are operated, there shall be no chatter, vibration, or dust marks. After ducts are thermally or acoustically insulated, ensure air flow area equal to duct cross section dimensions indicated.
   a. Field Changes to Ductwork: Those required to suit the sizes of factory fabricated equipment actually furnished, shall be designed to minimize expansion and contraction. Use gradual transitions in field changes as well as modifications to connecting ducts.
   b. Dampers: When installed on ducts to be thermally insulated, equip each damper operator with stand-off mounting brackets, bases, or adapters to provide clearance between the duct and operator not less than the thickness of insulation. Stand-off mounting items shall be integral with the operator or standard accessory of damper manufacturer.
   c. Deflectors: Provide in square elbows, duct mounted supply outlets, take off or extension collars to supply outlets, and tap in branch off connections. Adjust supply outlets to provide air volume and distribution as indicated or specified.
   d. Fire Dampers: Install for ducts penetrating fire walls and where duct systems serve two or more floors in accordance with UL 555.
   e. Access Doors: Provide for automatic dampers, volume dampers, fire dampers, coils, thermostats, temperature controllers, valves, filters, humidifiers and other concealed apparatus requiring service and inspection in the duct systems.
   f. Duct Sleeves and Prepared Openings: Install for duct mains, duct branches, and ducts passing through roofs and ceilings. The Contractor shall be responsible for the proper size and location of sleeves and prepared openings.
      1) Duct Sleeves: Allow one inch clearance between duct and sleeve or one inch clearance between insulation and sleeve for insulated ducts, except at grilles, registers, and diffusers.
      2) Prepared Openings: Allow one inch clearance between duct and opening or one inch clearance between insulation

and opening for insulated ducts, except at grilles, registers, and diffusers.

3) Closure Collars: Provide not less than 4 inches wide on each side of walls or floors where sleeves or prepared openings are installed. Fit collars snugly around ducts and insulation. Grind smooth edges of collar to preclude tearing or puncturing insulation covering or vapor barrier. Use nails with maximum 6 inch centers on collars.

2. Duct Hangers and Supports: SMACNA HVACDCS, Section 4. Unless otherwise indicated, provide not less than two one inch by 1/16 inch galvanized strap iron hangers spaced one on each side of duct. Anchor risers in the center of the vertical run to allow ends of riser free vertical movements. Attach supports only to structural framing members and concrete slabs. Do not anchor supports to metal decking unless a means is provided and approved for preventing the anchors from puncturing the metal decking. Where supports are required between structural framing member, provide suitable intermediate metal framing. Where C clamps are used, use retainer clips.
   a. Flexible Ducts: Support ducts by hangers every 3 feet. Use stretch flexible air ducts to smooth out corrugations, and long radius elbows, where possible, using a minimum length to make connections.
   b. Flexible Connectors: Provide flexible connectors between fans and ducts or casings and where ducts are of dissimilar metals. For round ducts, securely fasten flexible connectors by zinc coated steel clinch type draw bands. For rectangular ducts, lock flexible connectors to metal collars.
3. Flashings: Provide waterproof flashings where ducts pass through exterior walls and roofs.
4. Inspection Plates and Test Holes: Provide, where required, in ductwork or casings for all balance measurements. Test holes shall be factory fabricated, airtight, and noncorrosive with screw cap and gasket. Extend cap through insulation.
5. Cleaning of Ducts: Remove all debris and dirt from ducts and wipe clean. Before installing air outlets, use air handler to blow dry air through entire system at maximum attainable velocity. Provide temporary air filters for this operation.

3.02 TESTING AND COMMISSIONING

A. The Contractor is responsible for the administration and direction of tests. Furnish instruments, equipment, connecting devices, and personnel for the tests. Notify Engineer 5 days before inspection or testing is scheduled. Correct all defects in the work. Repeat tests until the work is in compliance.

1. Comply with SMACNA HVACTAB to achieve and confirm compliance with drawings and specifications, prepare complete report of final test results and submit in quadruplicate.

END OF SECTION

SECTION 23 37 13

DIFFUSERS, REGISTERS AND GRILLES

PART 1 - GENERAL

1.01 SUMMARY

A. Under this Section, the Contractor shall furnish all labor, materials and equipment for Diffusers, Registers and Grilles, as shown on the Plans, as specified and/or directed.

B. Related work specified elsewhere:
   1. Section 23 05 00 – Mechanical General Requirements
   2. Section 23 31 13 – Ductwork and Ductwork Accessories

1.02 REFERENCE STANDARDS

A. The following is a list of standards that may be referenced in this Section:
   1. Air Diffusion Control (ADC) Publication:
      a. 1062-R4 – Certification, Rating and Test Manual
      b. AD – Measurement of Room to Room Sound Transmissions Through Plenum Air Systems
   2. Air Conditioning, Heating and Refrigeration Institute (AHRI) Publication:
      a. 881 – Performance Rating of Air Terminals
   3. American Society of Heating, Refrigerating, and Air Conditioning Engineers, Inc. (ASHRAE) Publication:
      a. 70 – Performance of Air Outlets and Air Inlets Testing Method
   4. American Society for Testing and Materials (ASTM) Publication:
      a. A123 – Zinc (Hot Dip Galvanized) Coatings on Iron and Steel Products
      b. A527 – Steel Sheet, Zinc Coated (Galvanized) by the Hot Dip Process Lock Forming Quality
      c. B117 – Corrosive Environments Salt Spray Test
      d. C423 – Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method
      e. C553 – Mineral Fiber Blanket and Felt Insulation for Commercial and Industrial Applications
      f. D870 – Water Immersion Test
      g. D2794 – Reverse Impact Cracking Test
   5. National Fire Protection Association (NFPA) Publication:
      a. 90A – Installation of Air Conditioning and Ventilating Systems
   6. Sheet Metal and Air Conditioning Contractors' National Association, Inc. (SMACNA) Publications:
      a. HVACTAB – HVAC Systems Testing, Adjusting and Balancing (HVACTAB)

b. HVACDCS – HVAC Duct Construction Standards Metal and Flexible (HVACDCS)

7. Underwriters Laboratories, Inc. (UL) Publication:
   a. 181 – Factory Made Air Duct Connectors
8. Uniform Fire Prevention and Building Code of New York State Publication:
   a. 2020 Mechanical Code

1.03 SUBMITTALS

A. Manufacturer's Data:
   1. Diffusers, registers and grilles
      a. Submit a schedule of all inlets and outlets indicating location, catalog model number, manufacturer, dimensional information, sound pressure level rating, nominal rated volumetric flow rate (cfm), neck or face velocity at specified cfm, pressure drop at specified cfm, throw and drop for outlets, range for diffusers, and maximum and minimum cfm modulation.

B. Test Reports:
   1. Sound pressure level rating
      a. Submit for inlets and outlets including diffusers, registers and grilles.

1.04 QUALITY ASSURANCE

A. SMACNA Duct Construction Manuals: The SMACNA recommendations shall be considered as mandatory requirements. Substitute the word "shall" for the word "should" in these manuals.

PART 2 - PRODUCTS

2.01 DIFFUSERS, REGISTERS, AND GRILLES

A. Material and Finishes: Construct diffusers, registers, and grilles of aluminum. Exterior and exposed edges shall be rolled, or otherwise stiffened and rounded. Air outlets shall be factory treated and painted with a baked on anodic acrylic paint and pass a 100-hour ASTM B117 Corrosive Environments Salt Spray Test without creepage, blistering or deterioration of film. The paint must also meet testing requirements in accordance with ASTM B870 and D2794. Colors shall be selected or approved by the Engineer.

B. Sound Pressure Level: Manufacturer certified sound pressure level rating of inlets and outlets in accordance with ADC 1062 R4. Conform with the following permissible room sound pressure levels:

NC Range, dB	Typical Application

20 – 25	Private Offices and Conference Rooms
30 – 40	Corridors
25 – 30	Classrooms
20 – 25	Courtrooms

C. Throw: Defined as distance from the diffuser, register, or grille to the point which the air velocity falls below 50 feet per minute. Throw shall not exceed 1.5 times the outlet mounting height.

D. Drop: Maximum drop of air stream shall not be so great that it is within 5 feet of the floor at the end of the throw.

E. Ceiling Diffusers: Equip with baffles or other devices required to provide proper air distribution pattern. Provide factory fabricated, single key, volume dampers. Except for linear air diffusers, internal parts shall be removable through the diffuser neck for access to the duct and without the use of special tools.

1. Linear Air Diffusers: Joints between diffuser sections shall appear as hairline cracks. Provide alignment slots for insertion of key strips or other concealed means to align exposed butt edges of diffusers. Do not use screws and bolts in exposed face of frames or flanges. Metal fill and ground smooth corner joints of steel frames and flanges exposed below ceiling. Furnish separate pivoted or hinged adjustable air-volume damper and separate air-deflection blades. Galvanized steel plenums shall be designed specifically for field attachment and provided by manufacturer of the linear air diffusers tested in accordance with ASHRAE Standard 70. Plenums include a factory drawn side inlet to fit 1-, 2-, 3-, or 4-slot diffusers. Standard nominal length shall be 2, 3, 4, 5 or 6 feet. Provide optional internal insulation and field mounted inlet dampers intergral to plenums. Manufacture shall be as by Titus Model ML-38 with Titus Model MP1 plenum, or approved equal.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Installation shall conform to NFPA 90A, SMACNA HVACDCS. Install diffusers, registers, grilles and accessories as indicated in accordance with the manufacturer's printed instruction. Allow clearance for inspection, repair, replacement, and service.

3.02 FIELD TESTS AND INSPECTIONS

A. The Contractor is responsible for the administration and direction of tests. Furnish instruments, equipment, connecting devices, and personnel for the tests. Correct all defects in the work. Repeat tests until the work is in compliance.

1. Balancing and Testing of Air Systems: Comply with SMACNA HVACTAB to achieve and confirm compliance with drawings and

specifications, prepare complete report of final test results and submit in quadruplicate.

END OF SECTION

SECTION 26 05 01

ELECTRICAL GENERAL REQUIREMENTS

PART 1 - GENERAL

1.01 DESCRIPTION

A. Under this Section, the Contractor shall furnish all labor, materials and equipment for Electrical General Requirements, as shown on the Plans, as specified and/or directed.

1.02 REFERENCES

A. The publications listed below and their latest revisions form a part of this Specification to the extent referenced. The publications are referred to in the text by the basic designation only.
   1. Federal Specification (Fed. Spec.):
      a. L-P-387A - Plastic Sheet, Laminated, Thermosetting (for Design Plates)
   2. American National Standards Institute (ANSI) Publications:
      a. C37.20 - Switchgear Assemblies, Including Metal-Enclosed Bus
      b. Z35.1 - Accident Prevention Signs
   3. Institute of Electrical and Electronics Engineers (IEEE) Publication:
      a. 100 - Standard Dictionary of Electrical and Electronics Terms
   4. National Electrical Manufacturers Association (NEMA) Publication:
      a. ICS 6 - Enclosures for Industrial Controls and Systems
   5. National Fire Protection Association (NFPA) Publications:
      a. 70B - Electrical Equipment Maintenance
      b. 70 - National Electrical Code

1.03 APPLICATION

A. This Section applies to all sections of Division 26, "Electrical", of this project except as specified otherwise in each individual section.

1.04 DEFINITION OF ELECTRICAL TERMS

A. Unless otherwise specified or indicated, electrical terms used in these Specifications, and on the drawings, shall be as defined in IEEE Standard No. 100.

1.05 ELECTRICAL UTILITY COORDINATION & ELECTRICAL SYSTEM VERIFICATION

A. Contractor shall coordinate all pre and post construction activities with the Electrical Utility (EU) provider per the EUs written bulletin/specification requirements.

B. Prior to shop drawing submittals, prior to commencing any demolition and/or prior to commencing any new construction activities, electrical characteristics for all existing and/or proposed electrical systems (including service, premises wiring systems and/or separately derived systems) shall be verified by this Contractor.

C. The Contractor shall coordinate and confirm, in writing, the following information from the Electrical Utility prior to commencement of any work under this Contract:
   1. Voltage
   2. Number of phases
   3. Type of system grounding
   4. Metering arrangement and Style
   5. Electrical Service Capacity

D. Should the Contractor's verification of any existing or proposed electrical system indicate a discrepancy with the Contract Documents, report them immediately to the Owner and/or Owners designated representative.

E. Submitting shop drawings and/or commencing any work under this Contract prior to all electrical systems verification/confirmation as required above signifies that Contractor accepts all existing and proposed electrical system characteristics and conditions.

1.06 SUBMITTALS

A. Obtain approval before procurement, fabrication, or delivery of items to the job site. Partial submittals will not be acceptable and will be returned without review. Submittals shall include the manufacturer's name, trade name, place of manufacture, catalog model or number, nameplate data, size, layout dimensions, capacity, project specification and paragraph reference, applicable Federal, Military, industry, and technical society publication references, and other information necessary to establish contract compliance of each item to be furnished. Furnish a minimum of six (6) copies of shop drawings for each major device specified or electronic shop drawings as specified herein. All hard copy shop drawings shall be a minimum of 8.5 inches by 11 inches in size.

B. Shop Drawings: In addition to the requirements specified elsewhere, shop drawings shall meet the following requirements. Drawings shall include complete ratings information, wiring diagrams, and installation details of equipment indicating proposed location, layout and arrangement, control panels, accessories, piping, ductwork, and other items that must be shown to assure a coordinated

installation. Wiring diagrams shall identify circuit terminals and indicate the internal wiring for each item of equipment and the interconnection between each item of equipment. Drawings shall indicate adequate clearance for operation, maintenance, and replacement of operating equipment devices. If equipment is disapproved, revise drawings to show acceptable equipment and resubmit.

C. Manufacturer's Data: Submittals for each manufactured item shall be current manufacturer's descriptive literature of cataloged products, equipment drawings, diagrams, performance and characteristic curves, and catalog cuts.

D. Publication Compliance: Where equipment or materials are specified to conform to industry and technical society publications of organizations such as American National Standards Institute (ANSI), American Society for Testing and Materials (ASTM), and Underwriters' Laboratories Inc. (UL), submit proof of such compliance. The label or listing by the specified organization will be acceptable evidence of compliance. In each of the publications referred to herein, consider the advisory provisions to be mandatory, as though the word "shall" had been substituted for "should" wherever it appears. In lieu of the label or listing, submit a certificate from an approved independent testing organization, adequately equipped and competent to perform such services, stating that the item has been tested in accordance with the specified organization's test methods and that the item conforms to the specified organization's publication.

E. Submittals Required: Supply shop drawing submittal information as otherwise noted in each individual section.

F. Electronic Shop Drawings: If allowed by other sections of these Contract Documents, electronic submittals shall be submitted to Engineer in accordance with procedures outlined in these Contract Documents, as established at a preconstruction meeting and/or per Engineer’s written instructions.
   1. Electronic shop drawings shall be submitted in an OCR (searchable) PDF file format or per Engineer’s instructions. Each shop drawing shall be a single electronic file with correct orientation of all sheets contained within.
   2. Electronic shop drawings shall be scaled to print at 8.5 inches by 11 inches (for general information, manufacturer’s product data, etc.) and as required for drawings (layout drawings, coordination drawings, schematics, site drawings, electronic copy), except as specified otherwise.
   3. Engineer shall make final determination on clarity of electronic shop drawings and will reject electronic shop drawing if resolution is not acceptable.

1.07 OPERATION AND MAINTENANCE MANUAL

A. Submit as required for systems and equipment indicated in the technical sections. Furnish three (3) copies, bound in hardback binders or an approved equivalent. Furnish one complete manual prior to performance of systems or equipment tests,

and furnish the remaining manuals prior to contract completion. Inscribe the following identification on the cover: the words "OPERATION AND MAINTENANCE MANUAL", the name and location of the system, equipment, building, name of Contractor, and contract number. Include in the manual the names, addresses, and telephone numbers of each subcontractor installing the system or equipment and the local representatives for the system or equipment. Include a table of contents and assemble the manual to conform to the table of contents, with the tab sheets placed before instructions covering the subject. The instructions shall be legible and easily read, with large sheets of drawings folded in. The manual shall include:

1. Internal and interconnecting wiring and control diagrams with data to explain detailed operation and control of the system or equipment.
2. A control sequence describing startup, operation, and shutdown.
3. Description of the function of each principal item of equipment.
4. Installation and maintenance instructions.
5. Safety precautions.
6. Diagrams and illustrations.
7. Testing methods.
8. Performance data.
   Lubrication schedule including type, grade, temperature range, and frequency.
9. Parts list. The list shall indicate sources of supply, recommended spare parts, and name of servicing organization.
10. Appendix: List qualified permanent servicing organizations for support of the equipment, including addresses and certified qualifications.

B. Electronic Version: Provide a complete O&M as a single PDF file, or multiple files if there are significant amounts of data. PDF file(s) shall be an optical character recognition (OCR) or searchable file.

1.08 SPARE PARTS

A. Provide spare parts for all equipment installed under this Contract, as indicated in individual specification sections.

1.09 POSTED OPERATING INSTRUCTIONS

A. Furnish approved operating instructions for systems and equipment indicated in the technical sections for use by operation and maintenance personnel. The operating instructions shall include wiring diagrams, control diagrams, and control sequence for each principal system and equipment. Print or engrave operating instructions and frame under glass or in approved laminated plastic. Post instructions as directed. Attach or post operating instructions adjacent to each principal system and equipment including startup, proper adjustment, operating, lubrication, shutdown, safety precautions, procedure in the event of equipment failure, and other items of instruction as recommended by the manufacturer of each system or equipment. Provide weather-resistant materials or weatherproof

enclosures for operating instructions exposed to the weather. Operating instructions shall not fade when exposed to sunlight and shall be secured to prevent easy removal or peeling.

1.10 INSTRUCTION TO OWNER'S PERSONNEL

A. Where indicated in the technical sections, furnish the services of competent instructors to give full instruction to Owner's personnel in the adjustment, operation, and maintenance of systems and equipment, including pertinent safety requirements as required. Each instructor shall be thoroughly familiar with all parts of the installation and shall be trained in operating theory as well as practical operation and maintenance work. Instruction shall be given during the first regular work week after the equipment or system has been accepted and turned over to the Owner for regular operation. The number of man days (8 hours) of instruction furnished shall be as specified in each individual section.

1.11 LAYOUT OF THE WORK

A. Coordinate the proper relation of the work to the building structure, existing utilities and to the work of all trades. Visit the premises and become familiar with the dimensions in the field, and advise the Owner's Representative of any discrepancy before performing any work.
   1. Contract Drawings: The Contract Drawings represent the general intent as to layout and equipment arrangements. All locations and dimensions shown shall be field verified and minor alterations made if so required. Where dimensions are not given for the location and arrangement of mechanical systems, locations may be assumed to be approximate, and may be altered if required. Major modifications to the indicated arrangements shall be approved by the Owner's Representative prior to the installation of mechanical systems. Schematic diagrams represent the overall system requirements and do not necessarily indicate the physical orientation, location or dimensions of that system.
   2. Record Drawings: The Contractor shall maintain a record of the progress of the work and shall submit three (3) hard copy sets of As-Built Drawings upon completion of the project.

1.12 DELIVERY AND STORAGE

A. Handle, store, and protect equipment and materials in accordance with the manufacturer's recommendations and with the requirements of NFPA 70B, Appendix I, titled "Equipment Storage and Maintenance During Construction". Replace damaged or defective items with new items.

1.13 SPECIAL CONDITIONS

A. When performing work within active areas, the Contractor shall be responsible to coordinate with the Owner regarding planned interruptions to electrical services

and/or road access. Contractor must maintain in service the existing electrical services at the existing building unless otherwise coordinated with the Owner.

B. Protection of Existing Work: The Contractor shall take all necessary precautions to ensure against damage to existing work to remain in place, or to be reused. The Contractor shall ensure that structural elements are not overloaded and additional structural supports required as a result of any cutting, removal or demolition work performed under any part of this Contract are added. Unless specified otherwise, the Contractor shall submit for review detailed shop drawings applicable to the Contract work for all structural supports, hangers and related devices, structural modifications, temporary rigging and associated rigging plans. Commencement of such work prior to the submission and review of applicable shop drawings shall be at the sole risk of the Contractor.

C. Upon damage to existing equipment, buildings, and/or structures, the Contractor shall immediately notify the Owner. All damages shall be repaired by the Contractor, or shall be replaced if beyond repair, to match the existing to the Owner's satisfaction.

D. Protection of Buildings from the Weather: The interior of the buildings and all materials and equipment shall be protected from the weather at all times.

E. Protection of Personnel: Where the safety of non-contractor personnel is endangered in the area of the work, barricades shall be used. Additional protection shall be provided if required, to preserve the safety of non-contractor personnel in the immediate area of the work.

F. Contractor shall maintain open road access at all times to the existing . Contractor shall stage construction such that at least one lane of the existing access road is open at all times. Contractor shall coordinate with the Owner a minimum of one week prior to any planned road closings.

G. Construction in Existing Buildings: Verify with Owner expected routing of new wire and/or conduit within existing equipment or buildings prior to field construction of systems. Coordinate with the Owner a minimum of ten (10) working days prior to any planned disruption of existing working systems.

1.14 CATALOGED PRODUCTS/SERVICE AVAILABILITY

A. Materials and equipment shall be current products by manufacturers regularly engaged in the production of such products. Products shall have been in satisfactory commercial or industrial use for 2 years prior to bid opening. The 2-year period shall include applications of equipment and materials under similar circumstances and of similar size. The 2-year period shall be satisfactorily completed by a product for sale on the commercial market through advertisements, manufacturers' catalogs, or brochures. Products having less than a 2-year field service record will be acceptable if a certified record of satisfactory field operation for not less than 6000 hours, exclusive of the manufacturers'

factory or laboratory tests, is furnished. The equipment items shall be supported by service organizations which are reasonably convenient to the equipment installation in order to render satisfactory service to the equipment on a regular and emergency basis during the warranty period of the Contract.

1.15 MANUFACTURER'S RECOMMENDATIONS

A. Where installation procedures or any part thereof are required to be in accordance with manufacturer's recommendations, furnish printed copies of the recommendations prior to installation. Installation of the item shall not proceed until recommendations are received. Failure to furnish recommendations shall be cause for rejection of the equipment or material. Obtain manufacturer's recommendations from the Owner for equipment and/or material provided by the Owner.

1.16 MOTORS AND MOTOR CONTROLS FOR MECHANICAL EQUIPMENT

A. The electrical components of mechanical equipment, such as motors, motor starters, control or push button stations, float or pressure switches, solenoid valves, and other devices functioning to control mechanical equipment, and control wiring and conduit for circuits rated 100 volts or less, are specified in the section covering the associated mechanical equipment, rather than in Division 26, unless otherwise shown. The interconnecting power wiring and conduit, control wiring rated 120 volts (nominal) and conduit, and the electrical power circuits shall be furnished and installed under Division 26 in accordance with other sections and/or as shown on the Contract Drawings.

PART 2 - PRODUCTS

2.01 MATERIALS AND EQUIPMENT

A. All materials, equipment, and devices shall, as a minimum, meet the requirements of UL where UL standards are established for those items, and the requirements of NFPA 70. All items shall be new unless specified or indicated otherwise.

2.02 NAMEPLATES

A. Fed. Spec. L-P-387. Provide laminated plastic nameplates for each panelboard, equipment enclosure, relay, switch, and device. Each nameplate inscription shall identify the function and, when applicable, the position. Nameplates shall be melamine plastic, 0.125-inch thick, white with black center core. Surface shall be matte finish. Corners shall be square. Accurately align lettering and engrave into the black core. Minimum size of nameplates shall be 1.0 inch by 2.5 inches. Lettering shall be a minimum of 0.25-inch high normal block style.

B. For sites with power generation equipment: Provide permanent nameplate at service entrance equipment indicating type and location of on-site generation power source (generator, PV, co-gen, etc.) in accordance with NEC Article 705. Provide same nameplate at generation sources main disconnect indication type and location of service entrance equipment.

PART 3 - EXECUTION

3.01 NAMEPLATE MOUNTING

A. Provide number, location, and letter designation of nameplates as indicated. Fasten nameplates to the device with a minimum of two sheet-metal screws or two rivets.

B. Provide nameplates for all equipment as required by other sections.

C. Provide nameplates for all owner furnished equipment that is installed by this Contractor.

3.02 PAINTING OF EQUIPMENT

A. Factory Applied: Electrical equipment shall have factory-applied painting systems which shall, as a minimum, meet the requirements of NEMA ICS 6 corrosion-resistance test, except equipment specified to meet requirements of ANSI C37.20 shall have a finish as specified in ANSI C37.20.

3.03 TESTS

A. General: Perform and record all tests in the presence of the Owner's authorized representative and/or the Engineer. Furnish all instruments and personnel. Perform preliminary tests and correct all defective material and/or workmanship prior to witness of tests. Perform tests as indicated and as otherwise noted in other Sections of the Division 26.

B. Conduct field tests in the sequence listed below:
   1. Insulation Resistance Tests: As required per individual specification sections.

C. Load Balance Test: Make test by energizing all lighting, motors and other electrical equipment simultaneously for a three-hour period. Alter fuses, circuit breakers, circuit connections, etc., as required for satisfactory performance. Take voltage and amperage readings on each circuit at all panels.

D. Check the amperage draw, voltage and direction of rotation of each motor in the presence of the equipment contractor and the Owner's representative. Make all necessary changes to obtain proper rotation, motor terminal voltage, motor

protection, etc. Revise heater elements as necessary for proper motor protection. Similarly check all other electrically connected equipment.

1. Make the test at a time during the day or night that is mutually satisfactory to the Owner at least one week prior to substantial completion. Make all arrangements and notify all parties in writing at least seventy-two hours prior to the test.

E. Equipment Operation Test - Show by demonstration in service that all circuits are in good operating condition. Cycle all control equipment under load at least five times.

F. Equipment and apparatus factory tests - Manufacturer's normal quality control tests are acceptable, unless specific factory witnessed tests are specified in other sections.

G. Perform all other field tests as required in individual specification sections.

3.04 CLEANING

A. When directed, just prior to final acceptance, clean all equipment including, but not limited to, the following:

1. Lighting fixtures, panelboards, control centers, switchgear, receptacles and switch plates - Remove all tags and labels; leave ready for use
2. All equipment to be painted, removing all rust, etc., and leave ready for painting
3. Building, by removing all debris, conduits, wire, insulation, cartons, etc., left as a result of this work.

3.05 THIRD PARTY INSPECTION AND MISC SERVICES COORDINATION

A. Contractor shall provide and pay for inspection of electrical work by an AHJ approved electrical inspection agency.

B. Contractor shall coordinate with the Owner regarding connections to existing systems and work within existing buildings and equipment.

3.06 WORK WITHIN EXISTING BUILDINGS

A. Contractor shall install new feeder breakers in existing panels and shall install new conduit and wire systems within existing buildings. Contractor shall use care in installation of new work and shall protect existing work and finishes in his work area. Contractor shall immediately notify Owner of any damages to existing equipment or finishes and shall restore damaged items to Owner's satisfaction.

END OF SECTION

SECTION 26 05 19

WIRING/CABLE, 600 VOLTS AND UNDER

PART 1 - GENERAL

1.01 DESCRIPTION

A. Under this Section, the Contractor shall furnish all labor, materials, equipment and accessories for Wiring/Cable, 600 Volts and Under, as shown on the Plans, as specified and/or directed.

B. For type MC cable, refer to Contract Drawings for areas where MC cable is allowed. MC cable shall be allowed only for branch circuit wiring (lighting and receptacles).

1.02 REFERENCES

A. The publications listed below and their latest revisions form a part of this Specification to the extent referenced. The publications are referred to in the text by the basic designation only and shall be the most current version.

1. National Electrical Manufacturers Association (NECA) Publication:
   a. Standard of Installation
2. International Electrical Testing Association (NETA) Publication:
   a. ATS - Electrical Power Distribution Equipment and Systems
3. National Fire Protection Association (NFPA) Publication:
   a. 70 - National Electrical Code
4. American Society for Testing and Materials (ASTM) Publications:
   a. B1 - Hard-Drawn Copper Wire
   b. B8 - Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft
   c. E14 - Fire Tests of Through-Penetration Fire Stops
5. Underwriters Laboratories, Inc. (UL) Publications:
   a. 854 - Service Entrance Cables
   b. 486A - Wire Connector and Soldering Lugs for Use with Copper Conductors
   c. 486C - Splicing Wiring Connectors
   d. 1569 - Metal-Clad Cables

1.03 SUBMITTALS

A. Product Data: Catalog sheets, specifications and installation instructions.

B. Specification required test results.

1.04 PRODUCT DELIVERY

A. Mark and tag insulated conductors and cables for delivery to the site. Include:
   1. Contractor's name.
   2. Project title and number.
   3. Date of manufacture (month & year).
   4. Manufacturer's name.
   5. Environmental suitability information (listed or marked "sunlight resistant" where exposed to direct rays of sun; wet locations listed/marked for use in wet locations; other applications listed/marked suitable for the applications).

PART 2 - PRODUCTS

2.01 INSULATED CONDUCTORS AND CABLES

A. Date of Manufacture: No insulated conductor more than one year old when delivered to the site will be acceptable.

B. Acceptable Companies: American Insulated Wire Corp., BICC General Cable Industries, Inc., Cerro Wire & Cable Co. Inc., Pirelli Cable Corp., Owl Cable Corp., or Southwire Co.

C. Conductors: Annealed uncoated copper or annealed coated copper in conformance with the applicable standards for the type of insulation to be applied on the conductor. Conductor sizes No. 12 and larger shall be stranded.

D. Types:
   1. Lighting and Power Wiring:
      a. Insulation: Unless specified or indicated otherwise or required by NFPA 70, power and lighting wires shall be 600-volt, Type THW, THWN, XHHW, or RHW, except that grounding wire may be Type TW. Where lighting fixtures require 90-degree C conductors, provide only conductors with 90-degree C insulation or better.
      b. Metal-Clad Cable, NFPA 70 Article 334 Type MC:
      c. Interlocked flexible galvanized steel armor sheath, conforming to UL requirements for type MC metal clad cable.
      d. Insulated copper conductors, suitable for 600 volts, rated 90°C, one of the types listed in NFPA 70 Table 310-13 or of a type identified for use in Type MC cable.
      e. Internal full size copper ground conductor with green insulation.
      f. Acceptable Companies: AFC Cable Systems Inc., Coleman Cable Co.

g. Connectors for MC cable: AFC Fitting Inc.'s AFC Series, Arlington Industries Inc.'s Saddle grip, or Thomas & Betts Co.'s Tite-Bite with anti-short bushings.

1) MI: AFC Cable Systems' Type MI Cable, or BICC/Pyrotenax Mineral Insulated System 1850 Pyrotenax Cable:

a) Copper conductors.

b) Sheathing containing asbestos fibers shall not be used.

In corrosive areas where indicated on drawings, utilize the following:

c) PVC or HDPE jacketing (where shown on drawings).

d) 600 volt rating.

e) Fittings and accessories as required for a complete system to suit listing and installation conditions.

2. Class 1, 2, 3 Wiring: Minimum size for branch circuits shall be No. 12 AWG; for Class 1 remote-control and signal circuits, No. 14 AWG; and for Class 2 low-energy, remote-control and signal circuits, No. 16 AWG.

3. VFD Cables: VFD equipment shall be wired from line side (for standalone VFDs) and load side of VFD (standalone VFDs and MCC VFDs) to motor utilizing VFD rated cable. Cable specifications are as follows:

a. 600V UL 1277 Type TC per 2005 NEC Article 336
b. Copper Conductors
c. Class B Stranding per ASTM
d. XLPE Insulation XHHW-2 Rated Circuit Conductors (14 AWG and larger)
e. 90°C Wet/Dry
f. Class I & II; Division 2 Hazardous Locations
g. Overall UL 1685 Vertical Tray Flame Test
h. IEEE 1202/383 Vertical Tray Flame Test
i. Overall Shield

2.02 CONNECTORS

A. General:

1. Connectors specified are part of a system. Furnish connectors and components, and use specific tools and methods as recommended by connector manufacturer to form complete connector system.
2. Connectors shall be capable of continuous operation at the current rating of the cables on which they are used.
3. Connectors shall be UL 486 A listed, or UL 486 B listed for combination dual rated copper/aluminum connectors (marked AL7CU for 75 degrees C rated circuits and AL9CU for 90 degrees C rated circuits).

B. Splices:
   1. Spring Type:
      a. Rated 105° C, 600V; Buchanan/Ideal Industries Inc.'s B-Cap, Electrical Products Div./3M's Scotchlok Type Y, R, G, B, O/B+, R/Y+, or B/G+, or Ideal Industries Inc.'s Wing Nuts or Wire Nuts.
      b. Rated 150° C, 600V; Ideal Industries Inc.'s High Temperature Wire-Nut Model 73B, 59B.
   2. Indent Type with Insulating Jacket: Rated 105° C, 600V; Buchanan/Ideal Industries Inc.'s Crimp Connectors, Ideal Industries Inc.'s Crimp Connectors, Penn-Union Corp.'s Penn-Crimps, or Thomas & Betts Corp.'s STA-KON.
   3. Indent Type (Uninsulated): Anderson/Hubbell's Versa-Crimp, VERSAtile, Blackburn/T&B Corp.'s Color-Coded Compression Connectors, Electrical Products Div./3M's Scotchlok 10000, 11000 Series, Framatome Connectors/Burndy's Hydent, Penn-Union Corp.'s BCU, BBCU Series, or Thomas & Betts Corp.'s Compression Connectors.
   4. Connector Blocks: NIS Industries Inc.'s Polaris System, or Thomas & Betts Corp.'s Blackburn AMT Series.
   5. Resin Splice Kits: Electrical Products Div./3M's Scotchcast Brand Kit Nos. 82A Series, 82-B1 or 90-B1, or Scotchcast Brand Resin Pressure Splicing Method.
   6. Heat Shrinkable Splices: Electrical Products Div./3M's ITCSN, Raychem Corp.'s Thermofit Type WCS, or Thomas & Betts Corp.'s SHRINK-KON Insulators.
   7. Cold Shrink Splices: Electrical Products Div./3M's 8420 Series.

C. Gutter Taps: Anderson/Hubbell's GP/GT with GTC Series Covers, Blackburn/T&B Corp.'s H-Tap Type CF with Type C Covers, Framatome Connectors/Burndy's Polytap KPU-AC, H-Crimpit Type YH with CF-FR Series Covers, ILSCO's GTA Series with GTC Series Covers, Ideal Industries Inc.'s Power-Connect GP, GT Series with GIC covers, NSI Industries Inc.'s Polaris System, OZ/Gedney Co.'s PMX or PT with PMXC, PTC Covers, Penn-Union Corp.'s CDT Series, or Thomas & Betts Corp.'s Color-Keyed H Tap CHT with HTC Covers.

D. Terminals: Nylon insulated pressure terminal connectors by Amp-Tyco/Electronics, Electrical Products Div./3M, Framatome Connectors/Burndy, Ideal Industries Inc., Panduit Corp., Penn-Union Corp., Thomas & Betts Corp., or Wiremold Co.

E. Lugs:
   1. Single Cable (Compression Type Lugs): Copper, 1 or 2 hole style (to suit conditions), long barrel; Anderson/Hubbell's VERSAtile VHCL, Blackburn/T&B Corp.'s Color-Coded CTL, LCN, Framatome Connectors/Burndy's Hylug YA, Electrical Products Div./3M Scotchlok 31036 or 31145 Series, Ideal Industries Inc.'s CCB or CCBL, NSI

Industries Inc.'s L, LN Series, Penn-Union Corp.'s BBLU Series, or Thomas & Betts Corp.'s 54930BE or 54850BE Series.

2. Single Cable (Mechanical Type Lugs): Copper, one or 2 hole style (to suit conditions); Blackburn/T&B Corp.'s Color-Keyed Locktite Series, Framatome Connectors/Burndy's Qiklug Series, NSI Industries Inc.'s Type TL, Penn-Union Corp.'s VI-TITE Terminal Lug Series, or Thomas & Betts Corp.'s Locktite Series.
3. Multiple Cable (Mechanical Type Lugs): Copper, configuration to suit conditions; Framatome Connectors/Burndy's Qiklug Series, NSI Industries Inc.'s Type TL, Penn-Union Corp.'s VI-TITE Terminal Lug Series, or Thomas & Betts Corp.'s Color-Keyed Locktite Series.

2.03 TAPES

A. Insulation Tapes:
1. Plastic Tape: Electrical Products Div./3M's Scotch Super 33+ or Scotch 88, Plymouth Rubber Co.'s Plymouth/ Bishop Premium 85CW.
2. Rubber Tape: Electrical Products Div./3M's Scotch 130C, or Plymouth Rubber Co.'s Plymouth/Bishop W963 Plysafe.

B. Moisture Sealing Tape: Electrical Products Div./3M's Scotch 2200 or 2210, or Plymouth Rubber Co.'s Plymouth/Bishop 4000 Plyseal-V.

C. Electrical Filler Tape: Electrical Products Div./3M's Scotchfil, or Plymouth Rubber Co.'s Plymouth/Bishop 125 Electrical Filler Tape.

D. Color Coding Tape: Electrical Products Div./3M's Scotch 35, or Plymouth Rubber Co.'s Plymouth/Bishop Premium 37 Color Coding.

E. Arc Proofing Tapes:
1. Arc Proofing Tape: Electrical Products Div./3M's Scotch 77, Mac Products Inc.'s AP Series, or Plymouth Rubber Co.'s Plymouth/Bishop 53 Plyarc.
2. Glass Cloth Tape: Electrical Products Div./3M's Scotch 27/Scotch 69, Mac Products Inc.'s TAPGLA 5066,, or Plymouth Rubber Co.'s Plymouth/Bishop 77 Plyglas.
3. Glass-Fiber Cord: Mac Products Inc.'s MAC 0527.

2.04 WIRE-PULLING COMPOUNDS

A. To suit type of insulation; American Polywater Corp.'s Polywater Series, Electric Products Div./3M's WL, WLX, or WLW, Greenlee Textron Inc.'s Y-ER-EAS, Cable Cream, Cable Gel, Winter Gel, Ideal Industries Inc.'s Yellow 77, Aqua-Gel II, Agua-Gel CW, or Thomas & Betts Corp.'s Series 15-230 Cable Pulling Lubricants, or Series 15-631 Wire Slick.

2.05 TAGS

A. Precision engrave letters and numbers with uniform margins, character size minimum 3/16 inch high.

B. Phenolic: Two color laminated engraver's stock, 1/16 inch minimum thickness, machine engraved to expose inner core color (white).

C. Aluminum: Standard aluminum alloy plate stock, minimum .032 inch thick, engraved areas enamel filled or background enameled with natural aluminum engraved characters.

2.06 WIRE MANAGEMENT PRODUCTS

A. Cable Clamps and Clips, Cable Ties, Spiral Wraps, etc: Catamount/T&B Corp., or Ideal Industries Inc.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install conductors in raceways after the raceway system is completed. Exceptions: Type TC, MI, or other type specifically indicated on the drawings not to be installed in raceways.

B. No grease, oil, or lubricant other than wire-pulling compounds specified may be used to facilitate the installation of conductors. Completely and thoroughly swab raceway/wire before installing wire/cable.

C. All splices and connections shall be made in accessible boxes and cabinets only.

3.02 CIRCUITING

A. Wiring and cables of different systems shall not be run in same raceway. Power wiring shall not be run in same raceway for remote control/signal wiring.

B. Class 2, 3 plenum rated cables shall be run without raceway when concealed above accessible ceilings unless otherwise indicated on Contract Drawings. These cables shall be run parallel and perpendicular to building surfaces, and shall be neatly bundled and shall be supported independently from the accessible ceiling utilizing bridle rings or similar. Cables shall effectively be routed horizontal. Provide conduit sleeves at wall penetrations.

3.03 COMMON NEUTRAL CONDUCTOR

A. A common neutral shall not be used. Provide individual neutral per each circuit.

3.04 COLOR CODING

A. Color Coding for 120/208/240 Volt Electric Light and Power Wiring:
   1. Color Code:
      a. 2 wire circuit - black, white.
      b. 3 wire circuit - black, red, white.
      c. 4 wire circuit - black, red, blue, white.
   2. White to be used only for an insulated grounded conductor (neutral). If neutral is not required use black and red, or black, red and blue for phase to phase circuits.
      a. "White" for Sizes No. 6 AWG or Smaller:
         1) Continuous white outer finish, or:
         2) Three continuous white stripes on other than green insulation along its continuous length.
      b. "White" for Sizes Larger Than No. 6 AWG:
         1) Continuous white outer finish, or:
         2) Three continuous white stripes on other than green insulation along its continuous length, or:
         3) Distinctive white markings (color coding tape) encircling the conductor, installed on the conductor at time of its installation. Install white color coding tape at terminations, and at 1' 0" intervals in gutters, pull boxes, and manholes.
   3. Colors (Black, Red, Blue):
      a. For Branch Circuits: Continuous color outer finish.
      b. For Feeders:
         1) Continuous color outer finish, or:
         2) Color coding tapes encircling the conductors, installed on the conductors at time of their installation. Install color coding tapes at terminations, and at 1' 0" intervals in gutter, pull boxes, and manholes.

B. Color Coding For 277/480 Volt Electric Light and Power Wiring:
   1. Color Code:
      a. 2 wire circuit – brown, gray.
      b. 3 wire circuit – brown, yellow, gray.
      c. 4 wire circuit – brown, orange, yellow, gray.
   2. Gray to be used only for an insulated grounded conductor (neutral). If neutral is not required use brown and yellow, or brown, yellow and orange for phase to phase circuits.
      a. "Gray" For Sizes No. 6 AWG or Smaller:
         1) Continuous gray outer finish.
      b. "Gray" For Sizes Larger Than No. 6 AWG:
         1) Distinctive gray markings (color coding tape) encircling the conductor, installed on the conductor at time of its installation. Install gray color coding tape at terminations, and at 1' 0" intervals in gutters, pull boxes, and manholes.
      c. Colors (Brown, Yellow, Orange):

d. For Branch Circuits: Continuous color outer finish.
e. For Feeders:
1) Continuous color outer finish, or:
2) Color coding tapes encircling the conductors, installed on the conductors at the time of their installation. Install color coding tapes at terminations, and at 1’ 0” intervals in gutters, pull boxes, and manholes.

C. More Than One Nominal Voltage System Within A building: Permanently post the color coding scheme at each branch-circuit panelboard.

D. Existing Color Coding Scheme: Where an existing color coding scheme is in use, match the existing color coding if it is in accordance with the requirements of NFPA 70.

E. Color Code For Wiring Other Than Light and Power: In accordance with ICEA/NEMA WC-30 “Color Coding of Wires and Cables”. Other coding methods may be used, as approved.

F. On 3-phase, 4-wire delta system, high leg shall be orange, as required by NFPA 70.

3.05 IDENTIFICATION

A. Identification Tags: Use tags to identify feeders and designated circuits. Install tags so that they are easily read without moving adjacent feeders or requiring removal of arc proofing tapes. Attach tags with non-ferrous wire or brass chain.
1. Interior Feeders: Identify each feeder in pull boxes and gutters. Identify by feeder number and size.
2. Exterior Feeders: Identify each feeder in manholes and in interior pull boxes and gutters. Identify by feeder number and size, and also indicate building number and panel designation from which feeder originates.
3. Street and Grounds Lighting Circuits: Identify each circuit in manholes and lighting standard bases. Identify by circuit number and size, and also indicate building number and panel designation from which circuit originates.

B. Identification Plaque: Where a building or structure is supplied by more than one service, or has any combination of feeders, branch circuits, or services passing through it, install a permanent plaque or directory at each service, feeder and branch circuit disconnect location denoting all other services, feeders, or branch circuits supplying that building or structure or passing through that building or structure and the area served by each.

C. All control conductors as specified herein shall be labeled at each termination point. Labeling shall be permanently labeled with printed Brady type labels or equivalent.

3.06 WIRE MANAGEMENT

A. Use wire management products to bundle, route, and support wiring in junction boxes, pull boxes, wireways, gutters, channels, and other locations where wiring is accessible.

3.07 EQUIPMENT GROUNDING CONDUCTOR

A. Install Equipment Grounding Conductor:
   1. Where specified in other Sections or indicated on the Contract Drawings.
   2. In conjunction with circuits recommended by equipment manufacturers to have equipment grounding conductor.

B. Equipment grounding conductor is not intended as a current carrying conductor under normal operating circumstances.

C. Color Coding For Equipment Grounding Conductor:
   1. Color Code: Green.
   2. "Green" For sizes No. 6 AWG or Smaller:
      a. Continuous green outer finish, or:
      b. Continuous green outer finish with one or more yellow stripes, or:
      c. Bare copper (see exception below).
   3. "Green" For Sizes Larger Than No. 6:
      a. Stripping the insulation or covering from the entire exposed length (see exception below).
      b. Marking the exposed insulation or covering with green color coding tapes.
      c. Identify at each end and at every point where the equipment grounding conductor is accessible.
   4. Exception For use of Bare Copper: Not allowed for use where NFPA 70 specifically requires equipment grounding conductor to be insulated, or where specified in other sections or indicated on the drawings to be insulated.

3.08 SPECIAL GROUNDING CONDUCTORS

A. Technical Power System Grounding (Equipment grounding conductor isolated from the premises grounded conductor except at a single grounded termination point): Install an insulated grounding conductor running with the circuit conductors for isolated receptacles or utilization equipment requiring an isolated ground.
   1. Color Code: Green.
   2. "Green" For Isolated Grounding Conductor:
      a. Continuous green outer finish, or:
      b. Continuous green outer finish with one or more yellow stripes, and:

c. Different than the “green” used for the equipment grounding conductor run with the circuit (where required).

3. Install label at every point where the conductor is accessible, identifying it as an “Isolated Grounding Conductor”.

3.09 ARC PROOFING

A. Arc proof 600V and under cables only where routed in a manhole/handhole that also contains medium voltage cable/feeders as follows:
   1. Arc proof new 600V and under cables.
   2. Arc proof existing 600V and under cables that are spliced to new 600V and under cables.
   3. Arc proof each 600V and under cable as a unit (except cables consisting of multiple sets of conductors).
   4. Arc proof 600V and under cables consisting of multiple sets of conductors by arc proofing each set of conductors as a unit.
   5. Arc proof with half-lapped layer of 55 mils thick arc proofing tape and random wrapped or laced with glass cloth tape or glass-fiber cord. For arc proofing tape less than 55 mils thick, add layers to equivalent of 55 mils thick arc proofing tape.

3.10 INSULATED CONDUCTOR AND CABLE SCHEDULE - TYPES AND USE

A. Electric Light and Power Circuits:
   1. FEP, THHN, THW, THW-2, THWN, THWN-2, XHH, XHHW, or XHHW-2: Wiring in dry or damp locations (except where special type insulation is required).
   2. THWN, THWN-2, XHHW, XHHW-2, USE, or USE-2: Wiring in wet locations (except where type USE or USE-2 insulated conductors are specifically required, or special type insulation is required).
   3. THHN, THWN or THWN-2: Wiring installed in existing raceway systems (except where special type insulation is required).
   4. THHN, THW-2, THWN-2, XHHW, or XHHW-2: Wiring for electric discharge lighting circuits (fluorescent, HID), except where fixture listing requires wiring rated higher than 90° C.
   5. THWN Marked “Gasoline and Oil Resistant”: Wiring to gasoline and fuel oil pumps.
   6. USE, or USE-2: Wiring indicated on the drawings to be direct burial in earth.
   7. USE, or USE-2 Marked “Sunlight Resistant”:
      a. Service entrance wiring from overhead service to the service equipment.
      b. Wiring exposed to the weather and unprotected (except where special type insulation is required).

8. MC: Where allowed for 120V, 20A max circuits per the Contract Drawings or part as specified herein:
    a. Branch circuit wiring in wood framed construction (wood joists and wood stud partitions):
        1) Install conductors parallel with joists or studs and attach to the side of these timbers by galvanized straps spaced not more than 6 feet apart.
        2) Install conductors through holes bored in the center of the timbers when running at right angles to joists or studs.
        3) Do not attach the conductors to the edge of joists or studs.
    b. Branch circuit wiring in movable metal partitions and movable gypsum partitions.
        1) Install conductors in accordance with partition manufacturer's recommendations.
    c. Branch circuit wiring in metal stud partitions:
        1) Install conductors parallel with studs and attach to the side by galvanized straps spaced not more than 6 feet apart.
        2) Install conductors through holes bored in the center of the metal member when running at right angles to studs.
    d. Conductors shall be protected by listed bushings or listed grommets covering all metal edges.
        1) Do not attach the conductors to the edge of studs.
9. MI:
10. Wiring for underplaster extensions.
11. Wiring in areas where indicated on the Contract Drawings.
12. Where MI cable is installed in areas subjecting cable to corrosion, use PVC or HDPE jacketed MI cable (nonmetallic jacketed cable is not suitable for use in ducts, plenums or other spaces used for environmental air).

B. Emergency Feeder Circuits: Use electrical circuit protective system.

C. Class 1 Circuits: Use Class 1 wiring specified in Part 2 (except where special type insulation is required).

D. Class 2 Circuits: Use Class 2 wiring specified in Part 2 (except where special type insulation is required).

E. Class 3 Circuits: Use Class 3 wiring specified in Part 2 (except where special type insulation is required).

3.11 CONNECTOR SCHEDULE - TYPES AND USE

A. Temperature Rating: Use connectors that have a temperature rating, equal to, or greater than the temperature rating of the conductors to which they are connected.

B. Splices:
   1. Dry Locations:
      a. For Conductors No. 8 AWG or Smaller: Use spring type pressure connectors, indent type pressure connectors with insulating jackets, or connector blocks (except where special type splices are required).
      b. For Conductors No. 6 AWG or Larger: Use connector blocks or uninsulated indent type pressure connectors. Fill indentions in uninsulated connectors with electrical filler tape and apply insulation tape to insulation equivalent of the conductor, or insulate with heat shrinkable splices or cold shrink splices.
      c. Gutter Taps in Panelboards: For uninsulated type gutter taps fill indentions with electrical filler tape and apply insulation tape to insulation equivalent of the conductor, or insulate with gutter tap cover.
   2. Damp Locations: As specified for dry locations, except apply moisture sealing tape over the entire insulated connection (moisture sealing tape not required if heat shrinkable splices or cold shrink splices are used).
   3. Wet Locations: Use uninsulated indent type pressure connectors and insulate with resin splice kits, cold shrink splices or heat shrinkable splices. Exception: Splices aboveground which are totally enclosed and protected in NEMA 3R, 4, 4X enclosures may be spliced as specified for damp locations.

C. Terminations:
   1. For Conductors No. 10 AWG or Smaller: Use terminals for:
      a. Connecting wiring to equipment designed for use with terminals.
   2. For Conductors No. 8 AWG or Larger: Use compression or mechanical type lugs for:
      a. Connecting cables to flat bus bars.
      b. Connecting cables to equipment designed for use with lugs.
   3. For Conductor Sizes Larger Than Terminal Capacity On Equipment: Reduce the larger conductor to the maximum conductor size that terminal can accommodate (reduced section not longer than one foot). Use compression or mechanical type connectors suitable for reducing connection.

3.12 TESTING

A. Insulation Resistance Tests: Make tests after all wiring is completed and connected ready for the attachment of fixture and/or equipment. Repeat test when all fixtures and/or equipment are connected ready for use. Make tests with an instrument capable of measuring the resistance involved at a voltage of at least 500 VDC for equipment rated at 100 to 500 VAC, 1500 VDC for equipment rated at 151 to 600 VAC. Apply voltage continuously for one minute prior to taking reading. Measure insulation resistance between each pair of insulated conductor separately and between each insulated conductor and ground. Make tests at each

panelboard distribution panel, and switchboard on every circuit with the circuit protective device open but connected. The minimum acceptable measured insulation resistance for wiring completed and ready for connection of fixtures and/or equipment is 50 meg ohms.

END OF SECTION

SECTION 26 05 34

CONDUIT

PART 1 - GENERAL

1.01 DESCRIPTION

A. Under this Section, the Contractor shall furnish all labor, materials and equipment for Conduit as shown on the Plans, as specified, and/or directed.

1.02 REFERENCES

A. The publications listed below and their latest revisions form a part of this Specification to the extent referenced. The publications are referred to in the text by the basic designation only.
   1. American National Standards Institute (ANSI) Publications:
      a. C80.1 - Rigid Steel Conduit, Zinc Coated
      b. C80.3 - Electrical Metallic Tubing, Zinc Coated
      c. C80.5 - Rigid Aluminum Conduit
   2. National Electrical Manufacturers Association (NEMA) Publications:
      a. FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies
      b. RN 1 - Polyvinyl Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit
      c. TC 2 - Electrical Plastic Tubing (EPT) and Conduit (EPC-40 and EPC-80)
      d. TC 3 - PVC Fittings for Use with Rigid PVC Conduit and Tubing
   3. National Electrical Contractors Association (NECA) Publication:
      a. Standard of Installation

1.03 SECTION INCLUDES

A. Rigid steel conduit.

B. PVC coated rigid steel conduit.

C. Flexible metal conduit.

D. Liquid-tight flexible metal conduit.

E. Electrical metallic tubing.

F. Nonmetallic conduit.

G. Flexible nonmetallic conduit.

H. Electrical nonmetallic tubing.

I. Fittings and conduit bodies.

1.04 RELATED SECTIONS

A. Section 26 05 01, “Electrical General Requirements”, applies to this Section with additions and modifications specified herein.

1.05 SUBMITTALS

A. Conduit and fittings (each type).

1.06 DELIVERY, STORAGE, AND HANDLING

A. Protect conduit from corrosion and entrance of debris by storing above grade. Provide appropriate covering.

B. Protect PVC conduit from sunlight.

1.07 PROJECT CONDITIONS

A. Verify that field measurements are as shown on the Contract Drawings.

B. Field verify all conduit routing and coordinate proposed conduit routing with all existing equipment, structure features, proposed equipment locations for equipment furnished by this Contractor and all other Contractors, Owner furnished equipment, etc. prior to rough-in.

C. Conduit routing, when shown on the Contract Drawings, are in approximate locations unless dimensioned. Route as required to complete wiring system.

D. Plans (drawings) are diagrammatic and show only approximate locations of equipment, fixtures, devices, etc. Plans may not show exact quantity and locations of junction and pull boxes required for a complete installation. Exact locations and routing of conduit shall be determined in the field and shall suit the job conditions. Quantities and locations of outlet, junction, and pull boxes shall be provided to suit the installed arrangement and meet all NEC and local code requirements.

1.08 QUALITY ASSURANCE

A. In each standard referred to herein, consider the advisory provisions to be mandatory, as though the word “shall” has been substituted for “should” wherever it appears.

B. Verify routing and termination locations of conduit prior to rough-in.

C. Conduit routing when shown on the Contract Drawings are in approximate locations unless dimensioned. Route as required to complete wiring system.

1.09 QUALITY ASSURANCE

A. In each standard referred to herein, consider the advisory provisions to be mandatory, as though the word “shall” has been substituted for “should” wherever it appears.

PART 2 - PRODUCTS

2.01 MATERIALS AND EQUIPMENT

A. Materials, equipment, and devices shall, as a minimum, meet requirements of UL, where UL standards are established for these items, and requirements of NFPA 70.

B. Provide conduit types in specific installations as scheduled on Contract Drawings. Specific conduit material and installation specifications for the scheduled conduit type are specified herein.

2.02 CONDUIT AND FITTINGS

A. Rigid Steel Conduit (Zinc-coated): ANSI C80.1, UL 6.

B. Rigid Aluminum Conduit: ANSI C80.5, UL 6.

C. Rigid Nonmetallic Conduit: UL 651, UL 1684
   1. PVC Type EPC-40 and EPC-80, in accordance with NEMA TC2.
   2. Fiberglass conduit in accordance with NEMA TC14.

D. Intermediate Metal Conduit (IMC): UL 1242, zinc-coated steel only.

E. Electrical Metallic Tubing (EMT): UL 797, ANSI C80.3.

F. Electrical Nonmetallic Tubing (ENT): NEMA TC13.

G. Plastic-coated Rigid Steel and IMC Conduit: NEMA RN1, Type 40 (40 mils thick).

H. Flexible Metal Conduit: UL 1.
   1. Liquid-tight Flexible Metal Conduit, Steel: UL 360.

I. Fittings for Metal Conduit, EMT, and Flexible Metal Conduit: UL 514B. Ferrous fittings shall be cadmium- or zinc-coated in accordance with UL 514B. Fittings shall match conduit type and material.

1. Fittings for Rigid Metal Conduit and IMC: Threaded-type. Split couplings unacceptable.
2. Fittings for EMT: set screw type.
3. Fittings for Use in Hazardous Locations: UL 886.

J. Fittings for Rigid Nonmetallic Conduit: NEMA TC3. Fittings shall match conduit type and material.

2.03 FIBER OPTIC SYSTEMS

A. For conduit systems that are intended for the installation of fiber optic cables, all conduit bends radii shall meet or exceed minimum radius in accordance with installed fiber optic bending limitation specifications.

B. Where conduit bodies are used in 90 degree sections of conduit runs, only “Optical LB”, or equivalent shall be used.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Electrical installations shall conform to requirements of NFPA 70 and to requirements specified herein.

B. Hazardous Locations: Work in hazardous locations, as defined by NFPA 70, shall be performed in strict accordance with NFPA 70 for particular "Class", "Division", and "Group" of hazardous locations involved. Provide conduit and cable seals where required by NFPA 70. Conduit shall have tapered threads.

C. Service Entrance Identification: Service entrance disconnect devices, switches, or enclosures shall be labeled or identified as such.
1. Labels: Wherever work results in service entrance disconnect devices in more than one enclosure, as permitted by NFPA 70, each enclosure, new and existing, shall be labeled as one of several enclosures containing service entrance disconnect devices. Label, at minimum, shall indicate number of service disconnect devices housed by enclosure and shall indicate total number of enclosures that contain service disconnect devices. Provide laminated plastic labels. Use lettering of at least 0.25 inch in height, and engrave on black-on-white matte finish. Service entrance disconnect devices in more than one enclosure shall be provided only as permitted by NFPA 70.

D. Wiring Methods: Provide insulated conductors installed in conduit, except where specifically indicated or specified otherwise or required by NFPA 70 to be installed otherwise. Provide insulated, green equipment grounding conductor in feeder and branch circuits, including lighting circuits. Grounding conductor shall

be separate from electrical system neutral conductor. Provide insulated, green conductor for grounding conductors installed in conduit or raceways. Minimum conduit size shall be 1/2 inch in diameter for low voltage lighting and power circuits. Vertical distribution in multiple story buildings shall be made with metal conduit in fire-rated shafts. Metal conduit shall extend through shafts for minimum distance of 6 inches. Conduit which penetrates fire walls, fire partitions, or floors shall be metallic on both sides of fire walls, fire partitions, or floors for minimum distance of 6 inches.

1. Aluminum Conduit: Do not install underground or encase in concrete. Do not use brass or bronze fittings.
2. Restrictions Applicable to EMT:
    a. Do not install underground.
    b. Do not encase in concrete.
    c. Do not use in areas subject to severe physical damage.
    d. Do not use in hazardous areas.
    e. Do not use outdoors.
3. Nonmetallic Conduit: Conduit shall not penetrate fire walls, fire partitions, or floors.
4. ENT: ENT may be provided in walls, floors, and ceilings only when protected by thermal barriers identified as having minimum 15-minute finish rating. If ENT is used, provide required thermal barriers, whether indicated or not.
    a. Following restrictions apply to ENT:
    b. Do not route exposed.
    c. Do not route above suspended ceilings (i.e., between suspended ceilings and permanent ceilings).
    d. Do not use in feeder circuits.
    e. Do not install underground.
    f. Do not encase in concrete.
    g. Do not use in areas subject to severe physical damage including, but not limited to, mechanical equipment rooms, electrical equipment rooms, hospitals, power plants, missile magazines, and other such areas.
    h. Do not use in hazardous areas.
    i. Do not use outdoors.
    j. Do not use in sizes larger than 2 inches.
    k. Do not use in penetrating fire rated walls, partitions, etc.
5. Restrictions applicable to PVC Schedule 40 and PVC Schedule 80.
    a. Do not use in feeder circuits unless otherwise indicated.
    b. Do not use in areas subject to severe physical damage including, but not limited to, mechanical equipment rooms, electrical equipment rooms, hospitals, power plants, missile magazines, and other such areas.
    c. Do not use in hazardous areas.
    d. Do not use in penetrating fire-rated walls or partitions, fire rated floors, etc.

6. Service Entrance Conduit, Overhead: Rigid steel or IMC from service entrance to service entrance fitting or weatherhead outside building.
7. Service Entrance Conduit, Underground: Galvanized rigid steel or steel IMC. Underground portion shall be encased in minimum of 3 inches of concrete and shall be installed minimum 18 inches below slab or grade.
8. Underground Conduit Other Than Service Entrance: Plastic-coated rigid steel; plastic-coated steel IMC; PVC, Type EPC-40; or fiberglass. Convert nonmetallic conduit, other than PVC Schedule 40 or 80, to plastic-coated rigid, or IMC, steel conduit before rising through floor slab; plastic coating shall extend minimum 6 inches above floor.
9. Conduit in Floor Slabs: Rigid steel; steel IMC; fiberglass, or PVC, Type EPC-40.
10. Conduit Interior to Buildings for 400 Hz Circuits: Aluminum or nonmetallic. Where 400-Hz circuit runs underground or through concrete, conduit shall be PVC Schedule 80.
11. Conduit for Circuits Rated Greater Than 600 Volts: Rigid metal conduit or IMC only.

E. Conduit Installation: Unless indicated otherwise, conceal conduit within finished walls (existing or proposed), above ceilings, below floors or within floor slabs. With written approval by the Owner's Designated Representative where conduit cannot physically be installed concealed, install decorative surface metal raceway as manufactured by Wiremold Series 2400, or approved equal.
1. For new conduit runs in existing locations, Contractor to field verify all proposed locations prior to installation. Installation of conduit shall be located and installed:
    a. So as to not interfere with existing utilization equipment.
    b. Not in front of intake/exhaust fans and louvers.
    c. Not in front of access panels.
    d. Not in front of doors or windows.
    e. In a location that does not allow maintenance and clearance to existing and proposed mechanical and electrical equipment
    f. Not on floor or at a height above floor so as to be a tripping hazard,
    g. Not installed in dedicated space that would limit an overhead cranes or similar lifting device's ability to remove intended equipment below. This includes but is not limited to access hatches, crane trucks, crane hoists, movement along crane rails, jib crane full swinging arc/areas, etc.
2. Contractor to notify Owner and Owners Designated Representative of all potential conduit installation conflicts with existing equipment, HVAC, plumbing, building or structural systems prior to field construction of conduit systems.

F. Keep conduit minimum 6 inches away from parallel runs of flues and steam or hot water pipes. Install conduit parallel with or at right angles to ceilings, walls, and structural members where located above accessible ceilings and where conduit

will be visible after completion of project. Run conduits in crawl space under slab as if exposed.

1. Conduit Through Floor Slabs: Where conduits rise through floor slabs, curved portion of bends shall not be visible above finish slab.
2. Conduit Support: Support conduit by pipe straps, wall brackets, hangers, or ceiling trapeze. Fasten by wood screws to wood; by toggle bolts on hollow masonry units; by concrete inserts or expansion bolts on concrete or brick; and by machine screws, welded threaded studs, or spring-tension clamps on steel work. Threaded C-clamps may be used on rigid steel conduit only. Do not weld conduits or pipe straps to steel structures. Load applied to fasteners shall not exceed one-fourth proof test load. Fasteners attached to concrete ceiling shall be vibration- resistant and shock-resistant. Holes cut to depth of more than 1-1/2 inches in reinforced concrete beams or to depth of more than 3/4 inch in concrete joints shall not cut main reinforcing bars. Fill unused holes. In partitions of light steel construction, use sheet metal screws. In suspended- ceiling construction, run conduit above ceiling. Do not support conduit by ceiling support system. Spring-steel fasteners may be used for lighting branch circuit conduit supports in suspended ceilings in dry locations. Support exposed risers in wire shafts of multi-story buildings by U-clamp hangers at each floor level and at 10-foot maximum intervals. Where conduit crosses building expansion joints, provide suitable watertight expansion fitting that maintains conduit electrical continuity by bonding jumpers or other means. Support raceways within three (3) feet of each outlet box, junction box, cabinet or enclosure.
3. Directional Changes in Conduit Runs: Make changes in direction of runs with symmetrical bends or cast-metal fittings. Make field-made bends and offsets with hickey or conduit-bending machine. Do not install crushed or deformed conduits. Avoid trapped conduits. Prevent plaster, dirt, or trash from lodging in conduits, boxes, fittings, and equipment during construction. Free clogged conduits of obstructions.
4. Pull Wire: Install pull wires in empty conduits in which wire is to be installed by others. Pull wire shall be plastic having minimum 200-pound tensile strength. Leave minimum 12 inches of slack at each end of pull wire.
5. Telephone and Signal System Conduits: Install in accordance with specified requirements for conduit and with additional requirement that no length of run shall exceed 150 feet for trade sizes 2 inches and smaller and shall not contain more than two 90-degree bends or equivalent. Provide pull or junction boxes where necessary to comply with these requirements. Inside radii of bends in conduits 1-inch trade size and larger shall be minimum five times nominal diameter. Terminate conduit at bottom edge of backboard.
6. Conduit Installed in Concrete Floor Slabs: Locate so as not to adversely affect structural strength of slabs. Install conduit within middle 1/3 of concrete slab. Space conduits horizontally minimum three diameters,

except at cabinet locations. Curved portions of bends shall not be visible above finish slab. Increase slab thickness as necessary to provide minimum 1-inch cover over conduit. Where embedded conduits cross expansion joints, provide suitable watertight expansion fittings and bonding jumpers. Conduit larger than 1-inch trade size shall be parallel with or at right angles to main reinforcement; when at right angles to reinforcement, conduit shall be close to one of supports of slab. Where nonmetallic conduit is used, raceway must be converted to rigid steel or steel IMC before rising above floor, unless specifically indicated otherwise.

7. Locknuts and Bushings: Fasten conduits to sheet metal boxes and cabinets with two locknuts where required by NFPA 70, where insulated bushings are used, and where bushings cannot be brought into firm contact with the box; otherwise, use minimum single locknut and bushing. Locknuts shall have sharp edges for digging into wall of metal enclosures. Install bushings on ends of conduits, and provide insulating type where required by NFPA 70.
8. Stub-ups: Provide conduits stubbed up through concrete floor for connection to free-standing equipment with adjustable top or coupling threaded inside for plugs, set flush with finished floor. Extend conductors to equipment in rigid steel conduit, except that flexible metal conduit may be used 6 inches above floor. Where no equipment connections are made, install screwdriver-operated threaded flush plugs in conduit end.
9. Flexible Connections: Provide flexible connections of short length, 6-foot maximum, for recessed and semi-recessed lighting fixtures; for equipment subject to vibration, noise transmission, or movement; and for motors. Provide liquid-tight flexible conduit in wet locations. Provide separate ground conductor across flexible connections.
10. Arrange conduit to maintain headroom and present neat appearance.
11. Cut conduit square using saw or pipe cutter; deburr cut ends. For field cut threaded conduits, provide field applied anti-corrosion material to the threads in accordance with the manufacturer’s instructions and per the NEC. Product shall be Thomas & Betts KOPR-Shield or approved equal.
12. Use conduit hubs or sealing locknuts to fasten conduit to sheet metal boxes in damp and wet locations and to cast boxes.
13. Install no more than equivalent of three 90 degree bends between boxes.
14. Avoid moisture traps; provide junction box with drain fitting at low points in conduit system.
15. Provide suitable fittings to accommodate expansion and deflection where conduit crosses expansion joints.
16. Use Suitable caps to protect installed conduit against entrance of dirt and moisture.
17. Ground and bond conduit under as per NEC 250.

3.02 INTERFACE WITH OTHER PRODUCTS

A. Install conduit to preserve fire resistance rating of partitions and other elements, using materials and methods specified in other sections.

B. Route conduit through roof openings for piping and ductwork or through suitable roof jack with pitch pocket. Coordinate location with roofing installation. Coordinate installation with representative of roofing material manufacturer to maintain any roof warranty.

END OF SECTION

SECTION 26 05 35

OUTLET, JUNCTION AND PULL BOXES

PART 1 - GENERAL

1.01 DESCRIPTION

A. Under this Section, the Contractor shall furnish all labor, materials and equipment for Outlet, Junction and Pull Boxes, as shown on the Plans, as specified, and/or directed.

B. Plans (drawings) are diagrammatic and show only approximate locations of equipment, fixtures, devices, etc. Plans may not show exact quantity and locations of Junction and Pull Boxes required for a complete installation. Exact locations and routing shall be determined in the field and shall suit the job conditions. Quantities and locations of Outlet, Junction, and Pull Boxes shall be provided to suit the installed arrangement and meet all NEC and local code requirements.

1.02 REFERENCES

A. NEMA

B. UL. (Specifically UL 514A)

C. NFPA 70

1.03 SUBMITTALS

A. Product Data: Catalog sheets, specifications and installation instructions.
   1. For fire rated construction, prove that materials and installation methods proposed for use are in accordance with the listing requirements of the classified construction.

B. Shop Drawings: Plans, elevations, sections, and details for all custom enclosures and cabinets

1.04 GENERAL REQUIREMENTS

A. Section 26 05 01, "Electrical General Requirements", applies to this Section, with the additions and modifications specified herein.

PART 2 - PRODUCTS

2.01 GALVANIZED STEEL OUTLET BOXES

A. Standard galvanized steel boxes and device covers by Appleton Electric Co., Cooper/Crouse-Hinds, Hubbell, or approved equal.

2.02 GALVANIZED STEEL JUNCTION AND PULL BOXES

A. Code gage, galvanized steel screw cover boxes by Hoffman Enclosures Inc., Hubbell Wiegmann, or approved equal

2.03 THREADED TYPE BOXES

A. Outlet Boxes: For Dry, Damp Locations: Zinc electroplate malleable iron or cast iron alloy boxes by Appleton Electric Co., Cooper/Crouse-Hinds Co., or approved equal with zinc electroplate steel covers to suit application. For classified spaces, provide outlet boxes rated for Class I, Div. 1, group D hazardous areas as manufactured by Crouse-Hinds, Appleton or approved equal.

B. For Wet Locations: Malleable iron or cast iron alloy boxes with hot dipped galvanized or other specified corrosion resistant finish as produced by Cooper/Crouse-Hinds (hot dipped galvanized or Corro-free epoxy powder coat), or OZ/Gedney Co. (hot dipped galvanized), with stainless steel cover screws, and malleable iron covers gasketed to suit application.

C. Junction and Pull Boxes:
   1. For Dry, Damp Locations: Zinc electroplate cast iron boxes by Appleton Electric Co., Cooper/Crouse-Hinds, or approved equal with zinc electroplate steel or cast iron cover.
   2. For Wet Locations: Cast iron boxes by Cooper/Crouse-Hinds' (hot dipped galvanized or Corro-free epoxy powder coat), or OZ/Gedney Co. (hot dipped galvanized), or approved equal, with stainless steel cover screws and cast iron cover gasketed to suit application.
   3. For classified spaces, provide junction and pull boxes rated for Class I, Div. 1, group D hazardous areas as manufactured by Crouse-Hinds, Appleton or approved equal.

D. Conduit Bodies, Threaded (Provided with a Volume Marking):
   1. For Dry, Damp Location: Zinc electroplate malleable iron or cast iron alloy bodies with zinc electroplate steel covers; Appleton Electric Co.'s Unilets, Cooper/Crouse-Hinds' Condulets, or approved equal.
   2. For Wet Locations: Malleable iron or cast iron alloy bodies with hot dipped galvanized or other specified corrosion resistant finish; Cooper/Crouse-Hinds' Condulets (hot dipped galvanized or Corro-free epoxy power coat), or OZ/Gedney Co.'s Conduit Bodies (hot dipped galvanized) or approved equal, with stainless steel cover screws and malleable iron covers gasketed to suit application.

3. For classified spaces, provide outlet conduit bodies rated for Class I, Div. 1, group D hazardous areas as manufactured by Crouse-Hinds, Appleton, or approved equal.

2.04 SPECIFIC PURPOSE OUTLET BOXES

A. As fabricated by manufacturers for mounting their equipment.

PART 3 - EXECUTION

3.01 PREPARATION

A. Before proceeding with the installation of junction and pull boxes, check the locations with the Director's Representative and have same approved.

3.02 INSTALLATION

A. Mounting Position of Wall Outlets For Wiring Devices: Unless otherwise indicated, install boxes so that the long axis of each wiring device will be vertical.

B. Height of Wall Outlets: Unless otherwise indicated, locate outlet boxes with their center lines at the following elevations above finished floor:

Switches	4'-0"
Single & Duplex Receptacles	1'-6"
Special Purpose Receptacles	4'-0"
Telephone/Data Outlets	1'-6"
Telephone Outlets (Wall Phones)	4'-0"
Above-Counter Devices	8" Above Counter
Fire Alarm Manual Station	4'-0"
Fire Alarm Notification Device	7'-0"

C. Wall Outlet Location: Locations shown on drawings are approximate only. Locate wall outlet boxes as near to position indicated as possible, but so as to avoid conflicts with other trades (architectural, mechanical, plumbing, structural, etc.).

D. Where devices of different mounting heights are shown on drawings at same location, align outlet boxes along a common vertical line.

E. Outlet boxes in a common wall serving separate rooms shall not be installed back-to-back.

F. Outlet boxes shall be sized to accommodate the device that is to be installed.

G. Provide box extensions and/or trim rings as required to accommodate construction of wall/ceiling in which boxes are recessed.

H. Supplementary Junction and Pull Boxes: In addition to junction and pull boxes indicated on the drawings and required by NFPA 70, provide supplementary junction and pull boxes as follows:
   1. When required to facilitate installation of wiring.
   2. At every third 90 degree turn in conjunction with raceway sizes over 1 inch.
   3. At intervals not exceeding 100 feet in conjunction with raceway sizes over 1 inch.

I. All Junction and Pull Boxes shall have a screw-on cover plate. Cover plate shall match box material and construction.

J. Junction and Pull Boxes shall be installed in locations that are readily accessible, and shall not be blocked by equipment, piping, ducts, structural supports, etc.

3.03 OUTLET, JUNCTION, AND PULL BOX SCHEDULE

A. Boxes For Concealed Conduit System:
   1. Non-Fire Rated Construction:
      a. Depth: To suit job conditions and comply with NFPA 70 Article 370.
      b. For Lighting Fixtures: Use galvanized steel outlet boxes designed for the purpose.
         1) For Fixtures Weighing 50 lbs. or Less: Box marked “FOR FIXTURE SUPPORT”.
         2) For Fixtures More Than 50 lbs: Box listed and marked with the weight of the fixture to be supported (or support fixture independent of the box).
      c. For Ceiling Suspended Fans:
         1) For Fans Weighing 35 lbs or Less: Marked “Acceptable for Fan Support.”
         2) For Fans Weighing More Than 35 lbs, up to 70 lbs: Marked “Acceptable for Fan Support up to 70 lbs (or support fan independent of the box).”
      d. For Junction and Pull Boxes: Use galvanized steel boxes with flush covers.
      e. For Switches, Receptacles, Etc:
         1) Plaster or Cast-In-Place Concrete Walls: Use 4 inch or 4-11/16 inch galvanized steel boxes with device covers.
         2) Walls Other Than Plaster or Cast-In-Place Concrete: Use type of galvanized steel box which will allow wall plate to cover the opening made for the installation of the box.

B. Boxes For Exposed Conduit System:
   1. Dry and Damp Locations: Use zinc electroplate or hot dipped galvanized threaded type malleable iron or cast iron alloy outlet, junction, and pull boxes or conduit bodies provided with a volume marking in conjunction

with ferrous raceways unless otherwise specified or indicated on the drawings.

a. Galvanized steel boxes may be used in conjunction with conduit sizes over 1 inch in non-hazardous dry and damp locations.
b. Galvanized steel boxes may be used in conjunction with electrical metallic tubing where it is allowed (specified) to be installed exposed as branch circuit conduits at elevations over 10’-0” above finished floor.

2. Wet Locations: Use threaded type malleable iron or cast iron alloy outlet junction, and pull boxes or conduit bodies (provided with a volume marking) with hot dipped galvanized or other specified corrosion resistant coating in conjunction with ferrous raceways unless otherwise specified or indicated on the drawings.

a. Use corrosion resistant boxes in conjunction with plastic coated rigid ferrous metal conduit.

C. Specific Purpose Outlet Boxes: Use to mount equipment when available and suitable for job conditions. Unless otherwise specified, use threaded type boxes with finish as specified for exposed conduit system, steel (painted) for surface metal raceway system and galvanized steel for recessed installations.

3.04 LABELING

A. Identify junction and pull boxes for system served (i.e. power, lighting, fire alarm, telephone, data, public address, nurse call, etc.), using stencil lettering on box cover.

B. Identify panelboard and circuit number of all conductors contained within junction and pull boxes, using stencil lettering on box cover.

C. Identify junction and pull boxes for systems over 600V as follows: “DANGER HIGH VOLTAGE – KEEP OUT.” Label shall be white stencil lettering, minimum 1” text height, on box cover.

END OF SECTION

SECTION 26 27 26

WIRING DEVICES

PART 1 - GENERAL

1.01 DESCRIPTION

A. Under this Section, the Contractor shall furnish all labor, materials and equipment for Wiring Devices as shown on the Plans, as specified, and/or directed.

1.02 REFERENCES

A. NEMA

B. UL

C. NFPA 70

1.03 SUBMITTALS

A. Product Data: Catalog sheets, specifications and installation instructions.

1.04 RELATED SECTIONS

A. Section 26 05 01, “Electrical General Requirements”, applies to this Section, with the additions and modifications specified herein.

PART 2 - PRODUCTS

2.01 SWITCHES

A. Local Switches, Single Pole: 20A, 120/277 V ac; Bryant’s 4901, Crouse-Hinds/AH’s 1991, Hubbell’s 1121/1221, Leviton’s 1121/1221, Pass & Seymour’s 20AC1.

B. Local Switches, Double Pole: 20A, 120/277 V ac; Bryant’s 4902, Crouse-Hinds/AH’s 1992, Hubbell’s 1222/1122, Leviton’s 1222/1122, Pass & Seymour’s 20AC2.

C. Local Switches, Three-Way: 20A, 120/277 V ac; Bryant’s 4903, Crouse-Hinds/AH’s 1993, Hubbell’s 1223/1123, Leviton’s 1223-2/1123-2, Pass & Seymour’s 20AC3.

D. Local Switches, Four-Way: 20A, 120/277 V ac; Bryant’s 4904, Crouse-Hinds/AH’s 1994, Hubbell’s 1224/1124, Leviton’s 1224-2/1124-2, Pass & Seymour’s 20AC4.

E. Local Switches, Dimming: 20A, 120/277 V ac; Eaton's WBSD-010SLD, Leviton's 66EV-10W, Pass & Seymour's WS4FBL3PW.

2.02 RECEPTACLES

A. Federal Spec./NEMA Grade Receptacles:
   1. Single receptacle, NEMA 5-20R (20A, 125 V, 2P, 3W); Bryant's 5361, Crouse-Hinds/AH's 5361, Hubbell's 5361, Leviton's 5361, or Pass & Seymour's 5361.
   2. Duplex receptacle, NEMA 5-20R (20A, 125 V, 2P, 3W); Bryant's 5362, Crouse-Hinds/AH's 5739-S, Hubbell's 5362, Leviton's 5362, Pass & Seymour's 5362, or Daniel Woodhead's 5362 DW.

B. Ground Fault Interrupter Receptacles: Duplex receptacle rated 20A (NEMA 5-20R), circuit ampacity 20A; Bryant's GFR53FT, Crouse-Hind/AH's GF5342, Hubbell's GF 5352, Leviton's 6899, Pass & Seymour's 2091S,

2.03 WALL PLATES

A. Stainless Steel Wall Plates: Type 302 stainless steel with satin finish. All areas except finished spaces or wet locations.

B. Weatherproof/Wet Location Covers: UL 514D type "extra duty". Thomas & Betts Red Dot Code Keeper type 2CKU or equal.

C. Finished areas: Polycarbonate. Color to match device color.

2.04 NAMEPLATES

A. Phenolic Type: Standard phenolic nameplates with 3/16 inch minimum size lettering engraved thereon.

B. Embossed Aluminum: Standard stamped or embossed aluminum tags, 3/16 inch minimum size lettering, as produced by Seton Name Plate Corp. or Tech Products Inc.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install wiring devices in outlet boxes.

B. Local Switches:
   1. Install local switches rated 20A, 120/277 V ac for switches unless otherwise shown on the drawings or specified.
   2. Where more than one switch occurs at same location in a 120 volt system, arrange switches in gangs and cover with one face plate.

3. Install single and double pole switches so that switch handle is up when switch is in the “On” position.

C. Receptacles:
   1. Install Specification Grade receptacles, NEMA 5-20R, 20A, 125 V, 2P, 3W, for duplex receptacles and single receptacles unless otherwise shown on the drawings or specified.
   2. Install receptacles with ground pole in the up position.

D. Wall Plates:
   1. Install wall plates on all wiring devices in dry locations, with finish to match hardware in each area.

E. Weatherproof In-use Covers: Install weatherproof covers on wiring devices in damp and wet locations.

F. Nameplates: Provide phenolic or embossed aluminum nameplate for each special purpose receptacle indicating phase, ampere and voltage rating of the circuit. Attach nameplate with rivets or tamperproof fasteners to wall plate or to wall above receptacle. Wall plates may be engraved with required data in lieu of separate nameplates.

G. Labels: Provide electronically-generated, self-sticking label at each wiring device. Label shall indicate panel designation and circuit number associated with respective device. Label shall be attached to outside of wall plate.

H. Where Contract Drawings call out a classified area all equipment/devices and wiring methods to be suitable for this area per NEC. Refer to Contract Drawings for classified area locations.

END OF SECTION

SECTION 26 51 01

INTERIOR LIGHTING

PART 1 - GENERAL

1.01 SCOPE

A. The work under this Interior Lighting includes interior luminaires and accessories, exit signs, and building-mounted exterior lighting.

1.02 RELATED WORK

A. Applicable provisions of Division 1 govern work under this Section.

1.03 REFERENCE STANDARDS

A. RoHS – Restriction of Hazardous Substances. Council of the European Union (EC) Directive 2002/95/EC on the restriction of the use of certain hazardous substances in electrical and electronic equipment.

B. LM-79-08 (or latest) – IES Approved Method for the Electrical and Photometric Measurements of Solid-State Lighting Products.

C. LM-80-08 (or latest) – IES Approved Method for Measuring Lumen Maintenance of LED Light Sources.

D. TM-21-11 (or latest) – IES Technical Memorandum on Projecting Long Term Lumen Maintenance of LED Light Sources.

E. NEMA SSL 1-2010 (or latest) – Electronic Drivers for LED Devices, Arrays, or Systems.

1.04 SUBMITTALS

A. Include outline drawings, lamp and ballast data, support points, weights, accessory information and performance data for each luminaire type.

B. For each luminaire type, submit luminaire information including catalog cuts with highlighted catalog numbers and required accessories:
   1. Luminaire:
      a. Manufacturer and catalog number,
      b. Type (identification) as indicated on the plans and schedule,
      c. Delivered lumens,
      d. Input watts,
      e. Efficacy,
      f. Color rendering index.

2. Driver:
    a. Manufacturer and catalog number,
    b. Type (Non-Dimming, Step-dimming, Continuous dimming, etc.),
    c. Power Factor, Crest Factor, THD, etc.

1.05 OPERATION AND MAINTENANCE DATA

A. All operations and maintenance data shall comply with the submission and content requirements specified under Section General Requirements.

1.06 EXTRA MATERIALS

A. Provide three (3) percent of each lamp type, but not less than one (1) of each type.

B. Provide one (1) of each type of LED module, light bar, or array (if applicable). If the LED's are integrated into the luminaire and are not separate components, provide one (1) of each of these types of luminaires.

C. Provide one (1) LED driver or ballast of each type.

1.07 DEFINITIONS

A. Driver: The power supply used to power LED luminaires, modules, or arrays.

B. L70, $L_{70,}$ or $L_{70\%}$: The reported life of an LED component or system to reach 70% lumen maintenance, or 70% of the LED's original light output. This test is being developed by the IES and is currently described by TM-21-11.

C. LEDs: Broadly defined as complete luminaire with light emitting diode (LED) packages, modules, light bars or arrays, complete with driver.

D. LED luminaire failure: Negligible light output from more than 10 percent of the LED's constitutes luminaire failure.

PART 2 - PRODUCTS

2.01 INTERIOR LUMINAIRES AND ACCESSORIES

A. See the Luminaire Schedule on the drawings for type of luminaires and catalog numbers. Catalog numbers are shown on the drawings for quality and performance requirements only. Luminaires manufactured by others are equally acceptable provided they meet or exceed the performance of the indicated luminaires, and meet the intent of the design.

B. Luminaire shall be listed by a NRTL (Nationally Recognized Testing Laboratory: e.g., UL, ETL, etc.).

C. Provide luminaires with quick-connect disconnecting means, similar to Thomas & Betts Sta-Kon.

D. Fluorescent T8 lamps and ballasts shall be listed on CEE high-performance qualifying product list and approved by Focus–On–Energy.

2.02 GENERAL USE LAMPS

A. General Use Incandescent Lamps and Incandescent Reflector Lamps are prohibited. Use LED retrofit lamps or LED luminaires in lieu of incandescent or halogen luminaires. LED retrofit lamps shall be:
   1. Rated for the voltage of the incandescent lamp/luminaire they are replacing.
   2. Dimmable where required as indicated on the Plans.
   3. Rated for the luminaire in which they are being installed. Verify whether the luminaire is enclosed and whether the LED retrofit lamp is rated for enclosed luminaires and the temperatures that will be encountered.
   4. LED lamps/luminaires shall provide delivered footcandles equal to or greater than the footcandles provided by an equivalent incandescent lamp/luminaire.
   5. LED retrofit lamps shall have an average rated life of 25,000 hours, minimum.
   6. Lamp color temperature shall be nearly equal to the incandescent lamp it is replacing.

B. All lamps shall be new.

2.03 LED LUMINAIRES

A. LED Luminaires shall meet all DesignLights Consortium® (DesignLights.org) Product Qualification Criteria. This does not require that the luminaire be listed on the DesignLights Consortium's® Qualified Products List, but they must meet the Product Qualification Criteria. The technical requirements that the luminaire shall meet for each Application Category are:
   1. Minimum Light Output.
   2. Zonal Lumen Requirements.
   3. Minimum Luminaire Efficacy.
   4. Minimum CRI.
   5. L70 Lumen Maintenance.
   6. Minimum Luminaire Warranty of 5 years (not pro-rated) to include LED driver and all LED components.

B. Color Temperature of 3000K-4100K for interior luminaires as listed in the Luminaire Schedule on the Plans. The color temperature of exterior LED luminaires should not exceed 4100K (nominal).

C. Color Consistency: LED manufacturer shall use a maximum 3-step MacAdam Ellipse binning process to achieve consistent luminaire-to-luminaire color for

interior luminaires. Exterior luminaires shall use a maximum 5-step MacAdam Ellipse binning process.

D. Glare Control: Exterior luminaires shall meet DesignLights Consortium's® criteria for Zonal Lumen Distribution requirements or Backlight-Uplight-Glare (BUG) standards for exterior luminaires.

E. Luminaire shall be mercury-free, lead-free, and RoHS compliant.

F. Luminaire shall comply with FCC 47 CFR part 15 non-consumer RFI/EMI standards.

G. Light output of the LED system shall be measured using the absolute photometry method following IES LM-79 and IES LM-80 requirements and guidelines.

H. Luminaire shall maintain 70% lumen output (L70) for a minimum of 50,000 hours.

I. Lumen output shall not depreciate more than 20% after 10,000 hours of use.

J. Luminaire and driver shall be furnished from a single manufacturer to ensure compatibility.

K. Luminaire Color Rendering Index (CRI) shall be a minimum of 80 for interior luminaires, and a minimum of 70 for exterior luminaires.

L. LED luminaire shall be thermally designed as to not exceed the maximum junction temperature of the LED for the ambient temperature of the location the luminaire is to be installed. Rated case temperature shall be suitable for operation in the ambient temperatures typically found for the intended installation. Exterior luminaires to operate in ambient temperatures of -40°F to 104°F (-40°C to 40°C).

M. Luminaire shall operate normally for input voltage fluctuations of plus or minus 10 percent.

N. Luminaire shall have a maximum Total Harmonic Distortion (THD) of $\leq$20% at full input power and across specified voltage range.

O. All connections to luminaires shall be reverse polarity protected and provide high voltage protection in the event connections are reversed or shorted during the installation process.

P. All luminaires shall be provided with knockouts for conduit connections.

Q. The LED luminaire shall carry a limited 5-year warranty minimum for LED light engine(s)/board array, and driver(s).

R. Provide all of the following data on submittals:
   1. Delivered lumens
   2. Input watts
   3. Efficacy
   4. Color rendering index.

S. LED Luminaires used for Emergency Egress Lighting: The failure of one LED shall not affect the operation of the remaining LEDs.

T. Emergency LED Luminaire Compatibility with Inverters shall be sine-wave type, or have written confirmation from the luminaire manufacturer that the luminaire will function with a square-wave inverter.

2.04 LED DRIVERS

A. General Drivers:
   1. Provide driver type (non-dimmed, step-dimmed, continuous-dimming, etc.) as indicated on the luminaire schedule on the drawings.
   2. Minimum Warranty of 5 years (not pro-rated) to include LED driver and all LED components.
   3. Driver shall have a rated life of 50,000 hours, minimum.
   4. Driver and LEDs shall be furnished from a single manufacturer to ensure compatibility.
   5. Driver shall have a minimum power factor (pf) of 0.9 and a maximum crest factor (cf) of 1.5 at full input power and across specified voltage range.
   6. Driver shall operate normally for input voltage fluctuations of plus or minus 10 percent.
   7. Driver shall have a maximum Total Harmonic Distortion (THD) of $\leq$20% at full input power and across specified voltage range.
   8. Wiring connections to LED drivers shall utilize polarized quick-disconnects for field maintenance.
   9. Fuse Protections: All luminaires shall have built-in fuse protection. All power supply outputs shall be either fuse protected or be Polymeric Positive Temperature Coefficient (PTC)-protected as per Class 2 UL listing.
   10. Provide all of the following data on submittals:
      a. Input watts
      b. Power Factor (pf)
      c. Crest Factor (cf) at full input power
      d. Total Harmonic Distortion (THD).

B. Dimming Drivers:
   1. LED driver shall be compatible with dimming controls where dimming is indicated on the Plans. Dimmable drivers shall use Dimming Constant Current (DCC), Constant Voltage, or Pulse Width Modulation (PWM) operation.

2. Step-Dimming Drivers: Easily switched from 0% to 50% to 100% output power. Both switch-leg inputs shall control 50% of the luminaire's light output equally.
3. Continuous Dimming Drivers: LED luminaires shall dim to (10%, 1%, or 0.1%) as specified in the Luminaire Schedule on the Plans without visible flicker or "popcorn effect". "Popcorn effect" is defined as the luminaire being on a pre-set dimmed level (less than 100%), and going to 100% prior to returning to the pre-set level when power is returned to the luminaire. Continuous Dimming Drivers shall use 0-10V control.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Verify ceiling types with Architectural plans or with existing ceilings. Verify specified luminaires are compatible with specified ceiling type(s) prior to ordering luminaires.

B. Install in accordance with manufacturer's instructions.

C. Install suspended luminaires using aircraft cable, or pendants supported from swivel hangers. Heavy-duty chain supports may be used where indicated on the luminaire schedule. Provide aircraft cable, pendants, or chain lengths required to suspend luminaire at indicated height. All aircraft cables or pendant supported luminaires shall have an independent support to structure at all cable or pendant support locations. When chain is used, tie-wrap the luminaire wiring method to the chain.

D. Support luminaires larger than 2 x 4 foot (600 x 1200 mm) size independent of ceiling framing.

E. Provide independent support for all luminaires over 50 lbs.

F. Locate ceiling luminaires as indicated on reflected ceiling plan.

G. Install surface mounted luminaires and exit signs plumb and adjust to align with building lines and with each other. Secure to prohibit movement.

H. The Contractor shall install luminaire supports as required. Luminaire installations with luminaires supported only by insecure boxes will be rejected. It shall be the Contractor's responsibility to support all luminaires adequately, providing extra steel work for the support of luminaires if required. Any components necessary for mounting luminaires shall be provided by the Contractor. No plastic, composition or wood type anchors shall be used.

I. Exposed Grid Ceilings: Support surface mounted luminaires on grid ceiling directly from building structure.

J. Install recessed luminaires to permit removal from below.

K. Install recessed luminaires using accessories and firestopping materials to meet regulatory requirements for fire rating.

L. Install code required hardware to secure recessed grid-supported luminaires in place.

M. Install wall mounted luminaires and exit signs at height as scheduled. Use pendants supported from swivel hangers in exposed ceiling/structure locations where necessary to mount exit signs at the specified height.

N. Install accessories furnished with each luminaire.

O. Make wiring connections to branch circuit using building wire with insulation suitable for temperature conditions within luminaire.

P. Bond luminaires and metal accessories to branch circuit equipment grounding conductor.

Q. Install specified lamps in each luminaire and exit sign.

R. HID High-Bay or Low-Bay Luminaires: Use power hook hangers rated 500 pounds (225 kg) minimum and provide safety chain between ballast and structure. Also provide safety chain between reflector and ballast.

S. Dimmed luminaire circuits shall have separate neutrals.

T. Dimmed LED luminaires shall have a positive OFF, which requires turning off the circuit to the luminaire so that the luminaires don't "glow" at the lowest dimmed setting. This shall be accomplished using a switch, relay, or some other means acceptable to DFD.

U. All lamps shall be delivered to the job in sealed cartons and protected from dirt and dust during storage on the project. Lamps shall be taken directly from the cartons and installed in the luminaire with special care so that they do not become dusty and are not soiled in the operation.

V. Lamps installed in luminaires using dimming ballasts shall be burned in at 100% rated output by the contractor for a minimum of 100 hours as recommended by the ballast manufacturer.

W. All new lamps shall be operational at the Substantial Completion of the project.

3.02 ADJUSTING AND CLEANING

A. Align luminaires and clean lenses and diffusers at completion of work. Clean paint splatters, dirt, and debris from installed luminaires.

B. Aim and adjust luminaires as indicated on drawings or as directed by the A/E.

C. Touch up luminaire finish at completion of work.

3.03 INTERFACE WITH OTHER PRODUCTS

A. Interface with air handling accessories furnished and installed under Division 23.

B. Provide controls as indicated on the plans. Refer to Section 26 27 26, “Wiring Devices”. Controls shall be compatible with the luminaires/ballasts/drivers being installed.

3.04 ZERO-TO-10V DIMMING CONTROL WIRING INSTALLATION

A. Zero-to-10V dimming control conductors are classified by the NEC as Class 2 conductors and shall be kept separate from line-voltage conductors per NEC 725.136(A). Matching the insulation rating of Conductors of Different Systems does not apply to Class 2 conductors per NEC 300.3(C)(1), Informational Note No.1.

B. Wall box dimmers will typically have two conduits: One conduit for line-voltage power, and one conduit or conduit stub for the 0-10V control wiring.

C. At each luminaire, separate openings (either manufactured knock-outs or punched openings) shall be used for the line-voltage power and the 0-10V wiring. The EC shall use a cable connector at the opening for the 0-10V wiring. Zero-to-10V conductors entering and within a luminaire enclosure shall maintain a minimum separation of 6 mm (0.25 in.) per NEC 725.136(D).

D. Exposed 0-10V cables shall be installed in separate conduits from line-voltage conductors.

E. The 0-10V cables may be routed in free air where concealed above accessible ceilings. Cables routed in free air shall observe the following installation requirements:
   1. The 0-10V cables may be tie-wrapped to the outside of the luminaire power raceway where allowed by NEC 300.11(B)(2). Tie-wraps shall be UL listed for UV resistance. Care should be taken in the use of cable ties to secure and anchor the cabling. Ties shall not be over tightened as to compress the cable jacket. No sharp burrs shall remain where excess length of the cable tie has been cut.
   2. Cabling shall be neatly run at right angles and be kept clear of other trades work.
   3. Cabling shall be secured within twelve (12) inches of direction change or termination.
   4. Cabling shall be supported at a maximum of 5-foot intervals utilizing “J-Hook” or “Bridle Ring” supports anchored to ceiling concrete, piping supports or structural steel beams. If cable sag at mid-span exceeds 12-

inches, another support shall be provided. Cable supports shall be installed to maintain cable bend to larger than the minimum bend radius.

5. Cabling shall not be attached to or supported by existing cabling, plumbing or steam piping, ductwork, suspended ceiling supports or electrical or communications conduit. Do not place cable directly on the ceiling grid or attach cable in any manner to the ceiling grid wires.
6. All cables shall be free of tension at both ends. Nylon strain relief connectors shall be provided at each device and junction box where cables enter. In cases where the cable must bear some stress, Kellum type grips may be used to spread the strain over a longer length of cable.
7. Cable manufacturer's minimum bend radius shall be observed in all instances.
8. Use suitable cable fittings and connectors.

3.05 FIELD QUALITY CONTROL

A. Operate each luminaire after installation and connection. Inspect for proper connection and operation.

3.06 LUMINAIRE CONNECTIONS

A. Metal-Clad (MC) Cable Whips

1. Metal-Clad (MC) type cable that combines power and Class 2 circuits into a single cable may be used for luminaire whips where 0-10V dimming control wiring is required. Whips may not exceed six (6) feet in length. Examples of such products are Encore Wire® MC-LED™ or Southwire® MC-PCS Duo™. Manufacturer's names and catalog numbers are used for quality and performance only. MC Cables manufactured by others shall be equally acceptable provided they meet or exceed in performance and quality as specified.

B. Recessed, including Master-Satellite connections:

1. Use a luminaire fixture whip from a J-box for recessed lay-in luminaires. Luminaire fixture whips shall be aluminum or steel AC Cable (Armored Cable) or Flexible Metal Conduit (FMC). Metal Clad (MC) cable that combines power and Class 2 circuits (for 0-10V dimming control) into a single cable may be used as a whip for luminaires that are dimmed.
2. Cable/Conduit whips shall be 3/8" (10 mm) minimum diameter, six feet (1.8 m) maximum length.
3. Flexible whips or pre-wired systems between master and satellite luminaires may be supported by the ceiling grid wires.
4. The flexible connectors shall be steel, galvanized, clamp type with locknut, snap-in type with locknut, or snap-in connector type, including those used on the master-satellite units.

C. Chain or Cable Hung (unfinished spaces):
   1. Use manufacturer's SO cord or a luminaire fixture whip from a J-box. Luminaire fixture whips shall be aluminum or steel AC Cable (Armored Cable) or Flexible Metal Conduit (FMC). Metal Clad (MC) cable that combines power and Class 2 circuits (for 0-10V dimming control) into a single cable may be used as a whip for luminaires that are dimmed.
   2. Conduit whips shall be 3/8" (10 mm) minimum diameter. Conduit whip or SO cord shall be cut to length (six feet (1.8 m) maximum) and shall allow movement of the chain/cable/luminaire, but shall not be long enough to "loop" and shall present a neat and workmanlike appearance.
   3. Luminaire field wired flexible cord installations shall be connected per NEC 410.62.
   4. The flexible connectors shall be steel, galvanized, clamp type with locknut, snap-in type with locknut, or snap-in connector type, including those used on the master-satellite units.
   5. Conduit whip slack shall be tie-wrapped to the chain supports. Tie-wraps shall be UL listed for UV resistance.

D. Cable Hung (finished spaces):
   1. Use manufacturer's SO cord from luminaire to a J-box.
   2. SO cord shall be cut to length (six feet (1.8 m) maximum) and shall allow movement of the cable/luminaire, but shall not be long enough to "loop" and shall present a neat and workmanlike appearance.
   3. SO cord slack may be tie-wrapped to the cable supports. Tie-wraps shall be UL listed for UV resistance.
   4. Luminaire field wired flexible cord installations shall be connected per NEC 410.62.

E. Surface Mounted (unfinished spaces): Provide direct conduit and box connection.

F. Surface Mounted (finished spaces): Provide direct conduit and box connection. Use surface metal raceway where indicated on drawings. Conceal box and conduit where appropriate. Flexible metal conduit shall not be used where the conduit is exposed.

END OF SECTION