

**COLLEGE OF DUPAGE
REGULAR BOARD MEETING**

BOARD APPROVAL

1. **SUBJECT**

General Contractor for Pathways SRC 1144

2. **REASON FOR CONSIDERATION**

A single purchase exceeding the statutory limit of \$25,000 must be approved by the Board of Trustees.

3. **BACKGROUND INFORMATION**

This project creates an interim Pathways operating space in the general use section of the cafeteria, enabling the College to begin serving students sooner while awaiting the renovation of the permanent Pathways location. The temporary offices will be dismantled once the permanent Pathways offices are available, returning the north bay of the cafeteria to current conditions. At that time, re-usable building components from this project such as light fixtures, doors, diffusers and grills will be salvaged for future use in other projects.

A legal notice for an Invitation for Bids was published on February 11, 2019 in the Daily Herald; the invitation for Bid Number 2019-B0026 was also posted to the College of DuPage Purchasing website and distributed to the College of DuPage Center for Entrepreneurship and in-district Chambers of Commerce. Sixteen (16) vendors were directly solicited. Thirty-five (35) vendors downloaded the bid documents. A public Pre-Bid meeting and project site tour was held on February 19, 2019 at 10:00 a.m. in the College of DuPage Purchasing Department Conference Room (BIC 1B03A). A public opening was held on March 1, 2019 at 2:00 p.m. in the College of DuPage Purchasing Department Conference Room (BIC 1B03A). The following individuals were in attendance: Jacoby Radford (COD Purchasing Manager), Susan Castellanos (COD Buyer/Facilitator), Anne Marie Dando (COD Purchasing Assistant/Recorder), Eugene Refakes (COD Manager, Accounting Operations/Agent of the Board), Don Inman (Senior Project Manager), and representatives from four (4) companies. Four (4) bids were received. Two (2) woman/minority owned business submitted a bid.

One (1) bid was rejected due to an incomplete bid response. A bid from Bedell Builders, Inc. was determined to be non-responsive for failure to submit or

acknowledge the required bid 6.0 Certification Page, 7.0 Signature Page, and 8.0 Conflict of Interest Disclosure and Non-Collusion Form.

The following is a tabulation of the results:

| Vendor | Total Base Bid |
|-----------------------------------|--------------------|
| Integral Construction Inc. | \$65,320.00 |
| *Empire Construction Co. | \$80,536.00 |
| *Kave, Inc. | \$99,965.00 |

*Woman/Minority Owned Business
Recommended award in bold

Budget Status

| GL Account | FY2018 | FY2019 | | Available Balance |
|--|--------------|------------------|-----------------------|----------------------|
| | YTD Spend | Annual Budget | YTD Spend | |
| 03-90-39046-5804001 | \$ - | \$ 80,000 | \$ - | \$ 80,000 |
| <i>SCR 1144-Pathway Temp Space: Building Remodeling Exp.</i> | | | | |
| | | | FY2019 Request | \$ 65,320 |

**YTD Spend equals actuals plus committed as of 3/4/19.*

This purchase supports Goal #8 Infrastructure of the Strategic Long Range Plan: Maintaining, improving and developing structures, systems, and facilities necessary for the delivery of high quality education and meaningful cultural events.

This purchase complies with State Statute, Board Policy and Administrative Procedures.

4. RECOMMENDATION

That the Board of Trustees awards the contract for the General Contractor for Pathways SRC 1144 to the lowest responsible bidder, Integral Construction, Inc., 320 Rocbaar Drive, Romeoville, IL 60446 for the lump sum bid amount of \$65,320.00.

Staff Contact: Bruce Schmiedl – Director of Facilities
Ellen Roberts – Interim VP of Administrative Affairs

SIGNATURE PAGE

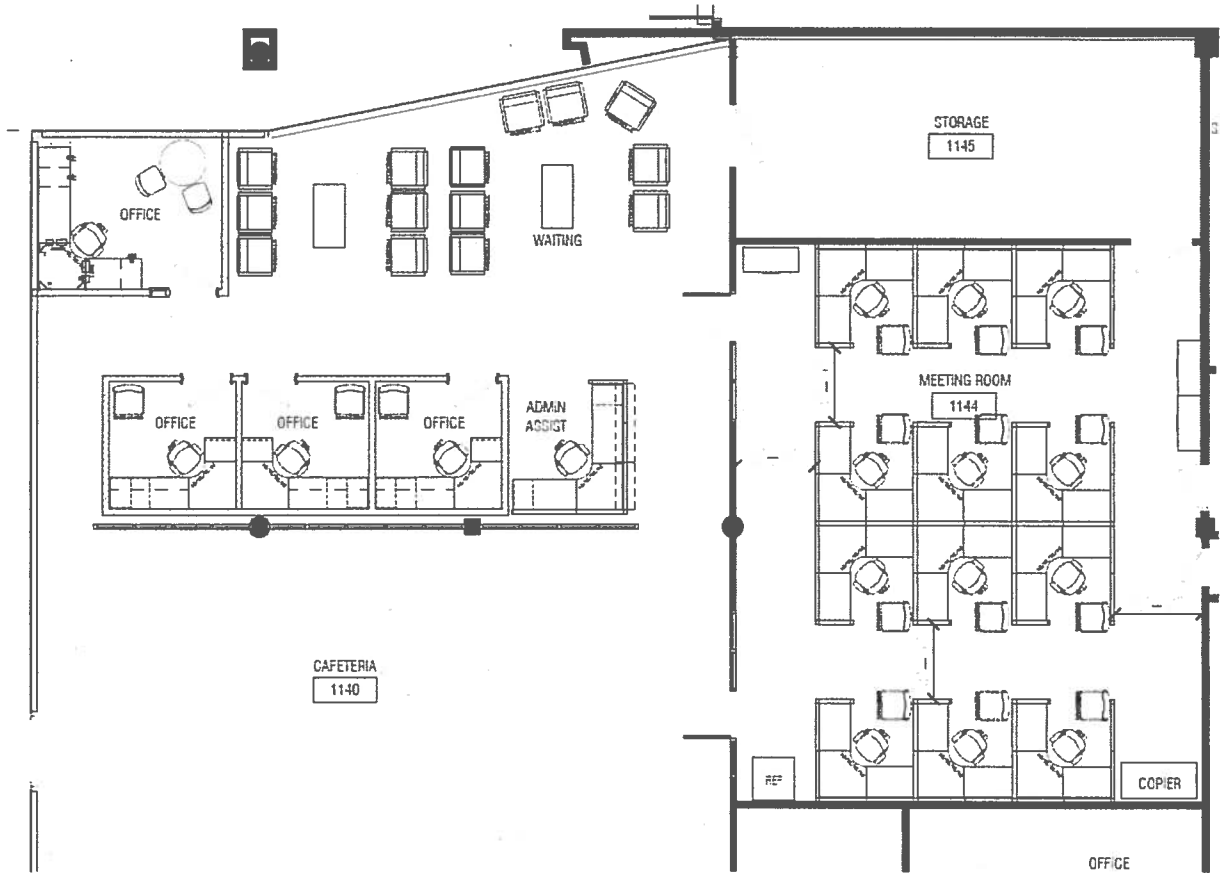
General Contractor for Pathways SRC 1144

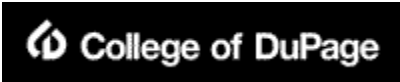
ITEM(S) ON REQUEST

That the Board of Trustees awards the contract for the General Contractor for Pathways SRC 1144 to the lowest responsible bidder, Integral Construction, Inc., 320 Rocbaar Drive, Romeoville, IL 60446 for the lump sum bid amount of \$65,320.00.

Frank J. Napitano 3/21/19
BOARD CHAIR DATE

Christine M. Jensen 3/21/19
BOARD SECRETARY DATE





Purchasing Department

425 Fawell Boulevard
Glen Ellyn, Illinois 60137-6599
PHONE (630) 942-2355
FAX (630) 942-4322

2019-B0026 GENERAL CONTRACTOR FOR PATHWAYS SRC 1144

ADDENDUM # 1

February 25 , 2019



This addendum is being issued to update the specifications and provide additional information.

This information becomes part of the Bid Documents upon receipt. Please review and incorporate into your Bid/Proposal accordingly.

For which Bids are scheduled to be received on March 1, 2019 no later than 2:00 p.m., Central Time.

Bids will be received by the College of DuPage, District 502, at the office of the Purchasing Manager, Berg Instructional Center (BIC) Building, Room 1B03, 425 Fawell Blvd., Glen Ellyn, IL 60137.

The signed Addendum acknowledgment is required to be returned with your Bid no later than the due date set forth for this Invitation for Bid.

I. Clarification

Comments below relate to general questions asked during pre-bid meeting site visit:

Contractor should reference Exhibit A and Exhibit B of the bid document for complete details of all work required for this project.

This project is a temporary office for the College’s Pathways program staff, who will be housed in this project space from June 2019 thru December 2019. This project is a phased buildout and removal of the spaces shown on the drawings. The Village of Glen Ellyn will issue permits and inspect, the work indicated on the drawings.

Contractors are referenced to the drawings to confirm whether any control or VAV work is included in this contract.

Contractors are to remove carpet squares under any wall tracks and store onsite. Contractor will fill in the bare areas with temporary carpet squares that match the field carpet in the

work area. During Phase 2, Contractor to return space to pre-construction condition, the carpet that was removed and stored onsite during Phase 1 shall be reinstalled.

There is an existing conduit pathway for the fibre run from the second floor MDF. No new coring is required. There is ample room to feed the innerduct thru the existing 4" conduit.

Contractors can plan on loading material to the project thru the side door (#8) of the cafeteria near the project, this door provides ready access to the loading dock. Craftsmen should not make this their man entry, they need to come to the project thru the cafeteria main entry if not unloading.

Contractors will need to supply and install their own protection to the space once they begin their work. Given the potential of unauthorized entry, this protection should be plywood or similar.

Work hours are flexible, so long as arranged ahead of time with the College's project manager.

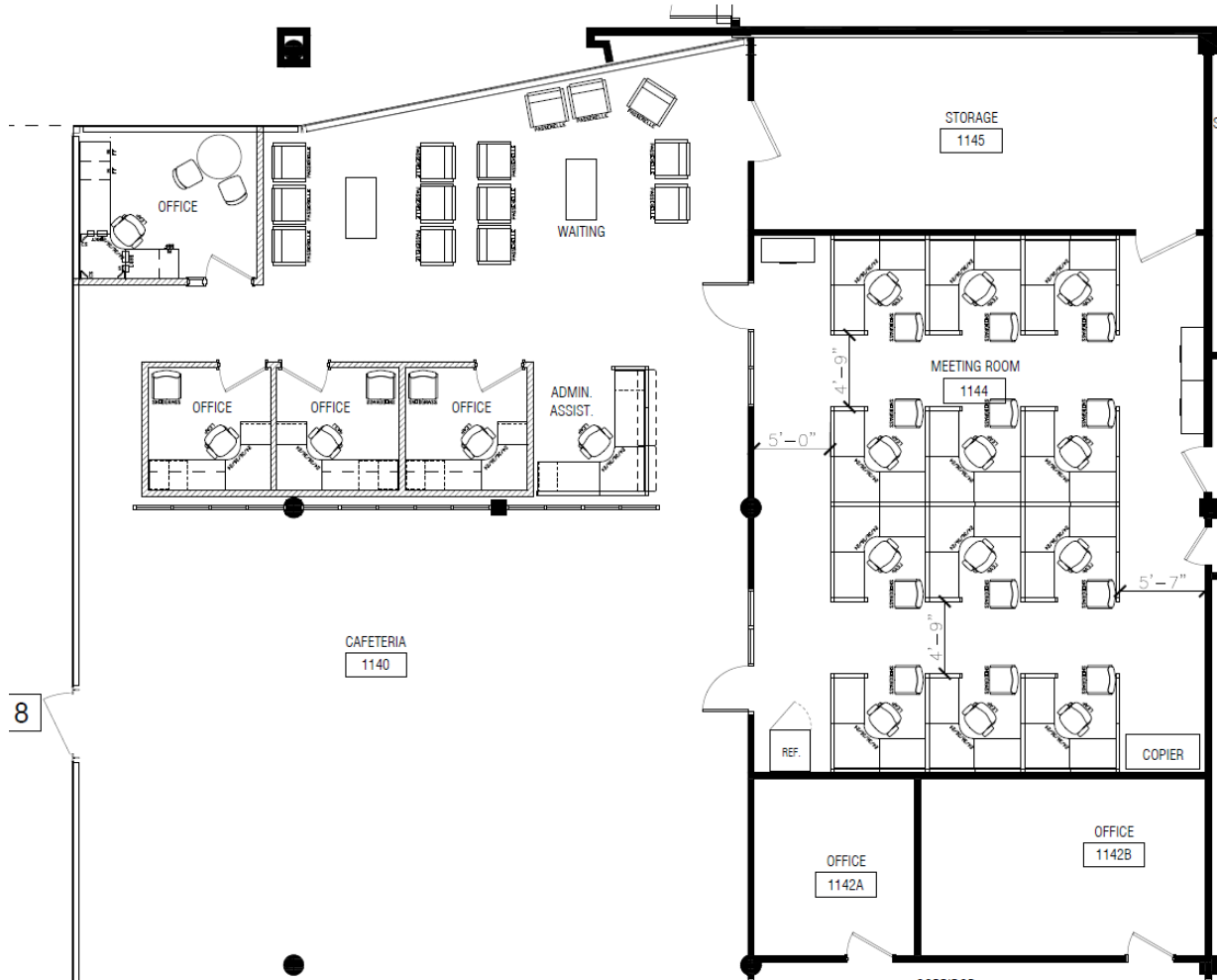
Contractors are referenced to the drawings to determine the extent of all work, inclusive of fire protection or alarm trades. Where Fire Alarm is shown, that work is under this contract, however must be performed by the College's contracted maintenance firm Randy Jensen, CAS Security Holdings LLC, Dba Commercial Alarm Systems, 120 King Street, Elk Grove Village, IL 60007, Office: 630-832-2844

Contract includes all low voltage work as indicated on the drawings. In Room SRC 1144, where workstations must be hardwired, the workstations will not be brought into the space until late May. Contractor should anticipate both electric and data final tie-in as included in this contract (as a separate trip from the infrastructure install work).

Trash disposal is in the contractor provided dumpster, not COD dumpster.

Attached is a layout of the future furniture and door #8 location.

Layout of the Future Furniture



2019-B0026 GENERAL CONTRACTOR FOR PATHWAYS SRC 1144

ADDENDUM # 1

February 25, 2019

.....
II. Acknowledgement:

This signed Addendum is required to be returned with your Bid no later than the due date set forth for this Invitation for Bid. If you have already submitted your Bid, please submit this signed form via email to purchasing@cod.edu.

You can submit this completed addendum to the Purchasing Office by one of the means below:

All issued addenda must be signed and returned to the College as per the instructions in the addenda or bid will not be accepted.

ACKNOWLEDGMENT

You can submit this completed addendum to the Purchasing Office by one of the means below:

1. If you have not yet submitted your bid please sign this addendum and include with your sealed bid.
2. If you have already submitted your bid, please sign and return to the Purchasing office via email at purchasing@cod.edu no later than the scheduled bid deadline. We will make sure it accompanies your bid.

You also have the option of withdrawing your proposal, if necessary.

I HAVE RECEIVED THIS ADDENDUM # _____

Company Name: _____

Address: _____

Authorized Signature: _____

BIDDER: _____



COMMUNITY COLLEGE DISTRICT NO. 502

BID NUMBER: 2019-B0026

GENERAL CONTRACTOR FOR PATHWAYS SRC 1144

BIDS DUE: FRIDAY, MARCH 1, 2019 AT 2:00 P.M. CENTRAL TIME

In the event of College closure due to inclement weather, bid deadline will be extended to the next business day at the same time.

RETURN BIDS TO:

**COLLEGE OF DUPAGE
PURCHASING DEPARTMENT
BIC BUILDING, ROOM 1B03
425 FAWELL BLVD.
GLEN ELLYN, ILLINOIS 60137**

Issue Date:

February 11, 2019

ISSUED BY THE COLLEGE OF DUPAGE PURCHASING DEPARTMENT



Purchasing Department

425 Fawell Boulevard
Glen Ellyn, Illinois 60137-6599 <http://www.cod.edu>

PHONE (630) 942-2217

February 11, 2019

INVITATION FOR BID

Sealed bids for **General Contractor for Pathways SRC 1144** will be received by the College of DuPage, District 502, at the office of the Purchasing Manager, Berg Instructional Center (BIC) Building, Room 1B03, 425 Fawell Blvd., Glen Ellyn, IL 60137, until **2:00 p.m. Central Time, Friday, March 1, 2019**, at which time they will be publicly opened. In the event of College closure due to inclement weather, bid deadline will be extended to the next business day at the same time.

Any bid received after the date and time stated above will be returned unopened. College of DuPage shall not be responsible for bids that are not received at the specific office location indicated above by the stated deadline. Failure by a delivery service company or person to meet the deadline will not excuse the Respondent from the deadline requirement. It is solely, the bidder's responsibility, to ensure that adequate time is allowed for timely and accurate delivery.

Prices offered shall be F.O.B. Destination, College of DuPage, 425 Fawell Blvd., Glen Ellyn, IL 60137. Prices must be firm. No bids will be accepted on the basis of a price prevailing at the time of shipment.

The award(s) of the contract will be made to the lowest responsible and qualified bidder whose bid complies with all the requirements prescribed.

Respondents may download the Bid in addition to any future addenda from the College's Purchasing website at the following URL address: <http://cod.edu/about/purchasing/requests/index.aspx>.

No bid shall be withdrawn for a period of ninety (90) days after the bid opening date without the consent of the College.

LEGAL NOTICE

BID NOTICE

No. 2019-B0026

The College of DuPage is accepting sealed bids for **General Contractor for Pathways SRC 1144**. Bid documents may be downloaded from the Purchasing Website at www.cod.edu/about/purchasing/requests by clicking on the link for this bid and following the instructions.

Bids are due to the College of DuPage Purchasing Department in the Berg Instructional Center (BIC) Building, Room 1B03, 425 Fawell Blvd., Glen Ellyn, IL 60137 up to and no later than **2:00 p.m. Central Time, Friday, March 1, 2019**, at which time they will publicly opened.

A pre-bid conference is scheduled for **Tuesday, February 19, 2019 at 10:00 a.m.** in the Berg Instructional Center (BIC) 1B03A at 425 Fawell Blvd, Glen Ellyn IL 60137. The pre-proposal conference is not mandatory, but highly recommended. The College of DuPage is committed to the economic development of disadvantaged business enterprises; qualified Minority, Women, and Persons with Disabilities Owned Businesses are highly encouraged to participate

College of DuPage Board of Trustees Reserves the right to reject any and all responses. This invitation is issued in the name of the Board of Trustees of College of DuPage, Community College District 502, Glen Ellyn, Illinois.

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BID SUBMISSION CHECKLIST

Things to Remember When Submitting a Response to an Invitation to Bid for the College of DuPage

1. **Read the *entire* document.** In your review, note critical items such as: blackout period, required goods and services, submittal dates, submission requirements, etc.
2. **Note the contact information provided.** The Purchasing Office Buyer at purchasing@cod.edu is the single point of contact for this Invitation to Bid and is the only person with whom you are allowed to communicate regarding this bid. This person is an excellent source of information for any questions you may have.
3. **Take advantage of the “question and answer” period.** Submit your questions to the Purchasing Department by the date in the Invitation to Bid and view the answers given in the formal addenda issued for the Invitation to Bid. All addenda issued for an Invitation to Bid will be emailed to each company that downloaded the bid documents and will include all questions asked and answered concerning the Invitation to Bid. Please ensure when downloading the bid documents, you use a valid email address.
4. **Do not alter, add to, or delete and part of the Bid documents without prior approval.** Please refer to the section titled *Exceptions* for instruction on how to request a deviation to the original Invitation to Bid.
5. **Ensure all Addenda are signed.** Before submitting your response, check the College Purchasing website at <http://www.cod.edu/about/purchasing/requests/index.aspx> to see whether any addenda were issued for this Bid request. If so, you must submit a signed copy of the addenda along with your bid response.
6. **Review and read the bid document again to make sure you have addressed all requirements.**
 - *Your original response and the requested electronic copy (flash drive) must be identical and be complete.
 - *Bids will not be accepted if Sections 6, 7, and 8 are not completed. (Please note there are two (2) signature lines in Section 8 that must be signed.)
 - *If your company is a Certified Women-Owned, Minority-owned, or Persons with Disability-owned business, please include a copy of any and all certifications.
7. **Submit your response on time.** Note the date and time listed on the front page of the Invitation to Bid and be sure to submit all required items on time. Late responses will not be accepted and will be returned, unopened. Ensure the box (s) containing your proposal is appropriately labeled. Please allow adequate time for delivery to the Purchasing Department.
8. **Important dates to know:**
 - Bid Publication Date – 2/11/19
 - Pre-Bid Meeting – 2/19/19 at 10:00 a.m.
 - Questions Due – 2/20/20/19 by 12:00 p.m. Central Time
 - Bids Due – 3/1/19 at 2:00 p.m. Central Time
 - Target Board Approval Date – 3/21/19

1.0 GENERAL INFORMATION

1.1 DEFINITIONS

- A. **BIDDER** shall mean the individual or business entity submitting a Bid to supply any or all of the services or goods required by the Bid Documents.
- B. **BID** shall mean the Bid Documents as completed by the Bidder which constitutes the Bidder's offer.
- C. **CONTRACT** shall mean the agreement between the College and Contractor as set forth in the Bid Documents and as awarded by the College of DuPage Board of Trustees.
- D. **BID DOCUMENTS** shall mean collectively the Instructions to Bidders, General Conditions, Special Conditions, Specifications, Attachments, and Addenda, if any, Bid, Site Inspection Certificate, Contractor Certifications and Forms for Minority Participation. The above documents shall be considered as one integrated document setting forth the obligations of the parties.
- E. **CONTRACTOR** shall mean the individual or business entity submitting a Bid and to whom the College of DuPage Board of Trustees awards the Contract.
- F. **COLLEGE** shall mean the College of DuPage, Community College District No. 502, a body politic and corporate of the State of Illinois.
- G. **DIRECTOR** shall mean the person or persons authorized by the College to act in connection with this Contract. Such authorization shall not include any power to change the scope of the Contract or to obligate the College to pay additional sums beyond the amount of the Contract awarded by the College of DuPage Board of Trustees.
- H. **PURCHASING MANAGER** shall mean the Purchasing Manager of the College of DuPage.
- I. **SPECIFICATIONS** shall mean the description of the required services, Contract Goods, equipment, personnel, volume and use statistics and all requirements for the scope of work set forth in the Bid Documents.

1.2 BIDS TO CONFORM TO REQUIREMENTS OF LEGAL ADVERTISING

The College will not entertain or consider any Bid responses: (i) received after the exact time specified in the legal advertisements; (ii) not accompanied by the required bid deposit/bond, if required; or (iii) in any other way failing to comply fully with the conditions stated in the legal advertisement.

1.3 COMPLIANCE

Submissions under this Invitation to Bid shall be for items at least equal to or better than the quality and performance characteristics stated herein. The burden of proof that product and services meet specifications shall be documented by the bidder and be provided as part of the submitted bid. Failure to provide complete documentation of the product compliance with specifications required may result in bid rejection.

1.4 COMPLIANCE WITH LAWS - PUBLIC CONTRACTS

This Contract is a competitively bid public contract of the College of DuPage subject to laws and ordinances governing public contracts. The Bidder shall at all times observe and comply with all laws, ordinances, regulations and codes of the Federal, State and other local government agencies which may in any manner affect the preparation of the Bid or the performance of the Contract. If the Bidder observes that any of the Bid Documents are at variance therewith, it shall promptly notify the Purchasing Manager in writing and necessary changes shall be effected by appropriate modification.

1.5 REGULATIONS

The Contractor or Subcontractor, warrants that they are familiar with and they shall comply with all Federal, State, and Local Laws, statutes, ordinances, rules and regulations and the orders and decrees of any courts or administrative bodies or tribunals in any manner affecting the performance of the Contract, including, without

limitation, Workmen's Compensation Laws, minimum salary and wage statutes and regulations, laws with respect to permits and licenses and fees in connection therewith, laws regarding maximum working hours and regulations with respect to use of explosives. No plea of misunderstanding or ignorance thereof will be considered. Whenever required, the Contractor, or Subcontractor, shall furnish the college with satisfactory proof of compliance with said Federal, State and Local Laws, statutes, ordinances, rules, regulations, orders, and decrees.

1.6 BID MODIFICATIONS

Unless indicated, it is understood that bids are in strict accordance with specification requirements. Bids shall be deemed final, conclusive, and irrevocable. No bid shall be subject to correction or amendment for any error or miscalculation. Bid prices shall include cost of materials as specified, any applicable discounts and shipping. Installation costs shall be included only when indicated on page one. Installation shall include, but is not limited to, all assembly required, setting in place, and mounting all materials at various campus locations.

1.7 PRICES FIRM

All prices quoted in the Bid shall be firm and will not be subject to increase during the term of the Contract awarded to the Contractor, except as otherwise provided in the Bid Documents.

1.8 AWARD OF CONTRACT

The award of the contract will be made within ninety (90) calendar days after the opening of bids to the lowest responsible and qualified bidder whose bid complies with all the requirements prescribed. The successful bidder will be notified by electronic mail that their bid has been accepted and that they have been awarded the contract. Notification will also be posted on the College's Purchasing website at <http://www.cod.edu/about/purchasing/> . Failure to execute performance as per accepted bid may result in legal action by the College of DuPage to recover damages.

If a contract is not awarded within ninety (90) days after the opening of bids, a bidder may file a written request with the Purchasing Manager for the withdrawal of their bid and the Purchasing Manager will permit such withdrawal.

The bid security (if required) of all except the three (3) low bidders will be returned promptly after the bids have been checked, tabulated, and the relation of the bids established. Bid security of the three (3) lowest bidders, if required in legal notice, will be returned as soon as the contract and the bond of the successful bidder have been promptly executed and approved. If contracts cannot be awarded promptly, the College may permit the three (3) lowest bidders to substitute bid bonds for bank cashier's checks, bank drafts or certified checks submitted with their bids. Bid bonds executed by corporate surety companies shall be satisfactory to the Owner, but such substitution shall not be made until a period of fifteen (15) days has elapsed after the date of opening of bids and bond forms furnished by the College shall be used.

1.9 CONSIDERATION OF BIDS

The College reserves the right to reject or accept any or all Bid responses, to extend the bidding period, to waive technicalities in the documents and/or to direct that the project be abandoned or rebid prior to award of the Contract.

1.10 COMPETENCY OF BIDDER

No Bid will be accepted from or Contract awarded to a Bidder that is in arrears or is in default to the College upon any debt or Contract, or that is a defaulter, as surety or otherwise upon any obligation to said College, or has failed to perform faithfully any previous contract with the College.

1.11 BIDDER WARRANTIES

The submission of a Bid shall constitute a warranty that: (i) Bidder has carefully and thoroughly reviewed the Bid Documents and has found them complete and free from ambiguities and sufficient to describe the Contract work; (ii) Bidder and all workers and/or employees it intends to use in the performance of this Contract are skilled and experienced in the type of work or services called for by the Bid Documents; and (iii) neither the Bidder nor any

of its employees, agents, suppliers or subcontractors have relied on any verbal representations from the College, or any of the College's employees, agents, or consultants, in preparing the Bid.

1.12 PAYMENT TERMS

All invoices must be provided to the College for services rendered directly to the College. Undisputed invoices will be paid to the contractor within sixty (60) days of receipt of properly submitted invoices, in accordance with the Local Government Prompt Payment Act.

1.13 PAYMENT REMITTANCE

All College vendors are required to receive payment from the College via an Automated Clearing House (ACH) transfer. Instructions to register for ACH payments will be sent, upon request, to successful bidders. Failure to comply with the ACH requirements may result in termination of the contract or purchase order. College ACH transfers typically occur the third week of each month. Invoices must be received at least 3 weeks prior to each ACH payment release. You are strongly encouraged to set up your account upon notice of award to avoid a delay payment.

1.14 CASH BILLING DISCOUNTS

Cash billing or percentage discounts for payment will not be considered in evaluating Bids.

1.15 LOCAL BUSINESS PREFERENCE

When two (2) or more responsible bidders submit the same low bid, the contract award will be determined by drawing lots in a public meeting unless one bidder is a local bidder within the District boundaries and one is a non-local bidder, in which event the local bidder will be awarded the contract.

1.16 EQUAL EMPLOYMENT OPPORTUNITY

In the hiring of employees for the performance of work under the Contract and any subcontract thereunder, no Contractor or Subcontractor shall, by reason of race, color, sex, religion, national origin, ancestry, age, marital status, disability, unfavorable military discharge or sexual orientation discriminate against any citizen of the United States, in the employment of Labor or workers, who are qualified and available to perform work to which the employment is related. Neither shall any Contractor or Subcontractor, or any person on behalf of either, discriminate against or intimidate any employee hired for the performance of work under this Contract on account of race, color, sex, religion, national origin, ancestry, age, marital status, disability, unfavorable military discharge or sexual orientation.

1.17 TAX EXEMPTION

College of DuPage District #502 is exempt from Federal, State and Municipal taxes. Exemption certificates will be furnished upon request.

1.18 HOLD HARMLESS CLAUSE

Contractor shall indemnify, hold harmless and defend the College of DuPage, its officers, trustees, agents, servants, and employees, from and against any and all claims, lawsuits, demands, liabilities, and losses whatsoever occurring or resulting to any and all persons, firms or corporations furnishing or supplying work, services, materials, or supplies in connection with the performance of this agreement, and from any and all claims, liabilities, and losses occurring or resulting to any person, firm, or corporation for damage, injury, or death arising out of or connected with Contractor's performance of this agreement, unless such claims, liabilities, or losses arise out of the sole negligence or willful misconduct of the College of DuPage.

"Contractors performance" includes Contractor's action or inaction and the action or inaction of Contractor's officers, employees, agents and Subcontractors.

1.19 CONTRACTORS LIABILITY INSURANCE

The Contractor shall not commence work under this contract until all insurance required herein is obtained and approved by the College. Nor shall the Contractor allow any subcontractor to commence work until all similar insurance required of the subcontractor has been so obtained.

The Contractor shall furnish the College of DuPage with a Certificate of Insurance, with College of DuPage, its trustees, officers, agents, employees, and any other parties designated by COD named as an additional insured for Commercial General and Automobile Liability, showing the minimum coverage indicated below. Insurance companies must have a Best Rating of at least A VI and otherwise be acceptable to the College. Workers' compensation insurance shall include a waiver of subrogation in favor of the College of DuPage. The College will also be shown as the certificate holder. Further, the Certificate of Insurance shall state that coverage provided is primary to any other coverage available to College of DuPage. An endorsement page showing coverage must accompany the certificate of insurance. The foregoing certificate shall contain a provision that coverage afforded under the policies will not be cancelled or non-renewed until at least sixty (60) days prior written notice has been given to College of DuPage.

TYPE OF INSURANCE

MINIMUM INSURANCE COVERAGE

Combined Single Limit per Occurrence/Aggregate

Commercial General Liability including:

| | |
|---|---------------------------|
| 1. Premises – Operations | \$1,000,000 / \$2,000,000 |
| 2. Explosion, Underground and Collapse Hazard | |
| 3. Products/Completed Operations | |
| 4. Contractual Insurance | |
| 5. Broad Form Property Damage | |
| 6. Independent Contractors | |
| 7. Bodily Injury | |

Automobile Liability

| | |
|-----------------------------|---------------------------|
| Owned, Non-owned, or Rented | \$1,000,000 / \$2,000,000 |
|-----------------------------|---------------------------|

Workers' Compensation and Employers' Liability As Required by Applicable Laws

Professional Liability If Performance Specifications are required by the Contract

1.20 PREVAILING WAGE ACT

When applicable, and as a condition of receiving payment, Contractor must pay its employees prevailing wages in the locality in which the work is to be performed as establish for Public Works (construction and maintenance of a public work) prevailing wage and other requirements under Contract for Public Workers 820 ILCS 130/4. When required by the College Contractor shall provide a copy of the certified payroll on request. Contractor is responsible for contacting the Illinois Department of Labor to ensure understanding of prevailing wage requirements.

The prevailing rates of wages are determined by the Illinois Department of Labor and are available on the Department's official website: <http://www.illinois.gov/idol/Laws- Rules/CONMED/Pages/prevailing-wage-rates.aspx>. The College of DuPage has adopted the resolution regarding the prevailing wage rates for DuPage County in accordance with Illinois Prevailing Wage Act and are available the College's website: http://www.cod.edu/about/purchasing/illinois_prevailing_wage_act.aspx.

1.21 BUSINESS ENTERPRISE PROGRAM

The College of DuPage encourages the participation of qualified minorities, females, and persons with disabilities owned businesses in public contracts. It is the practice of the College to ensure full and equitable economic opportunities to persons and businesses that compete for business with the College of DuPage, including minorities, females, and persons with disabilities owned business enterprises. The College is committed to the economic development of disadvantaged business enterprises and the award of contracts to businesses owned by minorities, females, and persons with disabilities for services to the extent provided by the Business Enterprise for Minorities, Females and Persons with Disabilities Act ("Act"), 30 ILCS 575.

END OF SECTION

2.0 INSTRUCTIONS TO BIDDERS

2.1 OUTSIDE DOCUMENT DISCLAIMER

The College of DuPage cannot warrant, represent, or guarantee the accuracy or completeness of documents which have not been obtained directly from the College. If you have obtained these documents from a third party source, the College is not responsible for any loss or damage including, but not limited to, time, money, or goodwill arising from errors, inaccuracies or omissions in any third party bid documents.

To obtain official documents, please visit: <https://www.cod.edu/about/purchasing/requests/index.aspx> . Click on the link for this project, and follow the prompts to enter your information onto our vendor list and download the original documents. This will ensure your contact information is registered on our vendor list, and we can send you any addenda that may be issued. This website is the only official website for prospective bidders to obtain digital copies of bid documents. It is the responsibility of each prospective bidder to verify the completeness of their printed bid documents before submitting a bid and accompanying executed addenda acknowledgement, and other required forms.

2.2 BLACKOUT PERIOD

Under no circumstances are respondents to contact or discuss this Invitation to Bid, or any of the information contained herein or about this project in general, with any College of DuPage trustee, employee, vendor, contractor or subcontractor, other than using the methods outlined in this bid. Respondents are strictly forbidden from visiting the College's locations or approaching any College trustee, employee, vendor, contractor or subcontractor for any information related to this Invitation to Bid or this project without the direct knowledge and authorization in writing in advance from the Purchasing Manager or Buyer. Violation of these provisions may subject the respondent to immediate disqualification.

Initial your understanding of this requirement

2.3 PRE-BID MEETING

The College will hold a Pre-Bid Meeting at the College of DuPage, Glen Ellyn Campus, 425 Fawell Blvd, Berg Instructional Center, (BIC) 1B03A, Glen Ellyn, IL at **10:00 a.m. Central Time on Tuesday, February 19, 2019**. All parties interested in responding to the RFP are urged to attend in person. The College will clarify the objectives of the RFP and answer questions during the Pre-Proposal Conference.

2.4 REQUESTS FOR INFORMATION/CLARIFICATION

If any firm submitting a bid for this project is in doubt as to the true meaning of the specifications or other documents or any part thereof, bidder shall request clarification from the Purchasing Department. Questions must be submitted in writing and be directed via email to the Purchasing Department at purchasing@cod.edu no later than **February 20, 2019 at 12:00 p.m. Central Time**. Questions for which answers are provided will be communicated to all registered recipients of bid documents via addendum. All issued addenda must be signed and returned to the College as per the instructions in the addenda or bid will not be accepted.

2.5 BID DEADLINE AND SUBMISSION

To be assured of consideration, Bids must be received by the College of DuPage in the College's in Purchasing Department, BIC-1B03, no later than **2:00 p.m. Central Time on Friday, March 1, 2019**. Failure by a delivery service company or person to meet the deadline will not excuse the Bidder from the deadline requirement. It is solely the Bidder's responsibility to ensure that adequate time is allowed for timely, accurate delivery and that the Bid is received as required.

All Bidders shall submit:

One (1) *sealed* original copy of the Bid, one (1) copy of the completed Bid, and two (2) flash drives containing all completed documents

Bids must be in a sealed envelope and delivered to:

ATTN: Bid No. 2019-B0026

Purchasing Manager
College of DuPage
BIC Building - Room 1B03
425 Fawell Blvd.
Glen Ellyn, Illinois 60137

Bids must be received by the date and hour of the Bid Opening as shown in the legal advertisement. The sealed envelope submitted by the Bidder shall carry the following information on the face of the envelope: Bidder's name, address, Bid Notice Number, advertised date of Bid Opening and the hour designated for Bid Opening as shown in the legal advertisement. Unless otherwise stated, all blank spaces on the bid forms shall be fully completed. Bidder bears all responsibility for error or omissions in the submission of the Bid.

2.6 EXCEPTIONS

If any Respondent intends to take any deviations or exceptions from the specifications or other bid documents, Respondent shall submit to the Purchasing Manager a written request for a deviation or exception at least 5 business days prior to the date and time of advertised bid opening date. If the Purchasing Manager considers such deviation or exception acceptable, the Purchasing Manager shall issue an Addendum setting forth such deviation or exception from the specifications or other which shall be applicable to all Respondents submitting a response.

If no Addendum is issued by the Purchasing Manager/Buyer, then such deviation or exception shall be deemed rejected.

The College may reject any response containing deviations or exceptions not previously accepted through a written Addendum. A copy of such Addendum will be e-mailed or delivered to each Respondent receiving a set of such bid documents. Respondent shall acknowledge receipt of each Addendum issued in the space provided on the bid form or via a signed addendum. Failure to acknowledge receipt of addenda may result in disqualification of the bid. All written requests for deviations or exceptions shall be sent to purchasing@cod.edu.

Initial understanding of this requirement: _____

2.7 ERROR IN BID

Where a bidder claims to have made a mistake, such mistake must be called to the attention of the Purchasing Manager within twenty-four (24) hours after the opening of bids. Within forty-eight (48) hours of the bid opening, bidder shall submit to the College's designated Purchasing Manager original documentary evidence and a detailed explanation of how the mistake was made. Failure to conform to this requirement precludes the bidder from withdrawing its bid based upon a bid mistake. If such notice, proof and explanations have been tendered, and the Purchasing Manager is convinced that a bona fide mistake has been made, the Purchasing Manager may recommend to the Board of Trustees that the bidder be allowed to withdraw its bid and recommend that the bid be awarded to the next lowest responsible, responsive bidder. If the Board determines by majority vote, that the bidder has made a bona fide error, no award will be made upon such bid and the bid security will be returned.

2.8 WITHDRAWAL OF BIDS

Bidders may withdraw their Bids at any time prior to the time specified in the legal advertisement as the date and hour set for the Bid Opening. However, no Bidder shall withdraw, cancel or modify its Bid response for a period of ninety (90) calendar days after said advertised Bid Opening. Requests for withdrawal must be made in writing on the Bidder's letterhead to the College's Purchasing Department. Bidders must make their own arrangements for the return of their Bid.

2.9 NOTICES

All communications and notices between the College and Bidders regarding the Bid Documents shall be in writing and hand delivered or delivered via United States mail, postage prepaid, or via email. Notices to the Bidders shall be addressed to the name and address or email address provided by the Bidders; notices to the Purchasing Manager shall be addressed to Purchasing Department, College of DuPage, BIC Building - Room 1B03, 425 Fawell Blvd., Glen Ellyn, Illinois 60137, or purchasing@cod.edu.

2.10 BID DEPOSIT

When required in the legal advertisement, the Bid shall be accompanied by cashier's check, certified check or surety bond in the amount shown in the legal advertisement or as may be prescribed in these Bid Documents. A certified or cashier's check shall be drawn on a responsible bank doing business in the United States and shall be made payable to the order of the College of DuPage. The Surety issuing the bond must have a general rating of "A", and shall be a Class V or higher in the financial size category as defined by Best's Key Rating Guide - Property and Casualty. Failure to submit the bid deposit shall constitute an informal Bid and such Bid shall be rejected.

The Bidder hereby agrees that the bid deposit shall be forfeited to the College as liquidated damages and not as penalty in the event Bidder fails to comply with the terms of this invitation to bid, or otherwise fails or refuses to honor the Bid upon award of the Contract by the College.

The bid deposit of all bidders will be returned, with the exception of the winning Contractor, after the College has awarded the Contract. The bid deposit of the Contractor will be returned after the Contract has been awarded and the Contractor has submitted all insurance documentation and the Performance and Payment Bond, as required by the Bid Documents.

***This project DOES NOT requires a bid deposit.**

2.11 PERFORMANCE AND PAYMENT BOND

The successful Bidder shall furnish a Performance and Payment Bond in the full amount of the Contract on the College Bid Form, a specimen of which is provided herein. The Surety issuing the Performance and Payment Bond must have a general rating of "A" and shall be a Class V or higher in the financial size category as defined by Best's Key Rating Guide-Property and Casualty.

In the event that the Bidder fails to furnish the Performance and Payment Bond within fourteen (14) calendar days after service of the Notice of Award, the College may elect to retain Bidder's bid deposit as liquidated damages and not as a penalty and the Contract may be terminated. The parties agree that the sum of the bid deposit is a fair estimate of the amount of damages that the College will sustain due to the Bidder's failure to furnish the Performance and Payment Bond and the termination of the Contract.

END OF SECTION

3.0 BID SPECIFICATIONS

Scope of Work – General Contractor for Pathways SRC 1144

This project is intended to be awarded Spring 2019 and complete Phase 1 June 1 2019. The Phase 1 portion of the project, in general, is adding 4 offices into an existing open space at the back of our cafeteria dining area and adding power and data to an adjacent conference room to feed owner provided furniture. The drawings [EXHIBIT B](#) indicate the details of the Phase 1 build out and also that this space is temporary, the area will be demobilized under this contract, as Phase 2, which will begin near the end of December 2019.

Doors, Frames, hardware, lighting fixtures, grilles and diffusers are going to be provided by the College, and returned to the College upon completion of Phase 2.

This project permitting authority is the Village of Glen Ellyn. Prior to the College receiving a permit, the awarded contractor and their subcontractors must be registered with the Village of Glen Ellyn. The College has submitted the application for permit, and will pay the review and inspection fees to obtain the partial permit for construction. Fire Alarm and Sprinkler submittals are submitted by this contractor. Review and Inspection fees for those two trades are paid by the contractor, who will be reimbursed by the College.

Awarded bidder will execute unaltered and comply with terms and conditions of sample contract [EXHIBIT D](#) attached to this bid package.

Prior to final payment, contractor will provide all certified payrolls and completed prevailing wage forms, [EXHIBIT C](#) attached ~~to this bid package~~) for all companies performing work on the campus under this agreement.

~~Given the odd condition of building a space out then returning it to the conditions before construction, bidders are recommended to review the drawings in detail, attend the pre-bid and ask questions.~~

~~Drawing Clarification: E1.0~~

Contractor provides the patch panel, and connects all data cables to the patch panel. Final connections from the panel to the switch are by owner.

END OF SECTION

4.0 BID FORM

2019-B0026 General Contractor for Navigator Space SRC 1144

FIRM NAME, CONTACT NAME and PHONE NUMBER

The below prices include all stipulations and requirements of Addenda No. _____

Proposes to furnish all labor, materials, equipment and services as required to satisfactorily complete all work described here in as required for the delivery and installation of the project where bid below:

| | |
|--|----|
| General Contractor for Navigator Space SRC 1144 | |
| Base Bid | \$ |

Comments:

Submitted by : _____(printed)

Submitted by : _____(signed)

END OF SECTION

5.0 BUSINESS ENTERPRISE PROGRAM

STATE OF ILLINOIS BUSINESS ENTERPRISE PROGRAM MINORITIES, FEMALES, PERSONS WITH DISABILITY PARTICIPATION AND UTILIZATION PLAN

The Business Enterprise for Minorities, Females and Persons with Disabilities Act (BEP) establishes a goal for community colleges contracting with businesses that have been certified as owned and controlled by persons who are minorities (MBE), female (FBE/ also referred to as WBE), or persons with disabilities (PDBE) (collectively, BEP certified vendor(s)). 30 ILCS 575

Contract Goal to be Achieved by Vendor: This solicitation includes an aspirational **BEP** participation goal of 20% based on the availability of BEP certified vendors to perform or provide the anticipated services and/or supplies required by this solicitation.

The BEP participation goal is applicable to all bids or offers. In addition to the award criteria established for this solicitation, the College will award this contract to a Vendor that meets the goal or demonstrates good faith efforts to meet the goal. This goal is applicable to change orders and allowances within the scope of work provided by the BEP certified vendors. If Vendor is an MBE and FBE certified vendor, the entire goal is met and no subcontracting with a BEP certified vendors is required; however, **Vendor must submit a Utilization Plan indicating that the goal will be met by self-performance.**

Following are guidelines for Vendor's completion of the Utilization Plan. The Utilization Plan must demonstrate that Vendor has either: (1) met the entire contract goal; or (2) made good faith efforts towards meeting the goal.

At the time of bid or offer, Vendor, or Vendor's proposed Subcontractor, must be certified with the Illinois Department of Central Management Services as a BEP certified vendor.

Failure to complete a Utilization Plan or provide Good Faith Effort documentation shall render the bid or offer non-responsive; and subject to rejection and/or disqualification in the College's sole discretion.

1. If applicable where there is more than one prime vendor, the Utilization Plan should include an executed Joint Venture Agreement specifying the terms and conditions of the relationship between the parties and their relationship and responsibilities to the contract. The Joint Venture Agreement must clearly evidence that the BEP certified vendor will be responsible for a clearly defined portion of the work and that its responsibilities, risks, profits and contributions of capital, and personnel are proportionate to its ownership percentage. It must include specific details related to the parties' contributions of capital, personnel, and equipment and share of the costs of insurance and other items; the scopes to be performed by the BEP certified vendor under its supervision; and the commitment of management, supervisory personnel, and operative personnel employed by the BEP certified vendor to be dedicated to the performance of the contract. Established Joint Venture Agreements will only be credited toward BEP goal achievements for specific work performed by the BEP certified vendor. **Each party to the Joint Venture Agreement must execute the bid or offer prior to submission of the bid or offer to the College.**
2. An agreement between a vendor and a BEP certified vendor in which a BEP certified vendor promises not to provide subcontracting or pricing quotations to other vendors is prohibited. The College may request additional information to demonstrate compliance. Vendor agrees to cooperate promptly with the College in submitting to interviews, allowing entry to places of business, providing further documentation, and to soliciting the cooperation of a proposed BEP certified vendor. Failure to cooperate by Vendor and BEP certified vendor may render the bidder or offeror non-responsive or not responsible. **The contract will not be awarded to Vendor unless Vendor's Utilization Plan is approved by the College.**
3. **BEP Certified Vendor Locator References:** Vendor may consult CMS' BEP Vendor Directory at www.sell2.illinois.gov/cms/business, as well as the directories of other certifying agencies, but firms **must be certified with CMS as BEP certified vendors at the time of bid or offer.**

- 4. Vendor Assurance:** Vendor shall not discriminate on the basis of race, color, national origin, sexual orientation or sex in the performance of this contract. Failure by Vendor to carry out these requirements is a material breach of this contract, which may result in the termination of this contract or such other remedy, as the College deems appropriate. This assurance must be included in each subcontract that Vendor signs with a subcontractor or supplier.
- 5. Calculating BEP Certified Vendor Participation:** The Utilization Plan documents work anticipated to be performed, or goods/equipment provided by all BEP certified vendors and paid for upon satisfactory completion/delivery. Only the value of payments made for the work actually performed by BEP certified vendors, by subcontractors or suppliers to such vendors, is counted toward the contract goal. Applicable guidelines for counting payments attributable to contract goals are summarized below:
- 5.1** The value of the work actually performed or goods/equipment provided by the BEP certified vendor shall be counted towards the goal. The entire amount of that portion of the contract that is performed by the BEP certified vendor, including supplies purchased or equipment leased by the BEP certified vendor shall be counted, except supplies purchased and equipment rented from the Prime Vendor submitting this bid or offer.
 - 5.2** A vendor shall count the portion of the total dollar value of the BEP contract equal to the distinct, clearly defined portion of the work of the contract that the BEP certified vendor performs toward the goal. A vendor shall also count the dollar value of work subcontracted to other BEP certified vendor. Work performed by the non- BEP certified party shall not be counted toward the goal. **Work that a BEP certified vendor subcontracts to a non-BEP certified vendor will not count towards the goal.**
 - 5.3** A Vendor shall count toward the goal 100% of its expenditures for materials and supplies required under the contract and obtained from a BEP certified vendor manufacturer, BEP certified regular dealer, or BEP certified supplier. A Vendor shall count toward the goal the following expenditures to BEP certified vendors that are not manufacturers, regular dealers, or suppliers:
 - 5.3.1** The fees or commissions charged for providing a bona fide service, such as professional, technical, consultant or managerial services and assistance in the procurement of essential personnel, facilities, equipment, materials or supplies required for performance of the contract, provided that the fee or commission is determined by College to be reasonable and not excessive as compared with fees customarily allowed for similar services.
 - 5.3.2** The fees charged for delivery of materials and supplies required by the contract (but not the cost of the materials and supplies themselves) when the hauler, trucker, or delivery service is not also the manufacturer or a supplier of the materials and supplies being procured, provided that the fee is determined by the College to be reasonable and not excessive as compared with fees customarily allowed for similar services. The BEP certified vendor's trucking firm must be responsible for the management and supervision of the entire trucking operation for which it is responsible on the contract, and must itself own and operate at least one fully licensed, insured and operational truck used on the contract.
 - 5.3.3** The fees or commissions charged for providing any bonds or insurance specifically required for the performance of the contract, provided that the fee or commission is determined by the College to be reasonable and not excessive as compared with fees customarily allowed for similar services.
 - 5.4** BEP certified vendors who are performing on contract as second tier subcontractors may be counted in meeting the established BEP goal for this contract as long as the Prime Vendor can provide documentation indicating the utilization of these vendors.
 - 5.5** A Vendor shall count towards the goal only expenditures to firms that perform a commercially useful function in the work of the contract.

5.5.1 A firm is considered to perform a commercially useful function when it is responsible for execution of a distinct element of the work of a contract and carries out its responsibilities by actually performing, managing, and supervising the work involved. The BEP certified vendor must also be responsible, with respect to materials or supplies used on the contract, for negotiating price, determining quality and quantity, ordering the materials or supplies, and installing the materials (where applicable) and paying for the material or supplies. To determine whether a firm is performing a commercially useful function, the College shall evaluate the amount of work subcontracted, whether the amount the firm is to be paid under the contract is commensurate with the work it is actually performing and the credit claimed for its performance of the work, industry practices, and other relevant factors.

5.5.2 A BEP certified vendor does not perform a commercially useful function if its role is limited to that of an extra participant in a transaction or contract through which funds are passed through in order to obtain BEP certified vendor participation. In determining whether a BEP certified vendor is such an extra participant, the College shall examine similar transactions, particularly those in which BEP certified vendors do not participate, and industry practices.

5.6 A Vendor shall not count towards the goal expenditures that are not direct, necessary and related to the work of the contract. Only the amount of services or goods that are directly attributable to the performance of the contract shall be counted. Ineligible expenditures include general office overhead or other Vendor support activities.

6. Good Faith Effort Procedures: Vendor must submit Utilization Plans, subcontract documents, and/or Letters of Intent that meet or exceed the published goal. If Vendor cannot meet the stated goal, Vendor must document and explain within the Utilization Plan the good faith efforts it undertook to meet the goal. Utilization Plans are due at the time of and must be enclosed and sealed with the bid or offer submission. Copies of subcontract documents and/or Letters of Intent shall be due upon request.

7. Contract Compliance: Compliance with this section is an essential part of the contract. The following administrative procedures and remedies govern Vendor's compliance with the contractual obligations established by the Utilization Plan. **After approval of the Plan and award of the contract, the Utilization Plan becomes part of the contract.** If Vendor did not succeed in obtaining BEP certified vendor participation to achieve the goal and the Utilization Plan was approved and contract awarded based upon a determination of good faith, the total dollar value of BEP certified vendor work calculated in the approved Utilization Plan as a percentage of the awarded contract value shall become the contract goal.

7.1. The Utilization Plan may not be amended after contract execution without the College's prior written approval.

7.2. Vendor may not make changes to its contractual BEP certified vendor commitments or substitute BEP certified vendors without the prior written approval of the College. Unauthorized changes or substitutions, including performing the work designated for a BEP certified vendor with Vendor's own forces, shall be a violation of the utilization plan and a breach of the contract, and shall be cause to terminate the contract, and/or seek other contract remedies or sanctions.

7.3. If it becomes necessary to substitute a BEP certified vendor or otherwise change the Utilization Plan, Vendor must notify the College in writing of the request to substitute a BEP certified vendor or otherwise change the Utilization Plan. The request must state specific reasons for the substitution or change. The College shall notify the Council or its delegate of the request to substitute a BEP certified vendor or change the Utilization Plan. The College reserves the right to approve or deny a request for substitution or other change in the Utilization Plan.

7.4. Where Vendor has established the basis for the substitution to the College's satisfaction, it must make good faith efforts to meet the contract goal by substituting a BEP certified vendor. Documentation of a replacement BEP certified vendor, or of good faith efforts to replace the BEP certified vendor, must meet the requirements of the initial Utilization Plan. If the goal cannot be reached and good faith efforts have been made, Vendor may substitute with a non- BEP certified

vendor or Vendor may perform the work.

- 7.5.** If a Vendor plans to hire a subcontractor for any scope of work that was not previously disclosed in the Utilization Plan, Vendor must obtain the approval of the College to modify the Utilization Plan and must make good faith efforts to ensure that BEP certified vendors have a fair opportunity to submit a bid or offer on the new scope of work.
- 7.6.** A new BEP certified vendor agreement must be executed and submitted to the College within five business days of Vendor's receipt of the College's approval for the substitution or other change.
- 7.7.** Vendor shall maintain a record of all relevant data with respect to the utilization of BEP certified vendors, including but without limitation, payroll records, invoices, canceled checks and books of account for a period of at least three years after the completion of the contract. Full access to these records shall be granted by Vendor upon 48 hours written demand by the College to any duly authorized representative thereof, or to any municipal, state or federal authorities. The College shall have the right to obtain from Vendor any additional data reasonably related or necessary to verify any representations by Vendor. After the performance of the final item of work or delivery of material by the BEP certified vendor and final payment to the BEP certified vendor by Vendor, but not later than 30 calendar days after such payment, Vendor shall submit a statement confirming the final payment and the total payments made to the BEP certified vendor under the contract.
- 7.8.** The College will periodically review Vendor's compliance with these provisions and the terms of its contract. Without limitation, Vendor's failure to comply with these provisions or its contractual commitments as contained in the Utilization Plan, failure to cooperate in providing information regarding its compliance with these provisions or its Utilization Plan, or provision of false or misleading information or statements concerning compliance, certification status or eligibility of the BEP certified vendor, good faith efforts or any other material fact or representation shall constitute a material breach of this contract and entitle the College to declare a default, terminate the contract, or exercise those remedies provided for in the contract or at law or in equity.
- 7.9.** The College reserves the right to withhold payment to Vendor to enforce these provisions and Vendor's contractual commitments. Final payment shall not be made pursuant to the contract until Vendor submits sufficient documentation demonstrating compliance with its Utilization Plan.

UTILIZATION PLAN

The Utilization Plan and Letter of Intent must be sealed and submitted with Proposal.

_____ (Vendor) submits the following Utilization Plan as part
Respondent Name

of our bid or offer in accordance with the requirements of the BEP Program Status and Participation section of the solicitation for **General Contractor for Pathways SRC 1144, Bid Number 2019-B0026**. We understand that all subcontractors must be certified with the CMS BEP Program at the time of submission of all bids and offers. **We understand that compliance with this section is an essential part of this contract and that the Utilization Plan will become a part of the contract, if awarded.**

Vendor submits the following statement:

- Vendor is a BEP certified firm and plans to fully meet the goal through self-performance.
- Vendor has identified BEP certified subcontractor(s) to fully meet the established goal and submits the attached executed Letter(s) of Intent; or
- Vendor has made good faith efforts towards meeting the entire goal as indicated on the attached Utilization Plan, or a portion of the goal, and hereby requests a waiver (complete checklist below).

Vendor's person responsible for compliance with this BEP goal:

Name: _____ Title: _____

Telephone: _____ Email: _____

DEMONSTRATION OF GOOD FAITH EFFORTS TO ACHIEVE GOAL AND REQUEST FOR WAIVER

If the BEP participation goal was not achieved, the vendor must provide documented evidence of good faith efforts to achieve the goal.

Below is a checklist of actions that will be used to evaluate a Vendor's Demonstration of Good Faith Efforts and Request for Waiver. **Please check the actions which you completed.** If any other efforts were made to obtain BEP participation in addition to the items listed below, attach a detailed description of such efforts. The College reserves the right to review and audit the results of the vendor's efforts as described below.

- Utilize the Sell2Illinois website: www2.illinois.gov/cms/business to identify BEP certified vendors within the respective commodity/service codes denoted above and at a minimum email all listed vendors and solicit quotes from all vendors who express an interest via follow-up emails or telephone calls.
- Solicit through all reasonable and available means (e.g., attendance at a vendor conference, advertising and/or written notices) the interest of BEP certified vendors that have the capability to perform the work of the contract. Vendor must solicit this interest within sufficient time to allow the BEP certified vendors to respond to the solicitation. Vendor must determine with certainty if the BEP certified vendors are interested by taking appropriate steps to follow up initial solicitations and encourage them to submit a bid or proposal. Vendor must provide interested BEP certified vendors with adequate information about the plans, specifications, and requirements of the contract in a timely manner to assist them in responding promptly to the solicitation.
- Select portions of the work to be performed by BEP certified vendors in order to increase the likelihood that the goal will be achieved. This includes, where appropriate, breaking out contract work items into economically feasible units to facilitate BEP certified vendor participation, even when Vendor might otherwise prefer to perform these work items with its own forces.
- Make a portion of the work available to BEP certified vendors and selecting those portions of the work or material needs consistent with their availability, so as to facilitate BEP certified vendor participation.
- Negotiate in good faith with interested BEP certified vendors. Evidence of such negotiation must include the names, addresses, email addresses, and telephone numbers of BEP certified vendors that were considered and an explanation as to why an agreement could not be reached.
- Thoroughly investigate the capabilities of BEP certified vendors and not reject them as unqualified without sound reasons.
- Make efforts to assist interested BEP certified vendors in obtaining lines of credit or insurance as required by the College.
- Make efforts to assist interested BEP certified vendors in obtaining necessary equipment, supplies, materials, or related assistance or services.

6.0 CERTIFICATIONS **Required**

IMPORTANT: All bidders are required to complete and sign this form. Completed form must be returned with bid no later than the advertised bid deadline. Failure to return this completed form may result in disqualification of bid.

THE UNDERSIGNED IS CAUTIONED TO CAREFULLY READ THESE CERTIFICATIONS PRIOR TO SIGNING THE SIGNATURE PAGE. SIGNING THE SIGNATURE PAGE SHALL CONSTITUTE A WARRANTY BY THE UNDERSIGNED THAT ALL THE STATEMENTS, CERTIFICATIONS AND INFORMATION SET FORTH WITHIN THESE CERTIFICATIONS ARE TRUE, COMPLETE AND CORRECT AS OF THE DATE THE SIGNATURE PAGE IS SIGNED. THE UNDERSIGNED IS NOTIFIED THAT IF THE COLLEGE LEARNS THAT ANY OF THE FOLLOWING CERTIFICATIONS WERE FALSELY MADE, THAT ANY CONTRACT ENTERED INTO WITH THE UNDERSIGNED SHALL BE SUBJECT TO TERMINATION.

- A. Prevailing Wage Act. To the extent required by law, Contractor shall not pay less than the prevailing wage as established pursuant to an Act Regulating the Wages of Laborers, Mechanics, and Other Workman employed under Contract for Public Workers 820 ILCS 130/1 *et seq.* Our company certifies that it is eligible for bidding on public contracts and has complied with section 11a of the Prevailing Wage Act, 820 ILCS 130.01-12. **Yes** _____ **No** _____
- B. Human Rights Act. To the extent required by law, Contractor shall abide by the Illinois Human Rights Act, 775 ILCS 10/0.01 *et seq.*
- C. Drug Free Workplace. To the extent required by law, Contractor shall abide with the requirements of the Drug Free Workplace Act 30 ILCS 580.1 *et seq.*
- D. Sexual Harassment Policy. Contractor represents by the signing of this agreement that it has a written sexual harassment policy that is in accordance with 775 ILCS 5/2-105 (A) (4).
- E. Non-debarment. By executing this agreement Contractor certifies that it has not been debarred from public contracts in the State of Illinois for violating either 33E-3 or 33E-4 of the Public Contracts Act, 720 ILCS 5/33E-1 *et seq.*
- F. Fair Employment Practice: Company is in compliance with all State and Federal laws regarding Fair Employment Practice as well as all rules and regulations. **Yes** _____ **No** _____
- G. Our company has an Equal Employment Opportunity and Affirmative Action Program which complies with Executive Order 11246, the Vietnam Era Veterans' Readjustment Assistance Act of 1974, and the Rehabilitation Act of 1973.
Yes _____ **No** _____
- H. Our company certifies that it is eligible for bidding on public contracts and is not in violation of either paragraph 33E-3 or 33-E-4 of Public Act 86-150, 720ICLS 5 with regards to bid rigging/bid rotating. **Yes** _____ **No** _____
- I. When required by law, the bidder and all bidder's subcontractors must participate in applicable apprenticeship and training programs approved by and registered with the United States Department of Labor's Bureau of Apprenticeship and Training as required by Illinois Public Act 093-0642.

ADVICE

- A. MINORITY/WOMAN-OWNED, DISADVANTAGED BUSINESS? YES _____ NO _____. If yes, please attach copy of certification and advise certification number and expiration date below:

Name of Certifying Entity: _____

Certification #: _____ Expiration Date: _____

- B. STATE NEGOTIATED COOPERATIVE AGREEMENT: YES _____ NO _____ Contract No. _____

Signature

Respondent/Company Official: _____ Date: _____

7.0 SIGNATURE PAGE **Required*

IMPORTANT: All bidders are required to complete and sign this form. Completed form must be returned with bid no later than the advertised bid deadline. Failure to return this completed form may result in disqualification of bid.

Check One:

- SOLE PROPRIETOR** **PARTNERSHIP** (and/or JOINT VENTURE) **LIMITED LIABILITY COMPANY**
- CORPORATION**

The undersigned acknowledges receipt of a full set of Bid Documents and Addenda Numbers _____ (None unless indicated here). **All issued addenda must be signed and returned to the College as per the instructions in the addenda or bid will not be accepted.**

The undersigned makes the foregoing Bid subject to all of the terms and conditions of the Bid Documents. The undersigned certifies that all of the foregoing statements of the Vendor Certifications are true and correct. The undersigned warrants that all of the facts and information submitted by the undersigned in connection with this Bid are true and correct. Upon award and execution of this Contract by the College of DuPage Board of Trustees, the undersigned agrees that execution of this Bid shall stand as the undersigned's execution of this Contract.

BUSINESS NAME: _____

BUSINESS ADDRESS: _____

BUSINESS TELEPHONE: _____ FAX NUMBER: _____

EMAIL ADDRESS: _____

CELLULAR TELEPHONE NUMBER: _____

FEIN/SSN: _____

AUTHORIZED SIGNATURE: _____

PRINT NAME: _____

TITLE: _____

DATE: _____

Subscribed to and sworn before me this

_____ Day of _____, 2019. My commission expires: _____

X _____

Notary Public Signature

Notary Seal

- * **Attach hereto a partnership resolution or other document authorizing the individual signing this Signature Page to so sign on behalf of the Partnership.**
- ** **If the LLC is not registered in the State of Illinois, a copy of a current Certificate of Good Standing from the state of incorporation must be submitted with this Signature Page.**
- *** **Attach either a certified copy of the by-laws, articles, resolution or other authorization demonstrating such persons to sign the Signature Page on behalf of the LLC.**
- *** **If the corporation is not registered in the State of Illinois, a copy of the Certificate of Good Standing from the state of incorporation must be submitted with this Signature Page.***** In the event that this Signature Page is signed by any persons other than the President and Secretary, attach either a certified copy of the corporate by-laws, a resolution or other authorization by the corporation, authorizing such persons to sign the Signature Page on behalf of the corporation.**

8.0 CONFLICT OF INTEREST DISCLOSURE AND NON-COLLUSION FORM **Required******

IMPORTANT: All bidders are required to complete and sign this form. Completed form must be returned with bid no later than the advertised bid deadline. Failure to return this completed form may result in disqualification of bid.

BID #: _____ DATE: _____

CONFLICT OF INTEREST DISCLOSURE

College of DuPage (COD) reserves the right, at its sole discretion, to reject any and all bids, revise the submission timeline as described in the solicitation, and to discontinue at any time the submission process as described in the solicitation. College of DuPage is requiring that any and all relationships with the College, its Administrators, Trustees, Committee members, COD Foundation Trustees, or any other Employee of the College be disclosed in writing as a part of any bid submitted. Contact with any employee of the College of DuPage during the pre-award period, except as noted in the solicitation, is strictly forbidden and is considered sufficient grounds for dismissal from the Bid/RFP process.

VENDOR CONFLICT OF INTEREST DISCLOSURE

Define the relationship with any College of DuPage Administrator, Trustee, Employee, COD Foundation Board member, Committee member, or their immediate family member, with which your company or any of its owners, officers, Trustees, employees, or their immediate family, does business or is likely to do business with, or for which there is an opportunity to influence a related College decision; include the name and relationship to any immediate family member.

Vendor certifies that there is no known conflict of interest with any COD Administrator, Employee, Trustee, Committee member, or COD Foundation Trustee, or their immediate family.

Vendor Printed Name: _____ Title: _____

Signature: _____ Date: _____

NON-COLLUSION STATEMENT

The undersigned affirms that he/she is duly authorized to execute this contract and that this company, corporation, firm, partnership or individual has not prepared this bid in collusion with any other bidder, and that the contents of this bid as to prices, terms or conditions of said bid have not been Communicated by the undersigned nor by any employee or agent to any other person engaged in this type of business prior to the official opening of this bid.

Company Name: _____ Owners/Principal(s)
Name(s)/Title(s): _____

Vendor Address: _____ City, State, Zip: _____

Phone Number: _____ Fax Number: _____

Email Address: _____

Signature

Bidder/Company Official: _____ Date: _____

END OF SECTION

EXHIBIT A – BID SET SPECIFICATIONS

**BID SET
SPECIFICATIONS
FOR**



COD SRC PATHWAYS OFFICES

**COLLEGE OF DUPAGE
GLEN ELLYN, IL**

**DATED:
FEBRUARY 04, 2019**

PREPARED BY:

**CORDOGAN CLARK & ASSOCIATES, INC.
960 RIDGEWAY AVENUE, AURORA, ILLINOIS 60506**

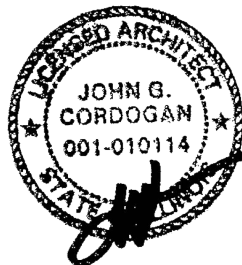


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M1.0 PARTIAL MECHANICAL PLANS AND NOTES

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COD SRC PATHWAYS OFFICES
COLLEGE OF DUPAGE

CORDOGAN CLARK & ASSOCIATES
BID SET

SECTION 011000 - SUMMARY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes:

1. Project information.
2. Work covered by Contract Documents.
3. Access to site.
4. Coordination with occupants.
5. Work restrictions.
6. Specification and drawing conventions.

- B. Related Section:

1. Division 01 Section "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.

1.3 PROJECT INFORMATION

- A. Project Identification: Institutional Advancement Office

1. Project Location: 425 Fawell Boulevard, Glen Ellyn, IL 60137.

- B. Owner: College of Dupage, 425 Fawell Boulevard, Glen Ellyn, IL 60137.

1. Owner's Representative: Donald Inman

- C. Architect: Cordogan, Clark & Associates, Inc., 960 Ridgeway Avenue, 3rd Floor, Aurora, IL 60506.

1.4 WORK COVERED BY CONTRACT DOCUMENTS

- A. The Work of the Project is defined by the Contract Documents and consists of the following:

1. Temporary office build-out.

- B. Type of Contract

1. Project will be constructed under a single prime contract.

1.5 ACCESS TO SITE

- A. General: Contractor shall have limited use of Project site for construction operations as indicated on Drawings by the Contract limits and as indicated by requirements of this Section.
- B. Use of Site: Limit use of Project site to areas within the Contract limits indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.
 1. Limits: Confine construction operations to the office. Trades are restricted from areas of campus that are not a part of the construction scope.
 2. Driveways, Walkways and Entrances: Keep driveways loading areas, and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.
 - a. Schedule deliveries to minimize use of driveways and entrances by construction operations.
 - b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.
- C. Condition of Existing Building: Maintain portions of existing building affected by construction operations in a weathertight condition throughout construction period. Repair damage caused by construction operations.

1.6 COORDINATION WITH OCCUPANTS

- A. Full Owner Occupancy: Owner will occupy site and existing building(s) during entire construction period. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's day-to-day operations. Maintain existing exits unless otherwise indicated.
 1. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from Owner and approval of authorities having jurisdiction.
 2. Notify the Owner not less than 72 hours in advance of activities that will affect Owner's operations.

1.7 WORK RESTRICTIONS

- A. Work Restrictions, General: Comply with restrictions on construction operations.
 1. Comply with limitations on use of public streets and other requirements of authorities having jurisdiction.
- B. On-Site Work Hours: Limit work in the existing building to normal business working hours of 7 a.m. to 6 p.m., Monday through Friday, except as otherwise arranged with the Owner.

1. Weekend Hours: Coordinate with the Owner.
 2. Early Morning Hours: Coordinate with the Owner.
 3. Hours for Utility Shutdowns: Coordinate with the Owner.
- C. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after providing temporary utility services according to requirements indicated:
1. Notify Architect & Owner not less than two days in advance of proposed utility interruptions.
 2. Obtain Owner's written permission before proceeding with utility interruptions.
- D. Existing Fire Alarm Interruptions: Do not interrupt fire alarm serving facilities occupied by Owner or others unless permitted under the following conditions according to requirements indicated:
1. Notify Architect & Owner not less than two days in advance of proposed fire alarm interruptions.
 2. Obtain Owner's written permission before proceeding with fire alarm interruptions.
 3. Existing smoke detectors are to be covered and protected throughout construction.
- E. Noise, Vibration, and Odors: Coordinate operations that may result in high levels of noise and vibration, odors, or other disruption to Owner occupancy with Owner.
1. Notify Architect & Owner not less than two days in advance of proposed disruptive operations.
 2. Obtain Owner's written permission before proceeding with disruptive operations.
- F. Nonsmoking Campus: College of Dupage is a smoke free campus. Smoking on campus property is not permitted.
- G. Controlled Substances: Use of tobacco products and other controlled substances on the Project site is not permitted.

1.8 SPECIFICATION AND DRAWING CONVENTIONS

- A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
 2. Specification requirements are to be performed by Contractor unless specifically stated otherwise.
- B. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.

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

1.9 MISCELLANEOUS PROVISIONS

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 011000

SECTION 012500 - SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 REQUIREMENTS INCLUDE:

- A. Coordinating Contractor: Review Contractor substitution requests for completeness, impact on overall schedule and coordinated Work of other Contractors. Request and collect additional information from Contractors as required. Forward complete requests to A/E and Owner for review.
- B. Each Contractor: Submit substitution requests meeting the requirements of this section to coordinating contractor as required.

1.2 RELATED DOCUMENTS

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

1.3 DEFINITIONS

- A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.

1.4 ACTION SUBMITTALS

- A. Substitution Requests: Regardless of the reason for the substitution request, the Contractor shall submit complete data demonstrating compliance of the proposed substitution with contract documents:
 - 1. An itemized comparison of proposed substitution with product or method specified.
 - 2. Data relating to changes in construction schedule, coordination, and other affected contracts.
 - 3. Accurate cost data on proposed substitution in comparison with product or method specified.
 - 4. Accurate cost data on proposed substitution in comparison with product or method specified.
- B. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within seven days of receipt of a request for substitution. Architect will notify Contractor through the Coordinating Contractor of acceptance or rejection of proposed substitution within twenty-one days of receipt of request, or twenty-one days of receipt of additional information or documentation, whichever is later.
 - 1. Forms of Acceptance: Change Order, Construction Change Directive, or Architect's Supplemental Instructions for minor changes in the Work.

2. Use product specified if Architect/Engineer does not issue a decision on use of a proposed substitution within time allocated.

1.5 QUALITY ASSURANCE

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

1.6 PROCEDURES

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

PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

- A. Substitution by Change Order. After notice of award, substitutions shall not be accepted if acceptance would require a change order increasing the amount of the contract, and may only be approved by written change order under one of the following conditions:
 1. Substitutions are required for compliance with final interpretations of code requirements or insurance regulations
 2. Unavailability of specified products, through no fault of contractor.
 3. Subsequent information discloses inability of a specified product to perform properly or to fit in designated space.
 4. Manufacturer/fabricator refusal to certify or guarantee performance of a specified product as specified.
 5. When a substitution would be substantially in the Owner's best interests (e.g. better quality, shorter delivery time, lower cost, etc.).
- B. Representations: In making a request for substitution, Contractor represents that:
 1. The proposed product is equal or superior to that specified.
 2. It will provide an equal or superior guarantee for the substitution as was specified.
 3. It will coordinate installation of accepted substitutions into work, making all changes for work to be complete.
 4. It will pay all additional costs and expenses for Owner, A/E, and other contractors affected.
 5. Cost savings (difference between price of product used in bid and substitution) will be passed on to Owner.
- C. Restrictions: Substitutions will not be considered by shop drawing, informal request or when acceptance will require substantial revision of contract documents.

COD SRC PATHWAYS OFFICES
COLLEGE OF DUPAGE

CORDOGAN CLARK & ASSOCIATES
BID SET

PART 3 - EXECUTION (Not Used)

END OF SECTION 012500

SUBSTITUTION REQUEST

Project Name: **COD SRC PATHWAYS OFFICES**
Substitution Request No.: _____

CCA Project No.: 19303

Subject description: _____
Document Reference: _____
Date: _____

Request by: _____
Company Name: _____
Phone Number: _____
Fax Number: _____

Attn.: _____

Response Date: _____

Attachments:

Proposed Substitution:

Manufacturer: _____
Address: _____
Phone: _____
Trade Name: _____
Model No.: _____
Installer: _____

Installer: _____
Address: _____
Phone: _____

Differences between proposed substitution and specified product:

Reason for proposing substitution:

Provide information re: similar installation:

Project: _____
Address: _____
Date Installed: _____
Architect: _____

Proposed substitution affects other parts of Work: Yes No (circle one).

Proposed substitution changes Contract Time: Yes No (circle one).

Savings to Owner for accepting substitution: \$ _____

(Substitution Request Cont.)

The Undersigned certifies:

1. Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.
2. Same warranty will be furnished for proposed substitution as for specified product.
3. Same maintenance service and source of replacement parts, as applicable, is available.
4. Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule.
5. Cost data as stated above is complete. Claims for additional costs related to accepted substitution which may subsequently become apparent are to be waived.
6. Proposed substitution does not affect dimensions and functional clearances.
7. Payment will be made for changes to building design, including A/E design, detailing, and construction costs caused by the substitution.
8. Coordination, installation, and changes in the Work as necessary for accepted substitutions will be complete in all respects.

Submitted by: _____

Signed by: _____

Firm: _____

Address: _____

Telephone: _____

A/E's Review and Action:

_____ Substitution Approved- Make submittals in accordance with Specification Section 013300.

_____ Substitution Approved As Noted- Make submittals in accordance w/ Specification Section 013300.

_____ Substitution Rejected- Use specified materials.

_____ Substitution Request received too late- Use specified materials.

Signed by: _____

Date: _____

Additional Comments:

SECTION 013100 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
 - 1. General coordination procedures.
 - 2. Requests for Information (RFIs).
 - 3. Project meetings.
- B. Each contractor shall participate in coordination requirements. Certain areas of responsibility are assigned to a specific contractor.
- C. Related Requirements:
 - 1. Division 01 Section "Construction Progress Documentation" for preparing and submitting Contractor's construction schedule.
 - 2. Division 01 Section "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
 - 3. Division 01 Section "Closeout Procedures" for coordinating closeout of the Contract.

1.3 DEFINITIONS

- A. RFI: Request from Owner, Architect, or Contractor seeking information required by or clarifications of the Contract Documents.

1.4 INFORMATIONAL SUBMITTALS

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

- B. Key Personnel Names: Within 15 days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including office, and cellular telephone numbers and e-mail addresses. Provide names, addresses, and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project.

1.5 GENERAL COORDINATION PROCEDURES

- A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections, that depend on each other for proper installation, connection, and operation.
 - 1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
 - 2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
 - 3. Make adequate provisions to accommodate items scheduled for later installation.
- B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
- C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
 - 1. Preparation of Contractor's construction schedule.
 - 2. Preparation of the schedule of values.
 - 3. Installation and removal of temporary facilities and controls.
 - 4. Delivery and processing of submittals.
 - 5. Progress meetings.
 - 6. Preinstallation conferences.
 - 7. Project closeout activities.
 - 8. Startup and adjustment of systems.
- D. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.

1.6 REQUESTS FOR INFORMATION (RFIs)

- A. General: Immediately on discovery of the need for additional information or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.
 - 1. Architect will return RFIs submitted to Architect by other entities controlled by Contractor with no response.

2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.
- B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:
1. Project name.
 2. Project number.
 3. Date.
 4. Name of Contractor.
 5. Name of Architect.
 6. RFI number, numbered sequentially.
 7. RFI subject.
 8. Specification Section number and title and related paragraphs, as appropriate.
 9. Drawing number and detail references, as appropriate.
 10. Field dimensions and conditions, as appropriate.
 11. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
 12. Contractor's signature.
 13. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.
 - a. Include dimensions, thicknesses, and details of affected materials, assemblies, and attachments on attached sketches.
- C. RFI Forms: AIA Document G716 or CSI Form 13.2A to be submitted electronically in Adobe Acrobat PDF format.
1. Attachments shall be electronic files in Adobe Acrobat PDF format.
- D. Architect's Action: Architect will review each RFI, determine action required, and respond. Allow three working days for Architect's response for each RFI. RFIs received by Architect after 1:00 p.m. will be considered as received the following working day.
1. The following Contractor-generated RFIs will be returned without action:
 - a. Requests for approval of submittals.
 - b. Requests for approval of substitutions.
 - c. Requests for approval of Contractor's means and methods.
 - d. Requests for coordination information already indicated in the Contract Documents.
 - e. Requests for adjustments in the Contract Time or the Contract Sum.
 - f. Requests for interpretation of Architect's actions on submittals.
 - g. Incomplete RFIs or inaccurately prepared RFIs.
 2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt of additional information.
 3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Division 01 Section "Contract Modification Procedures."

- a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within 10 days of receipt of the RFI response.
- E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log bimonthly. Include the following:
1. Project name.
 2. Name and address of Contractor.
 3. Name and address of Architect.
 4. RFI number including RFIs that were returned without action or withdrawn.
 5. RFI description.
 6. Date the RFI was submitted.
 7. Date Architect's response was received.
- F. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within seven days if Contractor disagrees with response.
1. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.
 2. Identification of related Field Order, Work Change Directive, and Proposal Request, as appropriate.

1.7 PROJECT MEETINGS

- A. General: Schedule and conduct meetings and conferences at Project site unless otherwise indicated.
1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times.
 2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
 3. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner, and Architect, within three days of the meeting.
- B. Preconstruction Conference: Architect will schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than 15 days after execution of the Agreement.
1. Conduct the conference to review responsibilities and personnel assignments.
 2. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
 3. Agenda: Discuss items of significance that could affect progress, including the following:
 - a. Tentative construction schedule.

- b. Phasing.
 - c. Critical work sequencing and long-lead items.
 - d. Designation of key personnel and their duties.
 - e. Lines of communications.
 - f. Procedures for processing field decisions and Change Orders.
 - g. Procedures for RFIs.
 - h. Procedures for testing and inspecting.
 - i. Procedures for processing Applications for Payment.
 - j. Distribution of the Contract Documents.
 - k. Submittal procedures.
 - l. Preparation of record documents.
 - m. Use of the premises.
 - n. Work restrictions.
 - o. Working hours.
 - p. Owner's occupancy requirements.
 - q. Responsibility for temporary facilities and controls.
 - r. Procedures for moisture and mold control.
 - s. Procedures for disruptions and shutdowns.
 - t. Construction waste management and recycling.
 - u. Parking availability.
 - v. Office, work, and storage areas.
 - w. Equipment deliveries and priorities.
 - x. First aid.
 - y. Security.
 - z. Progress cleaning.
4. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.
- C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity that requires coordination with other construction.
- 1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect of scheduled meeting dates.
 - 2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
 - a. Contract Documents.
 - b. Options.
 - c. Related RFIs.
 - d. Related Change Orders.
 - e. Purchases.
 - f. Deliveries.
 - g. Submittals.
 - h. Possible conflicts.
 - i. Compatibility requirements.
 - j. Time schedules.
 - k. Weather limitations.
 - l. Manufacturer's written instructions.

- m. Warranty requirements.
 - n. Compatibility of materials.
 - o. Acceptability of substrates.
 - p. Temporary facilities and controls.
 - q. Space and access limitations.
 - r. Regulations of authorities having jurisdiction.
 - s. Testing and inspecting requirements.
 - t. Installation procedures.
 - u. Coordination with other work.
 - v. Required performance results.
 - w. Protection of adjacent work.
 - x. Protection of construction and personnel.
3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
 4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.
 5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.
- D. Progress Meetings: Conduct progress meetings at weekly intervals.
1. Coordinate dates of meetings with preparation of payment requests.
 2. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
 3. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
 - a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
 - 1) Review schedule for next period.
 - b. Review present and future needs of each entity present, including the following:
 - 1) Interface requirements.
 - 2) Sequence of operations.
 - 3) Status of submittals.
 - 4) Deliveries.
 - 5) Off-site fabrication.
 - 6) Access.
 - 7) Site utilization.

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

- 7) Site utilization.
 - 8) Temporary facilities and controls.
 - 9) Work hours.
 - 10) Hazards and risks.
 - 11) Progress cleaning.
 - 12) Quality and work standards.
 - 13) Change Orders.
3. Reporting: Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013100

REQUEST FOR INFORMATION

Project Name: COD SRC PATHWAYS OFFICES

RFI NO: _____

CCA Project No.: 19303

Subject: _____

Document Reference: _____

Date: _____

Information requested by: _____

Attn: _____

Company Name: _____

Phone Number: _____

Fax Number: _____

Attachments: _____

Request for Information:

Requested Response Date:

Suggested Solution:

RESPONSE FROM:

DATE RESOLVED:

Cc:

SECTION 013200 - CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:
 - 1. Contractor's construction schedule.
 - 2. Daily construction reports.
 - 3. Field condition reports.
- B. Related Sections:
 - 1. Division 01 Section "Submittal Procedures" for submitting schedules and reports.
 - 2. Division 01 Section "Quality Requirements" for submitting a schedule of tests and inspections.

1.3 DEFINITIONS

- A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.
 - 1. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.
 - 2. Predecessor Activity: An activity that precedes another activity in the network.
 - 3. Successor Activity: An activity that follows another activity in the network.
- B. Cost Loading: The allocation of the schedule of values for the completion of an activity as scheduled. The sum of costs for all activities must equal the total Contract Sum, unless otherwise approved by Architect.
- C. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.
- D. Event: The starting or ending point of an activity.
- E. Float: The measure of leeway in starting and completing an activity.

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

1.4 INFORMATIONAL SUBMITTALS

- A. Format for Submittals: Submit required submittals in the following format:
1. PDF electronic file.
- B. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.
- C. Daily Construction Reports: Submit at monthly intervals.
- D. Field Condition Reports: Submit at time of discovery of differing conditions.

1.5 COORDINATION

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

PART 2 - PRODUCTS

2.1 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

- A. Construction Schedule Submittal: Supply construction schedule to Architect for review within 10 business days of Notice to Proceed.
- B. Time Frame: Extend schedule from date established for commencement of the Work to date of final completion.

- C. Activities: Treat each story or separate area as a separate numbered activity for each principal element of the Work. Comply with the following:
1. Activity Duration: Define activities so no activity is longer than 20 days, unless specifically allowed by Architect.
 2. Procurement Activities: Include procurement process activities for the following long lead items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
 3. Submittal Review Time: Include review and resubmittal times indicated in Division 01 Section "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's construction schedule with submittal schedule.
 4. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Architect's administrative procedures necessary for certification of Substantial Completion.
 5. Punch List and Final Completion: Include not more than 15 days for punch list and final completion.
- D. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.
1. Construction Areas: Identify each major area of construction for each major portion of the Work. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities to provide for the following:
 - a. Structural completion.
 - b. Permanent space enclosure.
 - c. Completion of mechanical installation.
 - d. Completion of electrical installation.
 - e. Substantial Completion.

2.2 REPORTS

- A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:
1. List of subcontractors at Project site.
 2. List of separate contractors at Project site.
 3. Approximate count of personnel at Project site.
 4. Equipment at Project site.
 5. Material deliveries.
 6. High and low temperatures and general weather conditions, including presence of rain or snow.
 7. Accidents.
 8. Meetings and significant decisions.
 9. Unusual events (refer to special reports).
 10. Stoppages, delays, shortages, and losses.
 11. Meter readings and similar recordings.
 12. Emergency procedures.
 13. Orders and requests of authorities having jurisdiction.

14. Change Orders received and implemented.
 15. Change Directives received and implemented.
 16. Services connected and disconnected.
 17. Equipment or system tests and startups.
 18. Partial completions and occupancies.
 19. Substantial Completions authorized.
- B. Field Condition Reports: Immediately on discovery of a difference between field conditions and the Contract Documents, prepare and submit a detailed report. Submit with a Request for Information. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

PART 3 - EXECUTION

3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

- A. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule one week before each regularly scheduled progress meeting.
1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
 2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
 3. As the Work progresses, indicate final completion percentage for each activity.
- B. Distribution: Distribute copies of approved schedule to Architect, Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.
1. Post copies in Project meeting rooms and temporary field offices.
 2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

END OF SECTION 013200

SECTION 013300 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.
- B. See Division 01 Section "Construction Progress Documentation" for submitting schedules and reports, including Contractor's Construction Schedule.
- C. See Division 01 Section "Quality Requirements" for submitting test and inspection reports.
- D. See Division 01 Section "Closeout Procedures" for submitting warranties.
- E. See Division 01 Section "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.

1.2 DEFINITIONS

- A. Action Submittals: Written and graphic information that requires Architect's responsive action.
- B. Informational Submittals: Written information that does not require Architect's responsive action. Submittals may be rejected for not complying with requirements.

1.3 SUBMITTAL PROCEDURES

- A. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
 - 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 - 2. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
 - a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- B. Submittals Schedule: Comply with requirements in Division 01 Section "Construction Progress Documentation" for list of submittals and time requirements for scheduled performance of related construction activities.
- C. Processing Time: Allow enough time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of

the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.

1. Initial Review: Allow 7 calendar days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
 2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
 3. Resubmittal Review: Allow 7 calendar days for review of each resubmittal.
- D. Identification: Place a permanent label or title block on each submittal for identification.
1. Indicate name of firm or entity that prepared each submittal on label or title block.
 2. Provide a space approximately 6 by 8 inches on label or beside title block to record Contractor's review and approval markings and action taken by Architect.
 3. Include the following information on label for processing and recording action taken:
 - a. Project name.
 - b. Date.
 - c. Name and address of Architect.
 - d. Name and address of Contractor.
 - e. Name and address of subcontractor.
 - f. Name and address of supplier.
 - g. Name of manufacturer.
 - h. Submittal number or other unique identifier, including revision identifier.
 - 1) Submittal number shall use Specification Section number followed by a decimal point and then a sequential number (e.g., 061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., 061000.01.A).
 - i. Number and title of appropriate Specification Section.
 - j. Drawing number and detail references, as appropriate.
 - k. Location(s) where product is to be installed, as appropriate.
 - l. Other necessary identification.
- E. Deviations: Highlight, encircle, or otherwise specifically identify deviations from the Contract Documents on submittals.
- F. Additional Copies: Unless additional copies are required for final submittal, and unless Architect observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.
- G. Transmittal: Package each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Architect will return submittals, without review, received from sources other than Contractor.
1. Transmittal Form: Use AIA Document G810.
- H. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.

1. Note date and content of previous submittal.
 2. Note date and content of revision in label or title block and clearly indicate extent of revision.
- I. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.
- J. Use for Construction: Use only final submittals with mark indicating action taken by Architect in connection with Construction Manager.

PART 2 - PRODUCTS

2.1 ACTION SUBMITTALS

- A. General: Prepare and submit Action Submittals required by individual Specification Sections.
1. **All submittals shall be in .pdf format and sent electronically. It is the responsibility of each Prime Contractor to provide their information in .pdf format.**
- B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
1. If information must be specially prepared for submittal because standard printed data are not suitable for use, submit as Shop Drawings, not as Product Data.
 2. Mark each copy of each submittal to show which products and options are applicable.
 3. Include the following information, as applicable:
 - a. Manufacturer's written recommendations.
 - b. Manufacturer's product specifications.
 - c. Manufacturer's installation instructions.
 - d. Manufacturer's catalog cuts.
 - e. Printed performance curves.
 - f. Compliance with specified referenced standards.
 - g. Testing by recognized testing agency.
 4. Number of Copies: Submit .pdfs of Product Data, unless otherwise indicated, via electronic mail. The architect will return the Product Data via electronic mail.
- C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.
1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
 - a. Dimensions.
 - b. Identification of products.
 - c. Fabrication and installation drawings.
 - d. Roughing-in and setting diagrams.

- e. Wiring diagrams showing field-installed wiring, including power, signal, and control wiring.
 - f. Shopwork manufacturing instructions.
 - g. Templates and patterns.
 - h. Schedules.
 - i. Notation of coordination requirements.
 - j. Notation of dimensions established by field measurement.
 - k. Relationship to adjoining construction clearly indicated.
 - l. Seal and signature of professional engineer if specified.
 - m. Wiring Diagrams: Differentiate between manufacturer-installed and field-installed wiring.
2. Sheet Size: The size of the shop drawings, if printed should be created on sheets at least 8-1/2 by 11 inches but no larger than 30 by 40 inches.
 3. Number of Copies: Submit a .pdf of each submittal via electronic mail. The Architect will return the .pdf via electronic mail.
- D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.
1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package. Provide (4) copies of samples.
 2. Identification: Attach label on unexposed side of Samples that includes the following:
 - a. Generic description of Sample.
 - b. Product name and name of manufacturer.
 - c. Sample source.
 - d. Number and title of appropriate Specification Section.
 3. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
- E. Product Schedule or List: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location.
1. Number of Copies: Submit .pdf of product schedule or list, unless otherwise indicated. Architect will return the .pdf.
- F. Submittals Schedule: Provide a schedule for all submittals within 10 business days of Notice to Proceed for Architect review.
- G. Application for Payment: Comply with requirements specified in Division 01 Section "Payment Procedures."
- H. Schedule of Values: Comply with requirements specified in Division 01 Section "Payment Procedures."

- I. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Use CSI Form 1.5A.
 1. Number of Copies: Submit .pdf of subcontractor list, unless otherwise indicated. Architect will return the .pdf.

2.2 INFORMATIONAL SUBMITTALS

- A. General: Prepare and submit Informational Submittals required by other Specification Sections.
 1. Number of Copies: Submit .pdf of each submittal, unless otherwise indicated.
 2. Certificates and Certifications: Provide a notarized statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
 3. Test and Inspection Reports: Comply with requirements specified in Division 01 Section "Quality Requirements."
- B. Coordination Drawings: Comply with requirements specified in Division 01 Section "Project Management and Coordination."
- C. Contractor's Construction Schedule: Comply with requirements specified in Division 01 Section "Construction Progress Documentation."
- D. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
- E. Installer Certificates: Prepare written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
- F. Manufacturer Certificates: Prepare written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
- G. Product Certificates: Prepare written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.
- H. Material Certificates: Prepare written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
- I. Material Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
- J. Product Test Reports: Prepare written reports indicating current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on

evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.

- K. Preconstruction Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.
- L. Compatibility Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.
- M. Maintenance Data: Prepare written and graphic instructions and procedures for operation and normal maintenance of products and equipment. Comply with requirements specified in Division 01 Section "Operation and Maintenance Data."
- N. Manufacturer's Instructions: Prepare written or published information that documents manufacturer's recommendations, guidelines, and procedures for installing or operating a product or equipment. Include name of product and name, address, and telephone number of manufacturer.
- O. Manufacturer's Field Reports: Prepare written information documenting factory-authorized service representative's tests and inspections. Include the following, as applicable:
 - 1. Statement on condition of substrates and their acceptability for installation of product.
 - 2. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
 - 3. Results of operational and other tests and a statement of whether observed performance complies with requirements.
- P. Insurance Certificates and Bonds: Prepare written information indicating current status of insurance or bonding coverage. Include name of entity covered by insurance or bond, limits of coverage, amounts of deductibles, if any, and term of the coverage.

2.3 DELEGATED DESIGN

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

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

- A. Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.
- B. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.2 ARCHITECT'S ACTION

- A. General: Architect will not review submittals that do not bear Contractor's approval stamp and will return them without action.
- B. Action Submittals: Architect will review each submittal, make marks to indicate corrections or modifications required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action taken, as follows:
 - 1. Reviewed
 - 2. Reviewed – Revise As Noted
 - 3. Reviewed – Revise and Resubmit
- C. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.
- D. Partial submittals are not acceptable, will be considered nonresponsive, and will be returned without review.
- E. Submittals not required by the Contract Documents may not be reviewed and may be discarded.

END OF SECTION 013300

SECTION 014000 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for quality assurance and quality control.
- B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
 - 1. Specific quality-assurance and -control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
 - 2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
 - 3. Requirements for Contractor to provide quality-assurance and -control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.
- C. Related Sections:
 - 1. Division 01 Section "Construction Progress Documentation" for developing a schedule of required tests and inspections.
 - 2. Divisions 02 through 49 Sections for specific test and inspection requirements.

1.3 DEFINITIONS

- A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
- B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Architect.
- C. Mockups: Full size physical assemblies that are constructed on-site. Mockups are constructed to verify selections made under sample submittals; to demonstrate aesthetic effects and, where

indicated, qualities of materials and execution; to review coordination, testing, or operation; to show interface between dissimilar materials; and to demonstrate compliance with specified installation tolerances. Mockups are not Samples. Unless otherwise indicated, approved mockups establish the standard by which the Work will be judged.

- D. Preconstruction Testing: Tests and inspections performed specifically for the Project before products and materials are incorporated into the Work to verify performance or compliance with specified criteria.
- E. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.
- F. Source Quality-Control Testing: Tests and inspections that are performed at the source, i.e., plant, mill, factory, or shop.
- G. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.
- H. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.
- I. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.
 - 1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade or trades.
- J. Experienced: When used with an entity or individual, "experienced" means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1.4 CONFLICTING REQUIREMENTS

- A. Referenced Standards: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to Architect for a decision before proceeding.
- B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

1.5 INFORMATIONAL SUBMITTALS

- A. Contractor's Quality-Control Plan: For quality-assurance and quality-control activities and responsibilities.
- B. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.
- C. Schedule of Tests and Inspections: Prepare in tabular form and include the following:
 - 1. Specification Section number and title.
 - 2. Entity responsible for performing tests and inspections.
 - 3. Description of test and inspection.
 - 4. Identification of applicable standards.
 - 5. Identification of test and inspection methods.
 - 6. Number of tests and inspections required.
 - 7. Time schedule or time span for tests and inspections.
 - 8. Requirements for obtaining samples.
 - 9. Unique characteristics of each quality-control service.

1.6 QUALITY ASSURANCE

- A. General: Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.
- B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- D. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
- E. Manufacturer's Technical Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

1.7 QUALITY CONTROL

- A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.

1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
 2. Payment for these services will be made from testing and inspecting allowances, as authorized by Change Orders.
 3. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor, and the Contract Sum will be adjusted by Change Order.
- B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities required to verify that the Work complies with requirements, whether specified or not.
1. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
 2. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.
 3. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
 4. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
 5. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
 6. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.
- C. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Division 01 Section "Submittal Procedures."
- D. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.
- E. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.
- F. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
1. Access to the Work.
 2. Incidental labor and facilities necessary to facilitate tests and inspections.
 3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
 4. Facilities for storage and field curing of test samples.

5. Delivery of samples to testing agencies.
 6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
 7. Security and protection for samples and for testing and inspecting equipment at Project site.
- G. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
1. Schedule times for tests, inspections, obtaining samples, and similar activities.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 REPAIR AND PROTECTION

- A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Division 01 Section "Execution."
- B. Protect construction exposed by or for quality-control service activities.
- C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 014000

SECTION 014200 - REFERENCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DEFINITIONS

- A. General: Basic Contract definitions are included in the Conditions of the Contract.
- B. "Approved": When used to convey Architect's action on Contractor's submittals, applications, and requests, "approved" is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.
- C. "Directed": A command or instruction by Architect. Other terms including "requested," "authorized," "selected," "required," and "permitted" have the same meaning as "directed."
- D. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."
- E. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.
- F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.
- G. "Install": Operations at Project site including unloading, temporarily storing, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.
- H. "Provide": Furnish and install, complete and ready for the intended use.
- I. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

1.3 INDUSTRY STANDARDS

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

- B. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.
- C. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.
 - 1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

1.4 ABBREVIATIONS AND ACRONYMS

- A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities indicated in Gale's "Encyclopedia of Associations" or in Columbia Books' "National Trade & Professional Associations of the United States."
- B. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

| | | |
|----------|---|----------------------------------|
| ACI | American Concrete Institute www.concrete.org | (248) 848-3700 |
| AGA | American Gas Association www.aga.org | (202) 824-7000 |
| AGC | Associated General Contractors of America (The) www.agc.org | (703) 548-3118 |
| AIA | American Institute of Architects (The) www.aia.org | (800) 242-3837 (202) 626-7300 |
| AISC | American Institute of Steel Construction www.aisc.org | (800) 644-2400 (312) 670-2400 |
| ANSI | American National Standards Institute www.ansi.org | (202) 293-8020 |
| ASCE/SEI | American Society of Civil Engineers/Structural Engineering Institute (See ASCE) | |
| ASHRAE | American Society of Heating, Refrigerating and Air- Conditioning Engineers www.ashrae.org | (800) 527-4723 (404) 636-8400 |
| MPI | Master Painters Institute www.paintinfo.com | (888) 674-8937 (604) 298-7578 |

| | | |
|----------|---|----------------------------------|
| NAAMM | National Association of Architectural Metal Manufacturers www.naamm.org | (630) 942-6591 |
| NEMA | National Electrical Manufacturers Association www.nema.org | (703) 841-3200 |
| NFPA | NFPA (National Fire Protection Association) www.nfpa.org | (800) 344-3555 (617) 770-3000 |
| NRCA | National Roofing Contractors Association www.nrca.net | (800) 323-9545 (847) 299-9070 |
| SEI/ASCE | Structural Engineering Institute/American Society of Civil Engineers (See ASCE) | |
| SMACNA | Sheet Metal and Air Conditioning Contractors' National Association www.smacna.org | (703) 803-2980 |
| SPRI | Single Ply Roofing Industry www.spri.org | (781) 647-7026 |
| SWRI | Sealant, Waterproofing, & Restoration Institute www.swrionline.org | (816) 472-7974 |
| WWPA | Western Wood Products Association www.wwpa.org | (503) 224-3930 |

C. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

| | | |
|-----|---|----------------|
| ICC | International Code Council www.iccsafe.org | (888) 422-7233 |
|-----|---|----------------|

D. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

| | | |
|------|--|----------------------------------|
| CPSC | Consumer Product Safety Commission www.cpsc.gov | (800) 638-2772 (301) 504-7923 |
| DOC | Department of Commerce www.commerce.gov | (202) 482-2000 |

EPA Environmental Protection Agency (202) 272-0167
www.epa.gov

OSHA Occupational Safety & Health Administration (800) 321-6742
www.osha.gov (202) 693-1999

E. Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

ADAAG Americans with Disabilities Act (ADA) (800) 872-2253
Architectural Barriers Act (ABA) (202) 272-0080
Accessibility Guidelines for Buildings and Facilities
Available from U.S. Access Board
www.access-board.gov

F. State Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

ICCB Illinois Community College Board (773) 444-0115
www.iccb.org

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 014200

SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.
- B. Related Sections:
 - 1. Division 01 Section "Summary" for work restrictions and limitations on utility interruptions.

1.3 USE CHARGES

- A. General: Installation and removal of and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities to use temporary services and facilities without cost, including, but not limited to Architect, testing agencies, and authorities having jurisdiction.
- B. Water and Sewer Service from Existing System: Water from Owner's existing water system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.
- C. Electric Power Service from Existing System: Electric power from Owner's existing system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.

1.4 INFORMATIONAL SUBMITTALS

- A. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel.

1.5 QUALITY ASSURANCE

- A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.

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

1.6 PROJECT CONDITIONS

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

PART 2 - PRODUCTS

2.1 TEMPORARY FACILITIES

- A. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.
 - 1. Store combustible materials apart from building.

2.2 EQUIPMENT

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

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.
- B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.2 TEMPORARY UTILITY INSTALLATION

- A. General: Install temporary service or connect to existing service.
 - 1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
- B. Water Service: Connect to Owner's existing water service facilities. Clean and maintain water service facilities in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.

- C. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.
- D. Isolation of Work Areas in Occupied Facilities: Prevent dust, fumes, and odors from entering occupied areas.
- E. Electric Power Service: Connect to Owner's existing electric power service. Maintain equipment in a condition acceptable to Owner.

3.3 SUPPORT FACILITIES INSTALLATION

- A. General: Comply with the following:
 - 1. Maintain support facilities until Architect schedules Substantial Completion inspection. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.
- B. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with Division 01 Section "Execution" for progress cleaning requirements.
- C. Existing Stair Usage: Use of Owner's existing stairs will be permitted, provided stairs are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore stairs to condition existing before initial use.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
- B. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
- C. Temporary Egress: Maintain temporary egress from existing occupied facilities as required by authorities having jurisdiction.
- D. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241.
 - 1. Prohibit smoking in construction areas.
 - 2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
 - 3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.

3.5 MOISTURE AND MOLD CONTROL

- A. Contractor's Moisture-Protection Plan: Avoid trapping water in finished work. Document visible signs of mold that may appear during construction.

3.6 OPERATION, TERMINATION, AND REMOVAL

- A. Maintenance: Maintain facilities in good operating condition until removal.

END OF SECTION 015000

SECTION 016000 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.
- B. Related Sections:
 - 1. Division 01 Section "Substitution Procedures" for requests for substitutions.
 - 2. Division 01 Section "References" for applicable industry standards for products specified.

1.3 DEFINITIONS

- A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
 - 1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature, that is current as of date of the Contract Documents.
 - 2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
 - 3. Comparable Product: Product that is demonstrated and approved through submittal process to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.
- B. Basis-of-Design Product Specification: A specification in which a specific manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of additional manufacturers named in the specification.

1.4 ACTION SUBMITTALS

- A. Comparable Product Requests: Submit request for consideration of each comparable product **prior to submitting a bid**. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
1. Include data to indicate compliance with the requirements specified in "Comparable Products" Article.
 2. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within one week of receipt of a comparable product request. Architect will notify Contractor of approval or rejection of proposed comparable product request within 10 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.
 - a. Form of Approval: As specified in Division 01 Section "Submittal Procedures."
 - b. Use product specified if Architect does not issue a decision on use of a comparable product request within time allocated.
- B. Basis-of-Design Product Specification Submittal: Comply with requirements in Division 01 Section "Submittal Procedures." Show compliance with requirements.

1.5 QUALITY ASSURANCE

- A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.
1. Each contractor is responsible for providing products and construction methods compatible with products and construction methods of other contractors.
 2. If a dispute arises between contractors over concurrently selectable but incompatible products, Architect will determine which products shall be used.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

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

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

C. Storage:

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

1.7 PRODUCT WARRANTIES

- A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

1. **Manufacturer's Warranty:** Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
2. **Special Warranty:** Written warranty required by the Contract Documents to provide specific rights for Owner.

- B. **Special Warranties:** Prepare a written document that contains appropriate terms and identification, ready for execution.

1. **Manufacturer's Standard Form:** Modified to include Project-specific information and properly executed.
2. **Specified Form:** When specified forms are included with the Specifications, prepare a written document using indicated form properly executed.
3. Refer to Divisions 02 through 49. Sections for specific content requirements and particular requirements for submitting special warranties.

- C. **Submittal Time:** Comply with requirements in Division 01 Section "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

- A. **General Product Requirements:** Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.

1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
4. Where products are accompanied by the term "as selected," Architect will make selection.
5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.
6. Or Equal: For products specified by name and accompanied by the term "or equal," or "or approved equal," or "or approved," comply with requirements in "Comparable Products" Article to obtain approval for use of an unnamed product.

B. Product Selection Procedures:

1. Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
2. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
3. Products:
 - a. Restricted List: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered, unless otherwise indicated.
 - b. Nonrestricted List: Where Specifications include a list of names of both available manufacturers and products, provide one of the products listed, or an unnamed product, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product.
4. Manufacturers:
 - a. Restricted List: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered, unless otherwise indicated.
 - b. Nonrestricted List: Where Specifications include a list of available manufacturers, provide a product by one of the manufacturers listed, or a product by an unnamed manufacturer, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed manufacturer's product.
5. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics

that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.

- C. Visual Matching Specification: Where Specifications require "match Architect's sample", provide a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.
 - 1. If no product available within specified category matches and complies with other specified requirements, comply with requirements in Division 01 Section "Substitution Procedures" for proposal of product.
- D. Visual Selection Specification: Where Specifications include the phrase "as selected by Architect from manufacturer's full range" or similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.2 COMPARABLE PRODUCTS

- A. Conditions for Consideration: Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect may return requests without action, except to record noncompliance with these requirements:
 - 1. Evidence that the proposed product does not require revisions to the Contract Documents, that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
 - 2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
 - 3. Evidence that proposed product provides specified warranty.
 - 4. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
 - 5. Samples, if requested.

END OF SECTION 016000

SECTION 017300 - EXECUTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:

- 1. Installation of the Work.
- 2. Cutting and patching.
- 3. Coordination of Owner-installed products.
- 4. Progress cleaning.
- 5. Starting and adjusting.
- 6. Protection of installed construction.
- 7. Correction of the Work.

- B. Related Sections:

- 1. Division 01 Section "Submittal Procedures" for submitting surveys.
- 2. Division 01 Section "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.
- 3. Division 02 Section "Selective Structure Demolition" for demolition and removal of selected portions of the building.

1.3 DEFINITIONS

- A. Cutting: Removal of in-place construction necessary to permit installation or performance of other work.
- B. Patching: Fitting and repair work required to restore construction to original conditions after installation of other work.

1.4 INFORMATIONAL SUBMITTALS

- A. Cutting and Patching Plan: Submit plan describing procedures at least 10 days prior to the time cutting and patching will be performed. Include the following information:
 - 1. Extent: Describe reason for and extent of each occurrence of cutting and patching.

2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building appearance and other significant visual elements.
3. Products: List products to be used for patching and firms or entities that will perform patching work.
4. Dates: Indicate when cutting and patching will be performed.
5. Utilities and Mechanical and Electrical Systems: List services and systems that cutting and patching procedures will disturb or affect. List services and systems that will be relocated and those that will be temporarily out of service. Indicate how long services and systems will be disrupted.

1.5 QUALITY ASSURANCE

A. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.

1. Structural Elements: When cutting and patching structural elements, notify Architect of locations and details of cutting and await directions from the Architect before proceeding. Shore, brace, and support structural element during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection
2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety. Operational elements include the following:
 - a. Primary operational systems and equipment.
 - b. Fire separation assemblies.
 - c. Air or smoke barriers.
 - d. Fire-suppression systems.
 - e. Mechanical systems piping and ducts.
 - f. Control systems.
 - g. Communication systems.
 - h. Conveying systems.
 - i. Electrical wiring systems.
 - j. Operating systems of special construction.
3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety. Other construction elements include but are not limited to the following:
 - a. Water, moisture, or vapor barriers.
 - b. Membranes and flashings.
 - c. Exterior curtain-wall construction.
 - d. Equipment supports.
 - e. Piping, ductwork, vessels, and equipment.
 - f. Noise- and vibration-control elements and systems.

4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.
- B. Cutting and Patching Conference: Before proceeding, meet at Project site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.
- C. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.

1.6 WARRANTY

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

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Comply with requirements specified in other Sections.
- B. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.
 1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to the Architect for the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.
 1. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:
 - a. Description of the Work.
 - b. List of detrimental conditions, including substrates.

- c. List of unacceptable installation tolerances.
 - d. Recommended corrections.
2. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
 3. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
 4. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
 5. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- B. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- C. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of the Contractor, submit a request for information to Architect according to requirements in Division 01 Section "Project Management and Coordination."

3.3 INSTALLATION

- A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
 1. Make vertical work plumb and make horizontal work level.
 2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
- C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.
- D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.
- E. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.

- F. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.
- G. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.
 - 1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
 - 2. Allow for building movement, including thermal expansion and contraction.
 - 3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- H. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.
- I. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.4 CUTTING AND PATCHING

- A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
 - 1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
- B. Temporary Support: Provide temporary support of work to be cut.
- C. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- D. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching in accordance with requirements of Division 01 Section "Summary."
- E. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to prevent interruption to occupied areas.
- F. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or

adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.

1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
 3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
 4. Excavating and Backfilling: Comply with requirements in applicable Division 31 Sections where required by cutting and patching operations.
 5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
 6. Proceed with patching after construction operations requiring cutting are complete.
- G. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.
1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
 2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.
 - a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
 - b. Restore damaged pipe covering to its original condition.
 3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
 - a. Where patching occurs in a painted surface, prepare substrate and apply primer and intermediate paint coats appropriate for substrate over the patch, and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.
 4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
- H. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.5 PROGRESS CLEANING

- A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.
 - 1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
 - 2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F (27 deg C).
 - 3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
 - a. Utilize containers intended for holding waste materials of type to be stored.
 - 4. Coordinate progress cleaning for joint-use areas where more than one installer has worked.
- B. Site: Maintain Project site free of waste materials and debris.
- C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
 - 1. Remove liquid spills promptly.
 - 2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
- D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
- E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
- F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
- G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in Division 01 Section "Temporary Facilities and Controls."
- H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
- I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
- J. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.6 PROTECTION OF INSTALLED CONSTRUCTION

- A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.
- B. Comply with manufacturer's written instructions for temperature and relative humidity.

3.7 CORRECTION OF THE WORK

- A. Repair or remove and replace defective construction. Restore damaged substrates and finishes.
 - 1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.
- B. Restore permanent facilities used during construction to their specified condition.
- C. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.

END OF SECTION 017300

SECTION 017700 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
 - 1. Inspection procedures.
 - 2. Warranties.
 - 3. Final cleaning.
- B. See Division 01 Section "Payment Procedures" for requirements for Applications for Payment for Substantial and Final Completion.
- C. See Division 01 Section "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.
- D. See Divisions 02 through 49 Sections for specific closeout and special cleaning requirements for the Work in those Sections.

1.2 SUBSTANTIAL COMPLETION

- A. Preliminary Procedures: Before requesting inspection for determining date of Substantial Completion, complete the following. List items below that are incomplete in request.
 - 1. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.
 - 2. Advise Owner of pending insurance changeover requirements.
 - 3. Submit specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
 - 4. Obtain and submit releases permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
 - 5. Prepare and submit Project Record Documents, operation and maintenance manuals, Final Completion construction photographs, damage or settlement surveys, property surveys, and similar final record information.
 - 6. Deliver tools, spare parts, extra materials, and similar items to location designated by Owner. Label with manufacturer's name and model number where applicable.
 - 7. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
 - 8. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
 - 9. Complete final cleaning requirements.
 - 10. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

- B. Inspection: Submit a written request for inspection for Substantial Completion. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.
 - 1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
 - 2. Results of completed inspection will form the basis of requirements for Final Completion.

1.3 FINAL COMPLETION

- A. Preliminary Procedures: Before requesting final inspection for determining date of Final Completion, complete the following:
 - 1. Submit a final Application for Payment according to Division 01 Section "Payment Procedures."
 - 2. Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
 - 3. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
- B. Inspection: Submit a written request for final inspection for acceptance. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.
 - 1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.4 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

- A. Preparation: Submit one electronic version (.pdf) of list. Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.

1.5 WARRANTIES

- A. Submittal Time: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties. **All warranties shall commence at substantial completion and last for 24 months. Special warranties may last longer than 24 months.**
- B. Organize warranty documents into an orderly sequence based on the table of contents of the individual specification sections within the Project Manual.

1. Bind warranties and bonds in heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.
 2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
 3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.
- C. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

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

PART 3 - EXECUTION

3.1 FINAL CLEANING

- A. General: Provide final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a portion of Project:
 - a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
 - b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
 - c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
 - d. Remove tools, construction equipment, machinery, and surplus material from Project site.
 - e. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural

- weathering of exterior surfaces. Restore reflective surfaces to their original condition.
- f. Remove debris and surface dust from limited access spaces, including trenches, equipment vaults, manholes, attics, and similar spaces.
 - g. Remove labels that are not permanent.
 - h. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.
 - i. Wipe surfaces of mechanical and electrical equipment and similar equipment. Remove foreign substances.
 - j. Replace parts subject to unusual operating conditions.
 - k. Leave Project clean and ready for use.
- C. Comply with safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on Owner's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from Project site and dispose of lawfully.

END OF SECTION 017700

SECTION 017839 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for project record documents, including the following:
 - 1. Record Product Data.
- B. Related Sections:
 - 1. Division 01 Section "Closeout Procedures" for general closeout procedures.
 - 2. Divisions 02 through 49 Sections for specific requirements for project record documents of the Work in those Sections.

1.3 CLOSEOUT SUBMITTALS

- A. Record Product Data: Submit annotated PDF electronic files and directories of each submittal.
 - 1. Where record Product Data are required as part of operation and maintenance manuals, submit duplicate marked-up Product Data as a component of manual.

PART 2 - PRODUCTS

2.1 RECORD PRODUCT DATA

- A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.
 - 1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 - 2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
 - 3. Note related Change Orders, record Specifications, and record Drawings where applicable.

- B. Format: Submit record Product Data as annotated PDF electronic file or scanned PDF electronic file(s) of marked up paper copy of Product Data.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

- A. Recording: Maintain one copy of each submittal during the construction period for project record document purposes. Post changes and modifications to project record documents as they occur; do not wait until the end of Project.
- B. Maintenance of Record Documents and Samples: Store record documents and Samples in the field office apart from the Contract Documents used for construction. Do not use project record documents for construction purposes. Maintain record documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to project record documents for Architect's reference during normal working hours.

END OF SECTION 017839

SECTION 024119 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Demolition and removal of selected portions of building or structure.
 - 2. Salvage of existing items to be reused or recycled.

1.3 DEFINITIONS

- A. Remove: Detach items from existing construction and dispose of them off-site unless indicated to be salvaged or reinstalled.
- B. Remove and Salvage: Detach items from existing construction, in a manner to prevent damage, and store.
- C. Remove and Reinstall: Detach items from existing construction, in a manner to prevent damage, prepare for reuse, and reinstall where indicated.
- D. Existing to Remain: Leave existing items that are not to be removed and that are not otherwise indicated to be salvaged or reinstalled.
- E. Dismantle: To remove by disassembling or detaching an item from a surface, using gentle methods and equipment to prevent damage to the item and surfaces; disposing of items unless indicated to be salvaged or reinstalled.

1.4 MATERIALS OWNERSHIP

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

1.5 INFORMATIONAL SUBMITTALS

- A. Proposed Protection Measures: for dust control and noise control.

1.6 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.
 - 1. Before selective demolition, Owner will remove all furniture or equipment.
- 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.

1.7 COORDINATION

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

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- B. Standards: Comply with ASSE A10.6 and NFPA 241.

PART 3 - EXECUTION

3.1 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. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.

- B. Remove temporary barricades and protections where hazards no longer exist.

3.2 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. 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. Store items in a secure area until delivery to Owner.
4. Protect items from damage.

- 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.

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

3.3 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

- A. Resilient Floor Coverings: Remove floor coverings and adhesive according to recommendations in RFCI's "Recommended Work Practices for the Removal of Resilient Floor Coverings." Do not use methods requiring solvent-based adhesive strippers.

3.4 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.
 - 4. Comply with requirements specified in Section 017419 "Construction Waste Management and Disposal."
- B. Burning: Do not burn demolished materials.

3.5 CLEANING

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

END OF SECTION 024119

SECTION 054000 - COLD-FORMED METAL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

- 1. Interior non-load-bearing wall framing exceeding height limitations of standard, nonstructural metal framing.
- 2. Ceiling joist framing.
- 3. Soffit framing.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For testing agency.
- B. Product Certificates: For each type of code-compliance certification for studs and tracks.
- C. Product Test Reports: For each listed product, for tests performed by a qualified testing agency.
 - 1. Expansion anchors.
 - 2. Power-actuated anchors.
 - 3. Mechanical fasteners.
 - 4. Vertical deflection clips.
 - 5. Miscellaneous structural clips and accessories.
- D. Evaluation Reports: For nonstandard cold-formed steel framing post-installed anchors and power-actuated fasteners, from ICC-ES or other qualified testing agency acceptable to authorities having jurisdiction.

1.5 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated.

- B. Product Tests: Mill certificates or data from a qualified independent testing agency, or in-house testing with calibrated test equipment, indicating steel sheet complies with requirements, including base-metal thickness, yield strength, tensile strength, total elongation, chemical requirements, and metallic-coating thickness.
- C. Code-Compliance Certification of Studs and Tracks: Provide documentation that framing members are certified according to the product-certification program of the Certified Steel Stud Association.
- D. Welding Qualifications: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 - 2. AWS D1.3/D1.3M, "Structural Welding Code - Sheet Steel."

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - 1. AllSteel & Gypsum Products, Inc.
 - 2. ClarkDietrich Building Systems.
 - 3. MarinoWARE.

2.2 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer to design cold-formed steel framing.
- B. Cold-Formed Steel Framing Standards: Unless more stringent requirements are indicated, framing shall comply with AISI S100, AISI S200, and the following:
 - 1. Wall Studs: AISI S211.
 - 2. Headers: AISI S212.

2.3 INTERIOR NON-LOAD-BEARING WALL FRAMING

- A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges.
- B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges.
- C. Single Deflection Track: Manufacturer's single, deep-leg, U-shaped steel track; unpunched, with unstiffened flanges, of web depth to contain studs while allowing free vertical movement, with flanges designed to support horizontal loads and transfer them to the primary structure.

2.4 FRAMING ACCESSORIES

- A. Fabricate steel-framing accessories from ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated steel sheet, of same grade and coating designation used for framing members.
- B. Provide accessories of manufacturer's standard thickness and configuration, as required.

2.5 ANCHORS, CLIPS, AND FASTENERS

- A. Mechanical Fasteners: ASTM C 1513, corrosion-resistant-coated, self-drilling, self-tapping, steel drill screws.
 - 1. Head Type: Low-profile head beneath sheathing; manufacturer's standard elsewhere.
- B. Welding Electrodes: Comply with AWS standards.

2.6 MISCELLANEOUS MATERIALS

- A. Shims: Load-bearing, high-density, multimonomer, nonleaching plastic; or cold-formed steel of same grade and metallic coating as framing members supported by shims.
- B. Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch-thick, selected from manufacturer's standard widths to match width of bottom track or rim track members as required.

2.7 FABRICATION

- A. Fabricate cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened, according to referenced AISI's specifications and standards, manufacturer's written instructions, and requirements in this Section.
 - 1. Fabricate framing assemblies using jigs or templates.
 - 2. Cut framing members by sawing or shearing; do not torch cut.
 - 3. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, pneumatic pin fastening, or riveting as standard with fabricator. Wire tying of framing members is not permitted.
 - a. Comply with AWS D1.3/D1.3M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
 - b. Locate mechanical fasteners and install according to Shop Drawings, with screws penetrating joined members by no fewer than three exposed screw threads.
 - 4. Fasten other materials to cold-formed steel framing by welding, bolting, pneumatic pin fastening, or screw fastening, according to Shop Drawings.
- B. Reinforce, stiffen, and brace framing assemblies to withstand handling, delivery, and erection stresses. Lift fabricated assemblies by means that prevent damage or permanent distortion.
- C. Tolerances: Fabricate assemblies level, plumb, and true to line to a maximum allowable variation of 1/8 inch in 10 feet and as follows:

1. Spacing: Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
2. Squareness: Fabricate each cold-formed steel framing assembly to a maximum out-of-square tolerance of 1/8 inch.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, conditions, and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. Cold-formed steel framing may be shop or field fabricated for installation, or it may be field assembled.
- B. Install cold-formed steel framing according to AISI S200, AISI S202, and manufacturer's written instructions unless more stringent requirements are indicated.
- C. Install shop- or field-fabricated, cold-formed framing and securely anchor to supporting structure.
 1. Screw, bolt, or weld wall panels at horizontal and vertical junctures to produce flush, even, true-to-line joints with maximum variation in plane and true position between fabricated panels not exceeding 1/16 inch.
- D. Install cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened.
 1. Cut framing members by sawing or shearing; do not torch cut.
 2. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, or riveting. Wire tying of framing members is not permitted.
 - a. Comply with AWS D1.3/D1.3M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
 - b. Locate mechanical fasteners, install according to Shop Drawings, and comply with requirements for spacing, edge distances, and screw penetration.
- E. Install framing members in one-piece lengths unless splice connections are indicated for track or tension members.
- F. Install temporary bracing and supports to secure framing and support loads equal to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.

- G. Do not bridge building expansion joints with cold-formed steel framing. Independently frame both sides of joints.
- H. Fasten hole-reinforcing plate over web penetrations that exceed size of manufacturer's approved or standard punched openings.

3.3 INTERIOR NON-LOAD-BEARING WALL INSTALLATION

- A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure.
- B. Fasten both flanges of studs to top and bottom track unless otherwise indicated. Space studs as follows:
 - 1. Stud Spacing: 16 inches
- C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar requirements.
- D. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.
 - 1. Install single deep-leg deflection tracks and anchor to building structure.
 - 2. Install double deep-leg deflection tracks and anchor outer track to building structure.
 - 3. Connect vertical deflection clips to studs and anchor to building structure.
 - 4. Connect drift clips to cold-formed steel metal framing and anchor to building structure.
- E. Install horizontal bridging in wall studs. Fasten at each stud intersection.
- F. Top Bridging for Single Deflection Track: Install row of horizontal bridging within 12 inches of single deflection track. Install a combination of bridging and stud or stud-track solid blocking of width and thickness matching studs, secured to stud webs or flanges.
- G. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

3.4 ERECTION TOLERANCES

- A. Install cold-formed steel framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:
 - 1. Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

3.5 FIELD QUALITY CONTROL

- A. Testing: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Field and shop welds will be subject to testing and inspecting.
- C. Testing agency will report test results promptly and in writing to Contractor and Architect.
- D. Cold-formed steel framing will be considered defective if it does not pass tests and inspections.
- E. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.6 REPAIRS AND PROTECTION

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed steel framing with galvanized repair paint according to ASTM A 780/A 780M and manufacturer's written instructions.
- B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that cold-formed steel framing is without damage or deterioration at time of Substantial Completion.

END OF SECTION 054000

SECTION 092900 - GYPSUM BOARD

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Interior gypsum board.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 GYPSUM BOARD, GENERAL

- A. Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

2.2 INTERIOR GYPSUM BOARD

- A. Manufactures: Subject to compliance with requirements, provide products by the following:
 - 1. American Gypsum.
 - 2. Certain Teed Corp.
 - 3. Georgia-Pacific Gypsum LLC.
 - 4. Lafarge north America Inc.
 - 5. National Gypsum Company.
 - 6. USG Corporation.
- B. Gypsum Wallboard: ASTM C 1396/C 1396M.
 - 1. Thickness: 5/8 inch.
 - 2. Long Edges: Tapered.
- C. Flexible Gypsum Board: ASTM C 1396/C 1396M. Manufactured to bend to fit radii and to be more flexible than standard regular-type gypsum board of same thickness.

1. Thickness: 1/4 inch.
2. Long Edges: Tapered.

D. Gypsum Ceiling Board: ASTM C 1396/C 1396M.

1. Thickness: 5/8 inch.
2. Long Edges: Tapered.

2.3 TRIM ACCESSORIES

A. Interior Trim: ASTM C 1047.

1. Material: Galvanized or aluminum-coated steel sheet, rolled zinc, plastic, or paper-faced galvanized-steel sheet.
2. Shapes:
 - a. Cornerbead.
 - b. LC-Bead: J-shaped; exposed long flange receives joint compound.

2.4 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C 475/C 475M.

B. Joint Tape:

1. Interior Gypsum Board: Paper.

C. Joint Compound for Interior Gypsum Board: For each coat, use formulation that is compatible with other compounds applied on previous or for successive coats.

1. Prefilling: At open joints, or beveled panel edges, and damaged surface areas, use setting-type taping compound.
2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use setting-type taping compound.
 - a. Use setting-type compound for installing paper-faced metal trim accessories.
3. Fill Coat: For second coat, use setting-type, sandable topping compound.
4. Finish Coat: For third coat, use setting-type, sandable topping compound.
5. Skim Coat: For final coat of Level 5 finish, use setting-type, sandable topping compound.

2.5 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written instructions.

B. Steel Drill Screws: ASTM C 1002 unless otherwise indicated.

1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch thick.
2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.

2.6 ACOUSTICAL SEALANT

- A. Acoustical Sealant for Exposed and Concealed Joints: Manufacturer's standard no sag, paintable, nonstaining latex sealant complying with ASTM C 834 and the following requirements:
 1. Product is effective in reducing airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.
- B. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 1. Acoustical Sealant for Exposed and Concealed Joints:
 - a. PL Acoustical Sealant; ChemRex, Inc., Contech Brands.
 - b. AC-20 FTR Acoustical and Insulation Sealant; Pecora Corp.
 - c. SHEETROCK Acoustical Sealant; United States Gypsum Co

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and substrates including welded hollow-metal frames and support framing, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.
- B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLYING INTERIOR GYPSUM BOARD

- A. Install interior gypsum board in the following locations:
 1. Wallboard Type: Vertical surfaces.
 2. Flexible Type: at curved assemblies.
 3. Ceiling Type: Ceiling surfaces.
- B. Generally, design all gypsum board wall to run to underside of floor or roof deck above. Please discuss with Owner, conditions where stopping at finished ceiling is desired.
- C. Single-Layer Application:

1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing unless otherwise indicated.
2. On partitions/walls, apply gypsum panels vertically (parallel to framing) or horizontally (perpendicular to framing) unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.
 - a. Stagger abutting end joints not less than one framing member in alternate courses of panels.
 - b. At stairwells and other high walls, install panels horizontally unless otherwise indicated or required by fire-resistance-rated assembly.
3. Fastening Methods: Apply gypsum panels to supports with steel drill screws.

D. Curved Surfaces:

1. Install panels horizontally (perpendicular to supports) and unbroken, to extent possible, across curved surface plus 12-inch long straight sections at ends of curves and tangent to them.

3.3 INSTALLING TRIM ACCESSORIES

- A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.
- B. Control Joints: Install control joints according to ASTM C 840 and in specific locations approved by Architect for visual effect.
- C. Interior Trim: Install in the following locations:
 1. Cornerbead: Use at outside corners.
 2. J-Bead: Use as required.

3.4 FINISHING GYPSUM BOARD

- A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.
- B. Prefill open joints beveled edges, and damaged surface areas.
- C. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.
- D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:
 1. Level 5: at panel surfaces exposed to view.

3.5 PROTECTION

- A. Protect adjacent surfaces from drywall compound and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.
- B. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.
- C. Remove and replace panels that are wet, moisture damaged, and mold damaged.
 - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 092900

SECTION 095123 - ACOUSTICAL TILE CEILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Acoustical tiles for interior ceilings.
 - 2. Fully concealed, direct-hung, suspension systems.

1.3 ACTION SUBMITTALS

- A. Samples: For each exposed product and for each color and texture specified, 6 inches in size.
- B. Samples for Initial Selection: For components with factory-applied finishes.
- C. Samples for Verification: For each component indicated and for each exposed finish required, prepared on Samples of sizes indicated below:
 - 1. Acoustical Tiles: Set of full-size Samples of each type, color, pattern, and texture.
 - 2. Concealed Suspension-System Members: 6-inch long Sample of each type.
 - 3. Exposed Moldings and Trim: Set of 6-inch long Samples of each type and color.
 - 4. Seismic Clips: Full size.
- D. Delegated-Design Submittal: For seismic restraints for ceiling systems.
 - 1. Include design calculations for seismic restraints including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For testing agency.
- B. Product Test Reports: For each acoustical tile ceiling, for tests performed by a qualified testing agency.
- C. Evaluation Reports: For each acoustical tile ceiling suspension system, from ICC-ES.
- D. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For finishes to include in maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Acoustical Ceiling Units: Full-size tiles equal to 2 percent of quantity installed.
 - 2. Suspension-System Components: Quantity of each concealed grid and exposed component equal to 2 percent of quantity installed.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver acoustical tiles, suspension-system components, and accessories to Project site and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.
- B. Before installing acoustical tiles, permit them to reach room temperature and a stabilized moisture content.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations:
 - 1. Suspended Acoustical Tile Ceilings: Obtain each type of acoustical ceiling tile and its suspension system from single source from single manufacturer.
 - 2. Directly Attached Acoustical Tile Ceilings: Obtain each type of acoustical ceiling tile from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Suspended ceilings shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
- B. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Flame-Spread Index: Class C according to ASTM E 1264.
 - 2. Smoke-Developed Index: 50 or less.

- C. The following criteria are only guidelines. a/e shall verify/confirm these requirements based on other elements that might impact lighting and acoustical performance (e.g. other finish materials, special acoustical requirements for special use rooms):
1. Typical Performance criteria for Educational Spaces:
 - a. Light reflectance shall be not less than 0.08.
 - b. CAC no less than 35.
 - c. NRC no less than 0.55.
 - d. Anti-microbial performance.
 2. Typical Performance criteria for Office and Administration Spaces:
 - a. Similar requirements as for educational spaces.

2.3 ACOUSTICAL TILES

- A. Manufacturers:
1. Armstrong, #1835 Fine Fissure or
 2. Armstrong, Cirrus
 3. BPB
 4. USG
- B. Product provided by manufacturer must match existing acoustical tiles, COD standard, coordinate with owner.
- C. Provide standard 24" x 24" x 3/4 thick panels unless noted otherwise in drawings.

2.4 METAL SUSPENSION SYSTEM

- A. Manufacturers:
1. Chicago Metallic Corp.
 2. Donn Ceiling Suspension System
 3. National Rolling Mills, Inc.
- B. Product provided by manufacturer must match existing metal suspension system.

2.5 ACCESSORIES

- A. Wire Hangers, Braces, and Ties: Provide wires as follows:
1. Zinc-Coated, Carbon-Steel Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper.
 2. Size: Wire diameter sufficient for its stress at three times hanger design load (ASTM C 635/C 635M, Table 1, "Direct Hung") will be less than yield stress of wire, but not less than 0.106-inch- diameter wire.
- B. Hanger Rods: Mild steel, zinc coated or protected with rust-inhibitive paint.

- C. Flat Hangers: Mild steel, zinc coated or protected with rust-inhibitive paint.
- D. Angle Hangers: Angles with legs not less than 7/8-inch wide; formed with 0.04-inch thick, galvanized-steel sheet complying with ASTM A 653/A 653M, G90 coating designation; with bolted connections and 5/16-inch diameter bolts.
- E. DLCC – Direct Load Ceiling Clip to hang suspension system below existing ACT system grid face, transferring weight directly to hanger wire.
- F. Impact resistant clips are not required. A/E shall discuss with Owner if conditions are present requiring clips.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, including structural framing and substrates to which acoustical tile ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine acoustical tiles before installation. Reject acoustical tiles that are wet, moisture damaged, or mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Testing Substrates: Before adhesively bonding tiles to wet-placed substrates such as cast-in-place concrete or plaster, test and verify that moisture level is below tile manufacturer's recommended limits.
- B. Measure each ceiling area and establish layout of acoustical tiles to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width tiles at borders unless otherwise indicated, and comply with layout shown on reflected ceiling plans.
- C. Layout openings for penetrations centered on the penetrating items.

3.3 INSTALLATION OF SUSPENDED ACOUSTICAL TILE CEILINGS

- A. Install suspended acoustical tile ceilings according to ASTM C 636/C 636M, and manufacturer's written instructions.
 - 1. Fire-Rated Assembly: Install fire-rated ceiling systems according to tested fire-rated design.
- B. Suspend ceiling hangers from building's structural members and as follows:

1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
 2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
 3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension-system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.
 4. Secure wire hangers to ceiling suspension members and to supports above with a minimum of three tight turns. Connect hangers directly to structure or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
 5. Secure flat, angle, channel, and rod hangers to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices that are secure and appropriate for both the structure to which hangers are attached and the type of hanger involved. Install hangers in a manner that will not cause them to deteriorate or fail due to age, corrosion, or elevated temperatures.
 6. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, postinstalled mechanical or adhesive anchors, or power-actuated fasteners that extend through forms into concrete.
 7. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.
 8. Do not attach hangers to steel deck tabs.
 9. Do not attach hangers to steel roof deck. Attach hangers to structural members.
 10. Space hangers not more than 48 inches o.c. along each member supported directly from hangers unless otherwise indicated; provide hangers not more than 8 inches from ends of each member.
 11. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards.
- C. Secure bracing wires to ceiling suspension members and to supports with a minimum of four tight turns. Suspend bracing from building's structural members as required for hangers without attaching to permanent metal forms, steel deck, or steel deck tabs. Fasten bracing wires into concrete with cast-in-place or postinstalled anchors.
- D. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical tiles.
1. Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.
 2. Screw attach moldings to substrate at intervals not more than 16 inches o.c. and not more than 3 inches from ends. Miter corners accurately and connect securely.
 3. Do not use exposed fasteners, including pop rivets, on moldings and trim.
- E. Install suspension-system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.
- F. Arrange directionally patterned acoustical tiles as follows:
1. As indicated on reflected ceiling plans.
 2. Install tiles with pattern running in one direction parallel to axis of space.

3. Install tiles in a basket-weave pattern.
- G. Install acoustical tiles in coordination with suspension system and exposed moldings and trim. Place splines or suspension-system flanges into kerfed edges of tiles so tile-to-tile joints are interlocked.
1. Fit adjoining tiles to form flush, tight joints. Scribe and cut tiles for accurate fit at borders and around penetrations through ceiling.
 2. Hold tile field in compression by inserting leaf-type, spring-steel spacers between tiles and moldings, spaced 12 inches o.c.
 3. Protect lighting fixtures and air ducts according to requirements indicated for fire-resistance-rated assembly.

3.4 ERECTION TOLERANCES

- A. Suspended Ceilings: Install main and cross runners level to a tolerance of 1/8 inch in 12 feet, non-cumulative.
- B. Moldings and Trim: Install moldings and trim to substrate and level with ceiling suspension system to a tolerance of 1/8 inch in 12 feet, non-cumulative.

3.5 ADJUSTING

- A. Clean exposed surfaces of acoustical tile ceilings, including trim and edge moldings. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage.
- B. Remove and replace tiles and other ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 095123

SECTION 096513 - RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Resilient base

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For each exposed product and for each color and texture specified, not less than 12 inches long.

C. Samples for Initial Selection: For each type of product indicated.

D. Samples for Verification: For each type of product indicated and for each color, texture, and pattern required in manufacturer's standard-size Samples, but not less than 12 inches long.

E. Product Schedule: For resilient base and accessory products.

1.3 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Furnish 10 linear feet of each type, color, pattern, and size of resilient product installed.
2. Require that record documents indicate lot number locations.
3. Require that attic stock have lot numbers marked clearly on outside of boxes.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F (10 deg C) or more than 90 deg F (32 deg C).

PART 2 - PRODUCTS

2.1 RESILIENT BASE

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Burke Mercer Flooring Products; a division of Burke Industries Inc.
 - 2. Johnsonite; a Tarkett company.
 - 3. Roppe Corporation, USA.
- B. Colors as selected by Architect, match sample to be provided.
- C. Provide pre-manufactured corners.

2.2 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland-cement-based or blended hydraulic-cement-based formulation provided or approved by resilient-product manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by resilient-product manufacturer for resilient products and substrate conditions indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
 - 1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
 - 1. Installation of resilient products indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Require that all floor preparation shall be included in contract. Indicate that Owner will not provide compensation to General Contractor or any subcontractor for floor preparation in new construction. In case of remodeling, if existing subfloor conditions are unknown, require Contractor to provide skim coat (with ARDEX K-15, SD-F or similar products) over entire area specified to receive new floor finish material. Specify an allowance with unit cost to be provided for major subfloor repair work (e.g. structural cracking, differential settlement).

- B. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.
- C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.
- D. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient products.

3.3 RESILIENT BASE INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient base.
- B. Require top set rubber or vinyl bases. Use coved base for hard surface floor areas. Use straight toed base for carpet areas. Pre-molded outside corners are required. Require base to be installed from rolled lengths (120' rolls) to minimize seams (short sections are generally not acceptable).
- C. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.
- D. Install resilient base in lengths as long as practical without gaps at seams and with tops of adjacent pieces aligned.
- E. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
- F. Do not stretch resilient base during installation.

3.4 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protecting resilient products.
- B. Perform the following operations immediately after completing resilient-product installation:
 - 1. Remove adhesive and other blemishes from surfaces.
 - 2. Sweep and vacuum horizontal surfaces thoroughly.
 - 3. Damp-mop horizontal surfaces to remove marks and soil.
- C. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

END OF SECTION 096513

SECTION 096813 - TILE CARPETING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes modular carpet tile.
- B. Related Requirements:
 - 1. Section 024119 "Selective Demolition" for removing existing floor coverings.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include manufacturer's written data on physical characteristics, durability, and fade resistance.
 - 2. Include manufacturer's written installation recommendations for each type of substrate.
- B. Samples: For each of the following products and for each color and texture required. Label each Sample with manufacturer's name, material description, color, pattern, and designation indicated on Drawings and in schedules.
 - 1. Carpet Tile: Full-size Sample.
- C. Specify record drawings to include location of product, seams, pile direction and dye lots.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Test Reports: For carpet tile, for tests performed by a qualified testing agency.
- C. Sample Warranty: For special warranty.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For carpet tiles to include in maintenance manuals. Include the following:

1. Methods for maintaining carpet tile, including cleaning and stain-removal products and procedures and manufacturer's recommended maintenance schedule.
2. Precautions for cleaning materials and methods that could be detrimental to carpet tile.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 1. Carpet Tile: Full-size units equal to 2 percent of amount installed for each type indicated.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who is certified by the International Certified Floorcovering Installers Association at the Commercial II certification level.

1.8 COORDINATION

- A. Generally, carpet is purchased and installed by Contractor; but in some cases, it may be provided by Owner. Verify with Owner.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Comply with CRI's "CRI Carpet Installation Standard."

1.10 FIELD CONDITIONS

- A. Comply with CRI's "CRI Carpet Installation Standard" for temperature, humidity, and ventilation limitations.
- B. Environmental Limitations: Do not deliver or install carpet tiles until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at levels planned for building occupants during the remainder of the construction period.
- C. Do not install carpet tiles over concrete slabs until slabs have cured and are sufficiently dry to bond with adhesive and concrete slabs have pH range recommended by carpet tile manufacturer.
- D. Where demountable partitions or other items are indicated for installation on top of carpet tiles, install carpet tiles before installing these items.

1.11 WARRANTY

- A. Special Warranty for Carpet Tiles: Manufacturer agrees to repair or replace components of carpet tile installation that fail in materials or workmanship within specified warranty period.

1. Warranty does not include deterioration or failure of carpet tile due to unusual traffic, failure of substrate, vandalism, or abuse.
2. Failures include, but are not limited to, the following:
 - a. More than 10 percent edge raveling, snags, and runs.
 - b. Dimensional instability.
 - c. Excess static discharge.
 - d. Loss of tuft-bind strength.
 - e. Loss of face fiber.
 - f. Delamination.
3. Warranty Period: 10 years from date of Substantial Completion.
4. Specify that the Warranty shall include costs for labor and material replacement in full.
5. Specify that the Warranty shall also include labor and material costs for replacement of floor accessories such as vinyl cove base and transition strips.
6. Specify an extended warranty to be for life of carpet (beyond 10 year period and shall include same failures as 10 year warranty) but shall be for material only.

PART 2 - PRODUCTS

2.1 CARPET TILE

- A. Match existing carpet tile. Coordinate with Owner prior to ordering.

2.2 INSTALLATION ACCESSORIES

- A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet tile manufacturer.
- B. Adhesives: Water-resistant, mildew-resistant, nonstaining, pressure-sensitive type to suit products and subfloor conditions indicated, that comply with flammability requirements for installed carpet tile, and are recommended by carpet tile manufacturer for releasable installation.
- C. Metal Edge/Transition Strips: Extruded aluminum with mill finish of profile and width shown, of height required to protect exposed edge of carpet, and of maximum lengths to minimize running joints.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet tile performance.
- B. Examine carpet tile for type, color, pattern, and potential defects.

- C. Concrete Slabs: Verify that surfaces are free of cracks, ridges, depressions, scale, and foreign deposits.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. General: Comply with CRI's "Carpet Installation Standards" and with carpet tile manufacturer's written installation instructions for preparing substrates indicated to receive carpet tile.
- B. Require all floor preparation to be included in contract. Specify that Owner will not provide compensation to General Contractor or any subcontractor for floor preparation in new construction. In case of remodeling, if existing subfloor conditions are unknown, require Contractor to provide skim coat (with ARDEX K-15, SD-F or similar products) over entire area specified to receive new floor finish material. Specify an allowance with unit cost be provided for major subfloor repair work (e.g. structural cracking, differential settlement).
- C. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, depressions, and protrusions in substrates. Fill or level cracks, holes and depressions 1/8 inch wide or wider, and protrusions more than 1/32 inch unless more stringent requirements are required by manufacturer's written instructions.
- D. Concrete Substrates: Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by adhesive and carpet tile manufacturers.
- E. Broom and vacuum clean substrates to be covered immediately before installing carpet tile.

3.3 INSTALLATION

- A. General: Comply with CRI's "CRI Carpet Installation Standard," Section 18, "Modular Carpet" and with carpet tile manufacturer's written installation instructions.
- B. Installation Method: As recommended in writing by carpet tile manufacturer.
- C. Maintain dye-lot integrity. Do not mix dye lots in same area.
- D. Maintain pile-direction patterns recommended in writing by carpet tile manufacturer.
- E. Carpet Tiles: Modular tiles to be no smaller than 24" x 24" and installed at locations shown in drawings.
- F. Cut and fit carpet tile to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet tile manufacturer.
- G. Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.

- H. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on carpet tile as marked on subfloor. Use nonpermanent, nonstaining marking device.
- I. Install pattern parallel to walls and borders.
- J. Access Flooring: Stagger joints of carpet tiles so carpet tile grid is offset from access flooring panel grid. Do not fill seams of access flooring panels with carpet adhesive; keep seams free of adhesive.
- K. Require calcium chloride (moisture) test shall be done prior to finish floor installation.

3.4 CLEANING AND PROTECTION

- A. Perform the following operations immediately after installing carpet tile:
 - 1. Remove excess adhesive and other surface blemishes using cleaner recommended by carpet tile manufacturer.
 - 2. Remove yarns that protrude from carpet tile surface.
 - 3. Vacuum carpet tile using commercial machine with face-beater element.
- B. Protect installed carpet tile to comply with CRI's "Carpet Installation Standard," Section 20, "Protecting Indoor Installations."
- C. Protect carpet tile against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by carpet tile manufacturer.
- D. Require carpet manufacturer shall provide training for Owner regarding maintenance and cleaning of carpet product.

END OF SECTION 096813

SECTION 099123 - INTERIOR PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes surface preparation and the application of paint systems on interior substrates.
 - 1. Gypsum board.

1.3 DEFINITIONS

- A. MPI Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523. ("eggshell" finish)

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
 - 1. Include Printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted.
 - 2. Indicate VOC content.
- B. Samples for Initial Selection: For each type of topcoat product.
- C. Samples for Verification: For each type of paint system and in each color and gloss of topcoat.
 - 1. Submit Samples on rigid backing, 8 inches square.
 - 2. Apply coats on Samples in steps to show each coat required for system.
 - 3. Label each coat of each Sample.
 - 4. Label each Sample for location and application area.
- D. Product List: Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules. Include color designations.

1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Paint: 1 gal. (3.8 L) of each material and color applied.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F (7 deg C).
 1. Maintain containers in clean condition, free of foreign materials and residue.
 2. Remove rags and waste from storage areas daily.

1.7 FIELD CONDITIONS

- A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F (10 and 35 deg C).
- B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Benjamin Moore & Co.
 2. Sherwin-Williams Company (The).
 3. ICI
 4. MAB
 5. Pittsburgh

2.2 PAINT, GENERAL

- A. MPI Standards: Products shall comply with MPI standards indicated and shall be listed in its "MPI Approved Products Lists."
- B. Material Compatibility:
 1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
 2. For each coat in a paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.

2.3 SOURCE QUALITY CONTROL

- A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure:
1. Owner will engage the services of a qualified testing agency to sample paint materials. Contractor will be notified in advance and may be present when samples are taken. If paint materials have already been delivered to Project site, samples may be taken at Project site. Samples will be identified, sealed, and certified by testing agency.
 2. Testing agency will perform tests for compliance with product requirements.
 3. Owner may direct Contractor to stop applying paints if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.
- C. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.
- D. Proceed with coating application only after unsatisfactory conditions have been corrected.
1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and paint systems indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
- C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.

- D. Gypsum Board Substrates: Do not begin paint application until finishing compound is dry and sanded smooth.

3.3 APPLICATION

- A. Apply paints according to manufacturer's written instructions and to recommendations in "MPI Manual."
 - 1. Use applicators and techniques suited for paint and substrate indicated.
 - 2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
 - 3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
 - 4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
 - 5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.
- B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.
- C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

3.4 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.5 INTERIOR PAINTING SCHEDULE

- A. Gypsum Board Substrates:

1. Latex over Latex Sealer System:
 - a. Prime Coat: Primer sealer, latex, interior, MPI #50.
 - b. Prime Coat: Latex, interior, matching topcoat.
 - c. Intermediate Coat: Latex, interior, matching topcoat.
 - d. Topcoat: Latex, interior, ceramic matte (MPI Gloss Level 1), MPI #53.

END OF SECTION 099123

SECTION 211313 - WET-PIPE SPRINKLER SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Pipes, fittings, and specialties.
 - 2. Fire-protection valves.
 - 3. Sprinklers.

1.3 DEFINITIONS

- A. Standard-Pressure Sprinkler Piping: Wet-pipe sprinkler system piping designed to operate at working pressure of 175 psig maximum.

1.4 SYSTEM DESCRIPTIONS

- A. Wet-Pipe Sprinkler System: Automatic sprinklers are attached to piping containing water and that is connected to water supply through alarm valve. Water discharges immediately from sprinklers when they are opened. Sprinklers open when heat melts fusible link or destroys frangible device. Hose connections are included if indicated.

1.5 PERFORMANCE REQUIREMENTS

- A. Standard-Pressure Piping System Component: Listed for 175-psig minimum working pressure.
- B. Sprinkler system design shall be approved by authorities having jurisdiction.
 - 1. Margin of Safety for Available Water Flow and Pressure: 10 percent, including losses through water-service piping, valves, and backflow preventers.
 - 2. Sprinkler Occupancy Hazard Classifications:
 - a. Automobile Parking Areas: Ordinary Hazard, Group 1.
 - b. Building Service Areas: Ordinary Hazard, Group 1.
 - c. Electrical Equipment Rooms: Ordinary Hazard, Group 1.
 - d. General Storage Areas: Ordinary Hazard, Group 1.
 - e. Mechanical Equipment Rooms: Ordinary Hazard, Group 1.
 - f. Office and Public Areas: Light Hazard.

3. Minimum Density for Automatic-Sprinkler Piping Design:
 - a. Light-Hazard Occupancy: 0.10 gpm over 1500-sq. ft. area.
 - b. Ordinary-Hazard, Group 1 Occupancy: 0.15 gpm over 1500-sq. ft. area.
 4. Maximum Protection Area per Sprinkler: Per UL listing.
 5. Maximum Protection Area per Sprinkler:
 - a. Office Spaces: 225 sq. ft..
 - b. Storage Areas: 130 sq. ft..
 - c. Mechanical Equipment Rooms: 130 sq. ft..
 - d. Electrical Equipment Rooms: 130 sq. ft..
 - e. Other Areas: According to NFPA 13 recommendations unless otherwise indicated.
 6. Total Combined Hose-Stream Demand Requirement: According to NFPA 13 unless otherwise indicated:
 - a. Ordinary-Hazard Occupancies: 250 gpm.
- C. Seismic Performance: Sprinkler piping shall withstand the effects of earthquake motions determined according to NFPA 13 and ASCE/SEI 7.

1.6 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For wet-pipe sprinkler systems. Include plans, elevations, sections, details, and attachments to other work.
 1. Wiring Diagrams: For power, signal, and control wiring.
- C. Delegated-Design Submittal: For sprinkler systems indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- D. Approved Sprinkler Piping Drawings: Working plans, prepared according to NFPA 13, that have been approved by authorities having jurisdiction, including hydraulic calculations if applicable.
- E. Coordination Drawings: Sprinkler systems, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
 1. Domestic water piping.
 2. Storm lines
 3. Vent lines
 4. Waste lines
 5. Compressed air piping.
 6. HVAC hydronic piping.

7. Items penetrating finished ceiling including the following:
 - a. Lighting fixtures.
 - b. Air outlets and inlets.
8. Ductwork.

1.7 INFORMATION SUBMITTALS

- A. Fire-hydrant flow test report.
- B. Qualification Data: For qualified Installer.
- C. Field quality-control reports.
- D. Field Test Reports and Certificates: Indicate and interpret test results for compliance with performance requirements and as described in NFPA 13. Include "Contractor's Material and Test Certificate for Aboveground Piping."
- E. Operation and Maintenance Data: For sprinkler specialties to include in emergency, operation, and maintenance manuals.

1.8 QUALITY ASSURANCE

- A. Installer Qualifications:
 1. Installer's responsibilities include designing, fabricating, and installing sprinkler systems and providing professional engineering services needed to assume engineering responsibility. Base calculations on results of fire-hydrant flow test.
 - a. Engineering Responsibility: Preparation of working plans, calculations, and field test reports by a qualified professional engineer.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- C. NFPA Standards: Sprinkler system equipment, specialties, accessories, installation, and testing shall comply with the following:
 1. NFPA 13, "Installation of Sprinkler Systems."
 2. NFPA 24, "Installation of Private Fire Service Mains and Their Appurtenances."

1.9 COORDINATION

- A. Coordinate layout and installation of sprinklers with other construction that penetrates ceilings, including light fixtures, HVAC equipment, and partition assemblies.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

- A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, and fitting materials, and for joining methods for specific services, service locations, and pipe sizes.

2.2 STEEL PIPE AND FITTINGS

- A. Standard Weight, Black-Steel Pipe: ASTM A 53/A 53M, Type E, Grade B Pipe ends may be factory or field formed to match joining method.
- B. Thinwall Black-Steel Pipe: ASTM A 135 or ASTM A 795/A 795M, threadable, with wall thickness less than Schedule 30 and equal to or greater than Schedule 10. Pipe ends may be factory or field formed to match joining method.
- C. Schedule 10, Black-Steel Pipe: ASTM A 135 or ASTM A 795/A 795M, Schedule 10 in NPS 5 and smaller; and NFPA 13-specified wall thickness in NPS 6 to NPS 10, plain end.
- D. Black-Steel Pipe Nipples: ASTM A 733, made of ASTM A 53/A 53M, standard-weight, seamless steel pipe with threaded ends.
- E. Uncoated, Steel Couplings: ASTM A 865, threaded.
- F. Uncoated, Gray-Iron Threaded Fittings: ASME B16.4, Class 125, standard pattern.
- G. Malleable- or Ductile-Iron Unions: UL 860.
- H. Cast-Iron Flanges: ASME 16.1, Class 125.
- I. Steel Flanges and Flanged Fittings: ASME B16.5, Class 150.
- J. Steel Welding Fittings: ASTM A 234/A 234M and ASME B16.9.
- K. Grooved-Joint, Steel-Pipe Appurtenances:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Anvil International, Inc.
 - b. Tyco Fire & Building Products LP.
 - c. Victaulic Company.
 - 2. Pressure Rating: 175 psig minimum.
 - 3. Uncoated, Grooved-End Fittings for Steel Piping: ASTM A 47/A 47M, malleable-iron casting or ASTM A 536, ductile-iron casting; with dimensions matching steel pipe.
 - 4. Grooved-End-Pipe Couplings for Steel Piping: AWWA C606 and UL 213, rigid pattern, unless otherwise indicated, for steel-pipe dimensions. Include ferrous housing sections, EPDM-rubber gasket, and bolts and nuts.

2.3 PIPING JOINING MATERIALS

- A. Pipe-Flange Gasket Materials: ASME B16.21, nonmetallic and asbestos free.
 - 1. Class 125, Cast-Iron Flanges and Class 150, Bronze Flat-Face Flanges: Full-face gaskets.
- B. Metal, Pipe-Flange Bolts and Nuts: ASME B18.2.1, carbon steel unless otherwise indicated.

2.4 LISTED FIRE-PROTECTION VALVES

- A. General Requirements:
 - 1. Valves shall be UL listed or FM approved.
 - 2. Minimum Pressure Rating for Standard-Pressure Piping: 175 psig.
- B. Ball Valves:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Anvil International, Inc.
 - b. Victaulic Company.
 - 2. Standard: UL 1091 except with ball instead of disc.
 - 3. Valves NPS 1-1/2 and Smaller: Bronze body with threaded ends.
 - 4. Valves NPS 2 and NPS 2-1/2: Bronze body with threaded ends or ductile-iron body with grooved ends.
 - 5. Valves NPS 3: Ductile-iron body with grooved ends.
- C. Bronze Butterfly Valves:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Milwaukee Valve Company.
 - 2. Standard: UL 1091.
 - 3. Pressure Rating: 175 psig (1200 kPa).
 - 4. Body Material: Bronze.
 - 5. End Connections: Threaded.
- D. Iron Butterfly Valves:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Anvil International, Inc.
 - b. Fivalco Inc.
 - c. Global Safety Products, Inc.
 - d. Kennedy Valve; a division of McWane, Inc.

- e. Milwaukee Valve Company.
 - f. NIBCO INC.
 - g. Pratt, Henry Company.
 - h. Shurjoint Piping Products.
 - i. Tyco Fire & Building Products LP.
 - j. Victaulic Company.
2. Standard: UL 1091.
 3. Pressure Rating: 175 psig.
 4. Body Material: Cast or ductile iron.
 5. Style: Lug or wafer.
 6. End Connections: Grooved.

E. Check Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. AFAC Inc.
 - b. Crane Co.; Crane Valve Group; Jenkins Valves.
 - c. Crane Co.; Crane Valve Group; Stockham Division.
 - d. Globe Fire Sprinkler Corporation.
 - e. Kennedy Valve; a division of McWane, Inc.
 - f. Mueller Co.; Water Products Division.
 - g. NIBCO INC.
 - h. Reliable Automatic Sprinkler Co., Inc.
 - i. Tyco Fire & Building Products LP.
 - j. United Brass Works, Inc.
 - k. Victaulic Company.
 - l. Viking Corporation.
2. Standard: UL 312.
3. Pressure Rating: 250 psig minimum.
4. Type: Swing check.
5. Body Material: Cast iron.
6. End Connections: Flanged or grooved.

2.5 TRIM AND DRAIN VALVES

A. General Requirements:

1. Standard: UL's "Fire Protection Equipment Directory" listing or "Approval Guide," published by FM Global, listing.
2. Pressure Rating: 175 psig minimum.

B. Angle Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- a. NIBCO
- b. United Brass Works, Inc.

C. Ball Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Anvil International, Inc.
 - b. Kennedy Valve; a division of McWane, Inc.
 - c. Milwaukee Valve Company.
 - d. NIBCO INC.
 - e. Stewart, M. A. and Sons Ltd.
 - f. Tyco Fire & Building Products LP.
 - g. Victaulic Company.
 - h. Watts Water Technologies, Inc.

D. Globe Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Fire Protection Products, Inc.
 - b. United Brass Works, Inc.

2.6 SPECIALTY VALVES

A. General Requirements:

1. Standard: UL's "Fire Protection Equipment Directory" listing or "Approval Guide," published by FM Global, listing.
2. Pressure Rating:
 - a. Standard-Pressure Piping Specialty Valves: 175 psig minimum.
3. Body Material: Cast or ductile iron.
4. Size: Same as connected piping.
5. End Connections: Flanged or grooved.

B. Automatic (Ball Drip) Drain Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. AFAC Inc.
 - b. Reliable Automatic Sprinkler Co., Inc.
 - c. Tyco Fire & Building Products LP.
2. Standard: UL 1726.
3. Pressure Rating: 175 psig minimum.

4. Type: Automatic draining, ball check.
5. Size: NPS 3/4.
6. End Connections: Threaded.

2.7 SPRINKLER SPECIALTY PIPE FITTINGS

A. Sprinkler Inspector's Test Fittings:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. AGF Manufacturing Inc.
 - b. Tyco Fire & Building Products LP.
2. Standard: UL's "Fire Protection Equipment Directory" listing or "Approval Guide," published by FM Global, listing.
3. Pressure Rating: 175 psig minimum.
4. Body Material: Cast- or ductile-iron housing with sight glass.
5. Size: Same as connected piping.
6. Inlet and Outlet: Threaded.

2.8 SPRINKLERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Globe Fire Sprinkler Corporation.
2. Reliable Automatic Sprinkler Co., Inc.
3. Tyco Fire & Building Products LP.
4. Victaulic Company.
5. Viking Corporation.

B. General Requirements:

1. Standard: UL's "Fire Protection Equipment Directory" listing or "Approval Guide," published by FM Global, listing.
2. Pressure Rating for Automatic Sprinklers: 175 psig minimum.

C. Automatic Sprinklers with Heat-Responsive Element:

1. Characteristics: Nominal 3/4-inch orifice with Discharge Coefficient K of 8.0, and for "Ordinary" temperature classification rating unless otherwise indicated or required by application.

D. Sprinkler Finishes:

1. Bronze.

- E. Sprinkler Escutcheons: Materials, types, and finishes for the following sprinkler mounting applications. Escutcheons for concealed, flush, and recessed-type sprinklers are specified with sprinklers.

1. Ceiling Mounting: Plastic, white finish, one piece, flat.
2. Sidewall Mounting: Chrome-plated steel, one piece, flat.

2.9 ESCUTCHEONS

- A. General: Manufactured ceiling, floor, and wall escutcheons and floor plates.
- B. One-Piece, Stamped-Steel Escutcheons: Chrome-plated finish with set-screw.
- C. One-Piece Floor Plates: Cast-iron flange with holes for fasteners.
- D. Split-Casting Floor Plates: Cast brass with concealed hinge.

2.10 SLEEVES

- A. Galvanized-Steel-Pipe Sleeves: ASTM A 53/A 53M, Type E, standard weight, zinc coated, plain ends.

2.11 SLEEVE SEALS

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 2. Advance Products & Systems, Inc.
 3. Calpico, Inc.
 4. Metraflex, Inc.
 5. Pipeline Seal and Insulator, Inc.
- B. Description: Modular sealing element unit, designed for field assembly, to fill annular space between pipe and sleeve.
 1. Sealing Elements: EPDM-rubber interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
 2. Pressure Plates: Carbon steel.
 3. Connecting Bolts and Nuts: Carbon steel with corrosion-resistant coating of length required to secure pressure plates to sealing elements.

2.12 GROUT

- A. Standard: ASTM C 1107, Grade B, posthardening and volume adjusting, dry, hydraulic-cement grout.
- B. Characteristics: Nonshrink, and recommended for interior and exterior applications.

- C. Design Mix: 5000-psi, 28-day compressive strength.
- D. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Perform fire-hydrant flow test according to NFPA 13 and NFPA 291. Use results for system design calculations required in "Quality Assurance" Article.
- B. Report test results promptly and in writing.

3.2 WATER-SUPPLY CONNECTIONS

- A. Connect sprinkler piping to building's interior water-distribution piping. Comply with requirements for interior piping in Division 22 Section "Domestic Water Piping."
- B. Install shutoff valve, backflow preventer, pressure gage, drain, and other accessories indicated at connection to water-distribution piping.
- C. Install shutoff valve, check valve, pressure gage, and drain at connection to water supply.

3.3 PIPING INSTALLATION

- A. Locations and Arrangements: Drawing plans, schematics, and diagrams indicate general location and arrangement of piping. Install piping as indicated, as far as practical.
 - 1. Deviations from approved working plans for piping require written approval from authorities having jurisdiction. File written approval with Architect before deviating from approved working plans.
- B. Piping Standard: Comply with requirements for installation of sprinkler piping in NFPA 13.
- C. Install seismic restraints on piping. Comply with requirements for seismic-restraint device materials and installation in NFPA 13.
- D. Use listed fittings to make changes in direction, branch takeoffs from mains, and reductions in pipe sizes.
- E. Install unions adjacent to each valve in pipes NPS 2 and smaller.
- F. Install flanges, flange adapters, or couplings for grooved-end piping on valves, apparatus, and equipment having NPS 2-1/2 and larger end connections.
- G. Install "Inspector's Test Connections" in sprinkler system piping, complete with shutoff valve, and sized and located according to NFPA 13.

- H. Install sprinkler piping with drains for complete system drainage.
- I. Install sprinkler control valves, test assemblies, and drain risers adjacent to standpipes when sprinkler piping is connected to standpipes.
- J. Install automatic (ball drip) drain valve at each check valve for fire-department connection, to drain piping between fire-department connection and check valve. Install drain piping to and spill over floor drain or to outside building.
- K. Install hangers and supports for sprinkler system piping according to NFPA 13. Comply with requirements for hanger materials in NFPA 13.
- L. Drain and fill sprinkler system piping with water as needed to perform work.

3.4 JOINT CONSTRUCTION

- A. Install couplings, flanges, flanged fittings, unions, nipples, and transition and special fittings that have finish and pressure ratings same as or higher than system's pressure rating for aboveground applications unless otherwise indicated.
- B. Install unions adjacent to each valve in pipes NPS 2 and smaller.
- C. Install flanges, flange adapters, or couplings for grooved-end piping on valves, apparatus, and equipment having NPS 2-1/2 and larger end connections.
- D. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
- E. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.
- F. Flanged Joints: Select appropriate gasket material in size, type, and thickness suitable for water service. Join flanges with gasket and bolts according to ASME B31.9.
- G. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
 - 1. Apply appropriate tape or thread compound to external pipe threads.
 - 2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.
- H. Steel-Piping, Roll-Grooved Joints: Roll rounded-edge groove in end of pipe according to AWWA C606. Assemble coupling with housing, gasket, lubricant, and bolts. Join steel pipe and grooved-end fittings according to AWWA C606 for steel-pipe grooved joints.

3.5 VALVE AND SPECIALTIES INSTALLATION

- A. Install listed fire-protection valves, trim and drain valves, specialty valves and trim, controls, and specialties according to NFPA 13 and authorities having jurisdiction.

B. Specialty Valves:

1. General Requirements: Install in vertical position for proper direction of flow, in main supply to system.

3.6 SPRINKLER INSTALLATION

- A. Install sprinklers in suspended ceilings in center of acoustical ceiling panels.

3.7 ESCUTCHEON INSTALLATION

- A. Install escutcheons for penetrations of walls, ceilings, and floors.

B. Escutcheons for New Piping:

1. Piping with Fitting or Sleeve Protruding from Wall: One piece, deep pattern.
2. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One piece, cast brass with polished chrome-plated finish.
3. Bare Piping at Ceiling Penetrations in Finished Spaces: One piece, cast brass with polished chrome-plated finish.
4. Bare Piping in Unfinished Service Spaces: One piece, cast brass with rough-brass finish.
5. Bare Piping in Equipment Rooms: One piece, cast brass.
6. Bare Piping at Floor Penetrations in Equipment Rooms: One-piece floor plate.

3.8 SLEEVE INSTALLATION

- A. General Requirements: Install sleeves for pipes and tubes passing through penetrations in floors, partitions, roofs, and walls.
- B. Sleeves are not required for core-drilled holes.
- C. Permanent sleeves are not required for holes formed by removable PE sleeves.
- D. Cut sleeves to length for mounting flush with both surfaces unless otherwise indicated.
- E. Install sleeves in new partitions, slabs, and walls as they are built.
- F. For interior wall penetrations, seal annular space between sleeve and pipe or pipe insulation using joint sealants appropriate for size, depth, and location of joint. Comply with requirements for joint sealants in Division 07 Section "Joint Sealants."
- G. For exterior wall penetrations above grade, seal annular space between sleeve and pipe using joint sealants appropriate for size, depth, and location of joint. Comply with requirements for joint sealants in Division 07 Section "Joint Sealants."
- H. Seal space outside of sleeves in concrete slabs and walls with grout.
- I. Install sleeves that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation unless otherwise indicated.

- J. Install sleeve materials according to the following applications:
1. Sleeves for Piping Passing through Concrete Floor Slabs: Galvanized-steel pipe.
 2. Sleeves for Piping Passing through Concrete Floor Slabs of Mechanical Equipment Areas or Other Wet Areas: Galvanized-steel pipe.
 - a. Extend sleeves 2 inches above finished floor level.
 - b. For pipes penetrating floors with membrane waterproofing, extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified. Secure flashing between clamping flanges. Install section of cast-iron soil pipe to extend sleeve to 2 inches above finished floor level. Comply with requirements for flashing in Division 07 Section "Sheet Metal Flashing and Trim."
 3. Sleeves for Piping Passing through Exterior Concrete Walls:
 - a. Galvanized-steel-pipe sleeves for pipes smaller than NPS 6.
 - b. Cast-iron wall-pipe sleeves for pipes NPS 6 and larger.
 - c. Install sleeves that are large enough to provide 1-inch annular clear space between sleeve and pipe or pipe insulation when sleeve seals are used.
 4. Sleeves for Piping Passing through Interior Concrete Walls:
 - a. Galvanized-steel-pipe sleeves for pipes smaller than NPS 6.
 - b. Galvanized-steel-sheet sleeves for pipes NPS 6 and larger.
- K. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Comply with requirements for firestop materials and installations in Division 07 Section "Penetration Firestopping."

3.9 SLEEVE SEAL INSTALLATION

- A. Install sleeve seals in sleeves in exterior concrete walls at water-service piping entries into building.
- B. Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble sleeve seal components and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

3.10 IDENTIFICATION

- A. Install labeling and pipe markers on equipment and piping according to requirements in NFPA 13.
- B. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Division 26 Section "Identification for Electrical Systems."

3.11 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Tests and Inspections:
 - 1. Leak Test: After installation, charge systems and test for leaks. Repair leaks and retest until no leaks exist.
 - 2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
 - 3. Flush, test, and inspect sprinkler systems according to NFPA 13, "Systems Acceptance" Chapter.
 - 4. Energize circuits to electrical equipment and devices.
 - 5. Coordinate with fire-alarm tests. Operate as required.
 - 6. Coordinate with fire-pump tests. Operate as required.
 - 7. Verify that equipment hose threads are same as local fire-department equipment.
- C. Sprinkler piping system will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports.

3.12 CLEANING

- A. Clean dirt and debris from sprinklers.
- B. Remove and replace sprinklers with paint other than factory finish.

3.13 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain specialty valves and pressure-maintenance pumps.

3.14 PIPING SCHEDULE

- A. Piping between Fire-Department Connections and Check Valves: Galvanized, standard-weight steel pipe with grooved ends; grooved-end fittings; grooved-end-pipe couplings; and grooved joints.
- B. Sprinkler specialty fittings may be used, downstream of control vales, instead of specified fittings.
- C. Standard-pressure, wet-pipe sprinkler system, NPS 2 and smaller, shall be one of the following:
 - 1. Standard-weight, black-steel pipe with threaded ends; uncoated, gray-iron threaded fittings; and threaded joints.
 - 2. Standard-weight, black-steel pipe with roll-grooved ends; uncoated, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.

3. Thinwall or Schedule 10, black-steel pipe with roll-grooved ends; uncoated, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.
- D. Standard-pressure, wet-pipe sprinkler system, NPS 2-1/2 to NPS 4, shall be the following:
1. Thinwall or Schedule 10 black-steel pipe with roll-grooved ends; uncoated, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.
- E. Standard-pressure, wet-pipe sprinkler system, NPS 6 and larger, shall be the following:
1. Thinwall or Schedule 10, black-steel pipe with roll-grooved ends; uncoated, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.

3.15 SPRINKLER SCHEDULE

- A. Use sprinkler types in subparagraphs below for the following applications:
1. Rooms without Ceilings: Upright sprinklers.
 2. Rooms with Suspended Ceilings: Concealed sprinklers.
 3. Wall Mounting: Sidewall sprinklers.
- B. Provide sprinkler types in subparagraphs below with finishes indicated.
1. Concealed Sprinklers: Rough brass, with factory-painted white cover plate.
 2. Flush Sprinklers: Bright chrome, with painted white escutcheon.
 3. Upright, Pendent, and Sidewall] Sprinklers: Chrome plated in finished spaces exposed to view; rough bronze in unfinished spaces not exposed to view; wax coated where exposed to acids, chemicals, or other corrosive fumes.

END OF SECTION 211313

SECTION 230529 - HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Steel pipe hangers and supports.
 - 2. Trapeze pipe hangers.
 - 3. Thermal-hanger shield inserts.
 - 4. Fastener systems.
 - 5. Pipe stands.

1.3 DEFINITIONS

- A. MSS: Manufacturers Standardization Society of The Valve and Fittings Industry Inc.

1.4 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design trapeze pipe hangers and equipment supports, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- B. Structural Performance: Hangers and supports for HVAC piping and equipment shall withstand the effects of gravity loads and stresses within limits and under conditions indicated according to ASCE/SEI 7.
 - 1. Design supports for multiple pipes, including pipe stands, capable of supporting combined weight of supported systems, system contents, and test water.
 - 2. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.
 - 3. Design seismic-restraint hangers and supports for piping and equipment and obtain approval from authorities having jurisdiction.

1.5 INFORMATIONAL SUBMITTALS

- A. Product Data: For each type of product indicated.

- B. Shop Drawings: Signed and sealed by a qualified professional engineer. Show fabrication and installation details and include calculations for the following; include Product Data for components:
 - 1. Trapeze pipe hangers.
 - 2. Steel pipe hangers and supports.
 - 3. Pipe stands.
 - 4. Equipment supports.
- C. Delegated-Design Submittal: For trapeze hangers indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 - 1. Detail fabrication and assembly of trapeze hangers.
 - 2. Design Calculations: Calculate requirements for designing trapeze hangers.
- D. Welding certificates.

1.6 QUALITY ASSURANCE

- A. Structural Steel Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- B. Pipe Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.

PART 2 - PRODUCTS

2.1 STEEL PIPE HANGERS AND SUPPORTS

- A. Description: MSS SP-58, Types 1 through 58, factory-fabricated components. Refer to Part 3 "Hanger and Support Applications" Article for where to use specific hanger and support types.
- B. Manufacturers:
 - 1. AAA Technology & Specialties Co., Inc.
 - 2. Bergen-Power Pipe Supports.
 - 3. B-Line Systems, Inc.; a division of Cooper Industries.
 - 4. Carpenter & Paterson, Inc.
 - 5. Empire Industries, Inc.
 - 6. ERICO/Michigan Hanger Co.
 - 7. Globe Pipe Hanger Products, Inc.
 - 8. Grinnell Corp.
 - 9. GS Metals Corp.
 - 10. National Pipe Hanger Corporation.
 - 11. PHD Manufacturing, Inc.
 - 12. PHS Industries, Inc.
 - 13. Piping Technology & Products, Inc.

14. Tolco Inc.

- C. Galvanized, Metallic Coatings: Pregalvanized or hot dipped.
- D. Nonmetallic Coatings: Plastic coating, jacket, or liner.
- E. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion for support of bearing surface of piping.

2.2 TRAPEZE PIPE HANGERS

- A. Description: MSS SP-69, Type 59, shop- or field-fabricated pipe-support assembly made from structural-steel shapes with MSS SP-58 hanger rods, nuts, saddles, and U-bolts.

2.3 THERMAL-HANGER SHIELD INSERTS

- A. Description: 100-psig- minimum, compressive-strength insulation insert encased in sheet metal shield.
- B. Manufacturers:
 - 1. Carpenter & Paterson, Inc.
 - 2. ERICO/Michigan Hanger Co.
 - 3. PHS Industries, Inc.
 - 4. Pipe Shields, Inc.
 - 5. Rilco Manufacturing Company, Inc.
 - 6. Value Engineered Products, Inc.
- C. Insulation-Insert Material for Cold Piping: ASTM C 552, Type II cellular glass with vapor barrier.
- D. Insulation-Insert Material for Hot Piping: ASTM C 552, Type II cellular glass.
- E. For Trapeze or Clamped Systems: Insert and shield shall cover entire circumference of pipe.
- F. For Clevis or Band Hangers: Insert and shield shall cover lower 180 degrees of pipe.
- G. Insert Length: Extend 2 inches beyond sheet metal shield for piping operating below ambient air temperature.

2.4 FASTENER SYSTEMS

- A. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.
 - 1. Manufacturers:
 - a. Hilti, Inc.

- b. ITW Ramset/Red Head.
- c. Masterset Fastening Systems, Inc.
- d. MKT Fastening, LLC.
- e. Powers Fasteners.

B. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated- steel anchors, for use in hardened portland cement concrete; with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

1. Manufacturers:

- a. B-Line Systems, Inc.; a division of Cooper Industries.
- b. Empire Industries, Inc.
- c. Hilti, Inc.
- d. ITW Ramset/Red Head.
- e. MKT Fastening, LLC.
- f. Powers Fasteners.

2.5 PIPE STAND FABRICATION

A. Pipe Stands, General: Shop or field-fabricated assemblies made of manufactured corrosion-resistant components to support roof-mounted piping.

2.6 EQUIPMENT SUPPORTS

A. Description: Welded, shop- or field-fabricated equipment support made from structural-steel shapes.

2.7 MISCELLANEOUS MATERIALS

A. Structural Steel: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.

PART 3 - EXECUTION

3.1 HANGER AND SUPPORT INSTALLATION

A. Metal Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from the building structure.

B. Metal Trapeze Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Arrange for grouping of parallel runs of horizontal piping, and support together on field-fabricated trapeze pipe hangers.

- 1. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified for individual pipe hangers.

2. Field fabricate from ASTM A 36/A 36M, carbon-steel shapes selected for loads being supported. Weld steel according to AWS D1.1/D1.1M.
- C. Fiberglass Pipe-Hanger Installation: Comply with applicable portions of MSS SP-69 and MSS SP-89. Install hangers and attachments as required to properly support piping from building structure.
- D. Metal Framing System Installation: Arrange for grouping of parallel runs of piping, and support together on field-assembled metal framing systems.
- E. Fiberglass Strut System Installation: Arrange for grouping of parallel runs of piping, and support together on field-assembled fiberglass struts.
- F. Thermal-Hanger Shield Installation: Install in pipe hanger or shield for insulated piping.
- G. Fastener System Installation:
 1. Install powder-actuated fasteners for use in lightweight concrete or concrete slabs less than 4 inches (100 mm) thick in concrete after concrete is placed and completely cured. Use operators that are licensed by powder-actuated tool manufacturer. Install fasteners according to powder-actuated tool manufacturer's operating manual.
 2. Install mechanical-expansion anchors in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.
- H. Pipe Stand Installation:
 1. Pipe Stand Types except Curb-Mounted Type: Assemble components and mount on smooth roof surface. Do not penetrate roof membrane.
 2. Curb-Mounted-Type Pipe Stands: Assemble components or fabricate pipe stand and mount on permanent, stationary roof curb. See Section 077200 "Roof Accessories" for curbs.
- I. Install hangers and supports complete with necessary attachments, inserts, bolts, rods, nuts, washers, and other accessories.
- J. Equipment Support Installation: Fabricate from welded-structural-steel shapes.
- K. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.
- L. Install lateral bracing with pipe hangers and supports to prevent swaying.
- M. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, NPS 2-1/2 and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.
- N. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.

- O. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and to not exceed maximum pipe deflections allowed by ASME B31.9 for building services piping.
- P. Insulated Piping:
 - 1. Attach clamps and spacers to piping.
 - a. Piping Operating above Ambient Air Temperature: Clamp may project through insulation.
 - b. Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.
 - c. Do not exceed pipe stress limits allowed by ASME B31.9 for building services piping.
 - 2. Install MSS SP-58, Type 39, protection saddles if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.
 - a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 (DN 100) and larger if pipe is installed on rollers.
 - 3. Install MSS SP-58, Type 40, protective shields on cold piping with vapor barrier. Shields shall span an arc of 180 degrees.
 - a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 (DN 100) and larger if pipe is installed on rollers.
 - 4. Shield Dimensions for Pipe: Not less than the following:
 - a. NPS 1/4 to NPS 3-1/2: 12 inches long and 0.048 inch thick.
 - b. NPS 4: 12 inches long and 0.06 inch thick.
 - c. NPS 5 and NPS 6: 18 inches long and 0.06 inch thick.
 - d. NPS 8 to NPS 14: 24 inches long and 0.075 inch thick.
 - e. NPS 16 to NPS 24: 24 inches long and 0.105 inch thick.
 - 5. Pipes NPS 8 and Larger: Include wood or reinforced calcium-silicate-insulation inserts of length at least as long as protective shield.
 - 6. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.

3.2 EQUIPMENT SUPPORTS

- A. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.
- B. Grouting: Place grout under supports for equipment and make bearing surface smooth.
- C. Provide lateral bracing, to prevent swaying, for equipment supports.

3.3 METAL FABRICATIONS

- A. Cut, drill, and fit miscellaneous metal fabrications for trapeze pipe hangers and equipment supports.
- B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.
- C. Field Welding: Comply with AWS D1.1/D1.1M procedures for shielded, metal arc welding; appearance and quality of welds; and methods used in correcting welding work; and with the following:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. Finish welds at exposed connections so no roughness shows after finishing and so contours of welded surfaces match adjacent contours.

3.4 ADJUSTING

- A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.
- B. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches.
- C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

3.5 HANGER AND SUPPORT SCHEDULE

- A. Specific hanger and support requirements are in Sections specifying piping systems and equipment.
- B. Comply with MSS SP-69 for pipe-hanger selections and applications that are not specified in piping system Sections.
- C. Use hangers and supports with galvanized metallic coatings for piping and equipment that will not have field-applied finish.
- D. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.
- E. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
 - 1. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated stationary pipes, NPS 1/2 to NPS 30.

2. Yoke-Type Pipe Clamps (MSS Type 2): For suspension of 120 to 450 deg F pipes, NPS 4 to NPS 16, requiring up to 4 inches of insulation.
 3. Pipe Hangers (MSS Type 5): For suspension of pipes, NPS 1/2 to NPS 4, to allow off-center closure for hanger installation before pipe erection.
 4. Adjustable, Swivel Split- or Solid-Ring Hangers (MSS Type 6): For suspension of noninsulated stationary pipes, NPS 3/4 to NPS 8.
- F. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers, NPS 3/4 to NPS 20.
 2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers, NPS 3/4 to NPS 20, if longer ends are required for riser clamps.
- G. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches for heavy loads.
 2. Steel Clevises (MSS Type 14): For 120 to 450 deg F piping installations.
 3. Swivel Turnbuckles (MSS Type 15): For use with MSS Type 11, split pipe rings.
 4. Malleable-Iron Sockets (MSS Type 16): For attaching hanger rods to various types of building attachments.
 5. Steel Weldless Eye Nuts (MSS Type 17): For 120 to 450 deg F piping installations.
- H. Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Steel or Malleable Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.
 2. Top-Beam C-Clamps (MSS Type 19): For use under roof installations with bar-joist construction to attach to top flange of structural shape.
 3. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.
 4. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.
 5. Welded Beam Attachments (MSS Type 22): For attaching to bottom of beams if loads are considerable and rod sizes are large.
 6. C-Clamps (MSS Type 23): For structural shapes.
 7. Top-Beam Clamps (MSS Type 25): For top of beams if hanger rod is required tangent to flange edge.
 8. Side-Beam Clamps (MSS Type 27): For bottom of steel I-beams.
 9. Steel-Beam Clamps with Eye Nuts (MSS Type 28): For attaching to bottom of steel I-beams for heavy loads.
 10. Linked-Steel Clamps with Eye Nuts (MSS Type 29): For attaching to bottom of steel I-beams for heavy loads, with link extensions.
 11. Malleable Beam Clamps with Extension Pieces (MSS Type 30): For attaching to structural steel.
 12. Welded-Steel Brackets: For support of pipes from below, or for suspending from above by using clip and rod. Use one of the following for indicated loads:
 - a. Light (MSS Type 31): 750 lb.

- b. Medium (MSS Type 32): 1500 lb.
 - c. Heavy (MSS Type 33): 3000 lb.
- 13. Side-Beam Brackets (MSS Type 34): For sides of steel or wooden beams.
 - 14. Plate Lugs (MSS Type 57): For attaching to steel beams if flexibility at beam is required.
 - 15. Horizontal Travelers (MSS Type 58): For supporting piping systems subject to linear horizontal movement where headroom is limited.
- I. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
 - 1. Steel Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.
 - 2. Protection Shields (MSS Type 40): Of length recommended in writing by manufacturer to prevent crushing insulation.
 - 3. Thermal-Hanger Shield Inserts: For supporting insulated pipe.
 - J. Comply with MSS SP-69 for trapeze pipe hanger selections and applications that are not specified in piping system Sections.
 - K. Comply with MFMA-102 for metal framing system selections and applications that are not specified in piping system Sections.
 - L. Use powder-actuated fasteners or mechanical-expansion anchors instead of building attachments where required in concrete construction.
 - M. Comply with MSS SP-69 for trapeze pipe-hanger selections and applications that are not specified in piping system Sections.
 - N. Comply with MFMA-103 for metal framing system selections and applications that are not specified in piping system Sections.
 - O. Use powder-actuated fasteners or mechanical-expansion anchors instead of building attachments where required in concrete construction.

END OF SECTION 230529

SECTION 230593 - TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Balancing Air Systems:
 - a. Constant-volume air systems.
 - b. Variable-air-volume systems.

1.3 DEFINITIONS

- A. AABC: Associated Air Balance Council.
- B. NEBB: National Environmental Balancing Bureau.
- C. TAB: Testing, adjusting, and balancing.
- D. TABB: Testing, Adjusting, and Balancing Bureau.
- E. TAB Specialist: An entity engaged to perform TAB Work.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: Within 30 days of Contractor's Notice to Proceed, submit documentation that the TAB contractor and this Project's TAB team members meet the qualifications specified in "Quality Assurance" Article.
- B. Contract Documents Examination Report: Within 30 days of Contractor's Notice to Proceed, submit the Contract Documents review report as specified in Part 3.
- C. Certified TAB reports.
- D. Sample report forms.
- E. Instrument calibration reports, to include the following:
 - 1. Instrument type and make.

2. Serial number.
3. Application.
4. Dates of use.
5. Dates of calibration.

1.5 QUALITY ASSURANCE

- A. TAB Contractor Qualifications: Engage a TAB entity certified by AABC, NEBB or TABB.
 1. TAB Technician: Employee of the TAB contractor and who is certified by AABC, NEBB or TABB as a TAB technician.
- B. Certify TAB field data reports and perform the following:
 1. Review field data reports to validate accuracy of data and to prepare certified TAB reports.
 2. Certify that the TAB team complied with the approved TAB plan and the procedures specified and referenced in this Specification.
- C. TAB Report Forms: Use standard TAB contractor's forms approved by Architect.
- D. Instrumentation Type, Quantity, Accuracy, and Calibration: As described in ASHRAE 111, Section 5, "Instrumentation."
- E. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 7.2.2 - "Air Balancing."
- F. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1, Section 6.7.2.3 - "System Balancing."

1.6 PROJECT CONDITIONS

- A. Partial Owner Occupancy: Owner may occupy completed areas of building before Substantial Completion. Cooperate with Owner during TAB operations to minimize conflicts with Owner's operations.

1.7 COORDINATION

- A. Notice: Provide seven days' advance notice for each test. Include scheduled test dates and times.
- B. Perform TAB after leakage and pressure tests on air and water distribution systems have been satisfactorily completed.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine the Contract Documents to become familiar with Project requirements and to discover conditions in systems' designs that may preclude proper TAB of systems and equipment.
- B. Examine systems for installed balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers. Verify that locations of these balancing devices are accessible.
- C. Examine the approved submittals for HVAC systems and equipment.
- D. Examine design data including HVAC system descriptions, statements of design assumptions for environmental conditions and systems' output, and statements of philosophies and assumptions about HVAC system and equipment controls.
- E. Examine design data including HVAC system descriptions, statements of design assumptions for environmental conditions and systems' output, and statements of philosophies and assumptions about HVAC system and equipment controls.
- F. Examine equipment performance data including fan and pump curves.
 - 1. Relate performance data to Project conditions and requirements, including system effects that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system.
 - 2. Calculate system-effect factors to reduce performance ratings of HVAC equipment when installed under conditions different from the conditions used to rate equipment performance. To calculate system effects for air systems, use tables and charts found in AMCA 201, "Fans and Systems," or in SMACNA's "HVAC Systems - Duct Design." Compare results with the design data and installed conditions.
- G. Examine system and equipment installations and verify that field quality-control testing, cleaning, and adjusting specified in individual Sections have been performed.
- H. Examine test reports specified in individual system and equipment Sections.
- I. Examine HVAC equipment and filters and verify that bearings are greased, belts are aligned and tight, and equipment with functioning controls is ready for operation.
- J. Examine terminal units, such as variable-air-volume boxes, and verify that they are accessible and their controls are connected and functioning.
- K. Examine strainers. Verify that startup screens are replaced by permanent screens with indicated perforations.
- L. Examine three-way valves for proper installation for their intended function of diverting or mixing fluid flows.

- M. Examine heat-transfer coils for correct piping connections and for clean and straight fins.
- N. Examine system pumps to ensure absence of entrained air in the suction piping.
- O. Examine operating safety interlocks and controls on HVAC equipment.
- P. Report deficiencies discovered before and during performance of TAB procedures. Observe and record system reactions to changes in conditions. Record default set points if different from indicated values.

3.2 PREPARATION

- A. Prepare a TAB plan that includes strategies and step-by-step procedures.
- B. Complete system-readiness checks and prepare reports. Verify the following:
 - 1. Permanent electrical-power wiring is complete.
 - 2. Hydronic systems are filled, clean, and free of air.
 - 3. Automatic temperature-control systems are operational.
 - 4. Equipment and duct access doors are securely closed.
 - 5. Balance, smoke, and fire dampers are open.
 - 6. Isolating and balancing valves are open and control valves are operational.
 - 7. Ceilings are installed in critical areas where air-pattern adjustments are required and access to balancing devices is provided.
 - 8. Windows and doors can be closed so indicated conditions for system operations can be met.

3.3 GENERAL PROCEDURES FOR TESTING AND BALANCING

- A. Perform testing and balancing procedures on each system according to the procedures contained in AABC's "National Standards for Total System Balance", ASHRAE 111, NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems" or SMACNA's "HVAC Systems - Testing, Adjusting, and Balancing" and in this Section.
 - 1. Comply with requirements in ASHRAE 62.1, Section 7.2.2 - "Air Balancing."
- B. Cut insulation, ducts, pipes, and equipment cabinets for installation of test probes to the minimum extent necessary for TAB procedures.
 - 1. After testing and balancing, patch probe holes in ducts with same material and thickness as used to construct ducts.
 - 2. After testing and balancing, install test ports and duct access doors that comply with requirements in Section 233300 "Air Duct Accessories."
 - 3. Install and join new insulation that matches removed materials. Restore insulation, coverings, vapor barrier, and finish according to Section 230713 "Duct Insulation," Section 230716 "HVAC Equipment Insulation," and Section 230719 "HVAC Piping Insulation."

- C. Mark equipment and balancing devices, including damper-control positions, valve position indicators, fan-speed-control levers, and similar controls and devices, with paint or other suitable, permanent identification material to show final settings.
- D. Take and report testing and balancing measurements in inch-pound units.

3.4 GENERAL PROCEDURES FOR BALANCING AIR SYSTEMS

- A. Prepare test reports for both fans and outlets. Obtain manufacturer's outlet factors and recommended testing procedures. Crosscheck the summation of required outlet volumes with required fan volumes.
- B. Prepare schematic diagrams of systems' "as-built" duct layouts.
- C. For variable-air-volume systems, develop a plan to simulate diversity.
- D. Determine the best locations in main and branch ducts for accurate duct-airflow measurements.
- E. Check airflow patterns from the outdoor-air louvers and dampers and the return- and exhaust-air dampers through the supply-fan discharge and mixing dampers.
- F. Locate start-stop and disconnect switches, electrical interlocks, and motor starters.
- G. Verify that motor starters are equipped with properly sized thermal protection.
- H. Check dampers for proper position to achieve desired airflow path.
- I. Check for airflow blockages.
- J. Check condensate drains for proper connections and functioning.
- K. Check for proper sealing of air-handling-unit components.
- L. Verify that air duct system is sealed as specified in Section 233113 "Metal Ducts."

3.5 PROCEDURES FOR VARIABLE-AIR-VOLUME SYSTEMS

- A. **Compensating for Diversity:** When the total airflow of all terminal units is more than the indicated airflow of the fan, place a selected number of terminal units at a minimum set-point airflow with the remainder at maximum-airflow condition until the total airflow of the terminal units equals the indicated airflow of the fan. Select the reduced-airflow terminal units so they are distributed evenly among the branch ducts.
- B. **Pressure-Independent, Variable-Air-Volume Systems:** After the fan systems have been adjusted, adjust the variable-air-volume systems as follows:
 - 1. Set outdoor-air dampers at minimum, and set return- and exhaust-air dampers at a position that simulates full-cooling load.
 - 2. Select the terminal unit that is most critical to the supply-fan airflow and static pressure. Measure static pressure. Adjust system static pressure so the entering static pressure for

the critical terminal unit is not less than the sum of the terminal-unit manufacturer's recommended minimum inlet static pressure plus the static pressure needed to overcome terminal-unit discharge system losses.

3. Measure total system airflow. Adjust to within indicated airflow.
 4. Set terminal units at maximum airflow and adjust controller or regulator to deliver the designed maximum airflow. Use terminal-unit manufacturer's written instructions to make this adjustment. When total airflow is correct, balance the air outlets downstream from terminal units the same as described for constant-volume air systems.
 5. Set terminal units at minimum airflow and adjust controller or regulator to deliver the designed minimum airflow. Check air outlets for a proportional reduction in airflow the same as described for constant-volume air systems.
 - a. If air outlets are out of balance at minimum airflow, report the condition but leave outlets balanced for maximum airflow.
 6. Remeasure the return airflow to the fan while operating at maximum return airflow and minimum outdoor airflow.
 - a. Adjust the fan and balance the return-air ducts and inlets the same as described for constant-volume air systems.
 7. Measure static pressure at the most critical terminal unit and adjust the static-pressure controller at the main supply-air sensing station to ensure that adequate static pressure is maintained at the most critical unit.
 8. Record final fan-performance data.
- C. Pressure-Dependent, Variable-Air-Volume Systems without Diversity: After the fan systems have been adjusted, adjust the variable-air-volume systems as follows:
1. Balance variable-air-volume systems the same as described for constant-volume air systems.
 2. Set terminal units and supply fan at full-airflow condition.
 3. Adjust inlet dampers of each terminal unit to indicated airflow and verify operation of the static-pressure controller. When total airflow is correct, balance the air outlets downstream from terminal units the same as described for constant-volume air systems.
 4. Readjust fan airflow for final maximum readings.
 5. Measure operating static pressure at the sensor that controls the supply fan if one is installed, and verify operation of the static-pressure controller.
 6. Set supply fan at minimum airflow if minimum airflow is indicated. Measure static pressure to verify that it is being maintained by the controller.
 7. Set terminal units at minimum airflow and adjust controller or regulator to deliver the designed minimum airflow. Check air outlets for a proportional reduction in airflow the same as described for constant-volume air systems.
 - a. If air outlets are out of balance at minimum airflow, report the condition but leave the outlets balanced for maximum airflow.
 8. Measure the return airflow to the fan while operating at maximum return airflow and minimum outdoor airflow.

- a. Adjust the fan and balance the return-air ducts and inlets the same as described for constant-volume air systems.
- D. Pressure-Dependent, Variable-Air-Volume Systems with Diversity: After the fan systems have been adjusted, adjust the variable-air-volume systems as follows:
1. Set system at maximum indicated airflow by setting the required number of terminal units at minimum airflow. Select the reduced-airflow terminal units so they are distributed evenly among the branch ducts.
 2. Adjust supply fan to maximum indicated airflow with the variable-airflow controller set at maximum airflow.
 3. Set terminal units at full-airflow condition.
 4. Adjust terminal units starting at the supply-fan end of the system and continuing progressively to the end of the system. Adjust inlet dampers of each terminal unit to indicated airflow. When total airflow is correct, balance the air outlets downstream from terminal units the same as described for constant-volume air systems.
 5. Adjust terminal units for minimum airflow.
 6. Measure static pressure at the sensor.
 7. Measure the return airflow to the fan while operating at maximum return airflow and minimum outdoor airflow. Adjust the fan and balance the return-air ducts and inlets the same as described for constant-volume air systems.

3.6 PROCEDURES FOR MULTIZONE SYSTEMS

- A. Set unit at maximum airflow through the cooling coil.
- B. Adjust each zone's balancing damper to achieve indicated airflow within the zone.

3.7 TOLERANCES

- A. Set HVAC system's air flow rates and water flow rates within the following tolerances:
 1. Supply, Return, and Exhaust Fans and Equipment with Fans: Plus or minus 10 percent.
 2. Air Outlets and Inlets: Plus or minus 10 percent.
 3. Heating-Water Flow Rate: Plus or minus 10 percent.
 4. Cooling-Water Flow Rate: Plus or minus 10 percent.

3.8 REPORTING

- A. Initial Construction-Phase Report: Based on examination of the Contract Documents as specified in "Examination" Article, prepare a report on the adequacy of design for systems' balancing devices. Recommend changes and additions to systems' balancing devices to facilitate proper performance measuring and balancing. Recommend changes and additions to HVAC systems and general construction to allow access for performance measuring and balancing devices.

3.9 FINAL REPORT

- A. General: Prepare a certified written report; tabulate and divide the report into separate sections for tested systems and balanced systems.
 - 1. Include a certification sheet at the front of the report's binder, signed and sealed by the certified testing and balancing engineer.
 - 2. Include a list of instruments used for procedures, along with proof of calibration.
- B. Final Report Contents: In addition to certified field-report data, include the following:
 - 1. Pump curves.
 - 2. Fan curves.
 - 3. Manufacturers' test data.
 - 4. Field test reports prepared by system and equipment installers.
 - 5. Other information relative to equipment performance; do not include Shop Drawings and product data.
- C. General Report Data: In addition to form titles and entries, include the following data:
 - 1. Title page.
 - 2. Name and address of the TAB contractor.
 - 3. Project name.
 - 4. Project location.
 - 5. Architect's name and address.
 - 6. Engineer's name and address.
 - 7. Contractor's name and address.
 - 8. Report date.
 - 9. Signature of TAB supervisor who certifies the report.
 - 10. Table of Contents with the total number of pages defined for each section of the report. Number each page in the report.
 - 11. Summary of contents including the following:
 - a. Indicated versus final performance.
 - b. Notable characteristics of systems.
 - c. Description of system operation sequence if it varies from the Contract Documents.
 - 12. Nomenclature sheets for each item of equipment.
 - 13. Data for terminal units, including manufacturer's name, type, size, and fittings.
 - 14. Notes to explain why certain final data in the body of reports vary from indicated values.
 - 15. Test conditions for fans and pump performance forms including the following:
 - a. Settings for outdoor-, return-, and exhaust-air dampers.
 - b. Conditions of filters.
 - c. Cooling coil, wet- and dry-bulb conditions.
 - d. Face and bypass damper settings at coils.
 - e. Fan drive settings including settings and percentage of maximum pitch diameter.
 - f. Inlet vane settings for variable-air-volume systems.
 - g. Settings for supply-air, static-pressure controller.
 - h. Other system operating conditions that affect performance.

- D. System Diagrams: Include schematic layouts of air and hydronic distribution systems. Present each system with single-line diagram and include the following:
1. Quantities of outdoor, supply, return, and exhaust airflows.
 2. Water and steam flow rates.
 3. Duct, outlet, and inlet sizes.
 4. Pipe and valve sizes and locations.
 5. Terminal units.
 6. Balancing stations.
 7. Position of balancing devices.
- E. Air-Terminal-Device Reports:
1. Unit Data:
 - a. System and air-handling unit identification.
 - b. Location and zone.
 - c. Apparatus used for test.
 - d. Area served.
 - e. Make.
 - f. Number from system diagram.
 - g. Type and model number.
 - h. Size.
 - i. Effective area in sq. ft. (sq. m).
 2. Test Data (Indicated and Actual Values):
 - a. Air flow rate in cfm (L/s).
 - b. Air velocity in fpm (m/s).
 - c. Preliminary air flow rate as needed in cfm (L/s).
 - d. Preliminary velocity as needed in fpm (m/s).
 - e. Final air flow rate in cfm (L/s).
 - f. Final velocity in fpm (m/s).
 - g. Space temperature in deg F (deg C).
- F. System-Coil Reports: For reheat coils and water coils of terminal units, include the following:
1. Unit Data:
 - a. System and air-handling-unit identification.
 - b. Location and zone.
 - c. Room or riser served.
 - d. Coil make and size.
 - e. Flowmeter type.
 2. Test Data (Indicated and Actual Values):
 - a. Air flow rate in cfm (L/s).
 - b. Entering-water temperature in deg F (deg C).
 - c. Leaving-water temperature in deg F (deg C).
 - d. Water pressure drop in feet of head or psig (kPa).

- e. Entering-air temperature in deg F (deg C).
- f. Leaving-air temperature in deg F (deg C).

G. Instrument Calibration Reports:

- 1. Report Data:
 - a. Instrument type and make.
 - b. Serial number.
 - c. Application.
 - d. Dates of use.
 - e. Dates of calibration.

3.10 INSPECTIONS

A. Initial Inspection:

- 1. After testing and balancing are complete, operate each system and randomly check measurements to verify that the system is operating according to the final test and balance readings documented in the final report.
- 2. Check the following for each system:
 - a. Measure airflow of at least 10 percent of air outlets.
 - b. Measure water flow of at least [5] <Insert number> percent of terminals.
 - c. Measure room temperature at each thermostat/temperature sensor. Compare the reading to the set point.
 - d. Verify that balancing devices are marked with final balance position.
 - e. Note deviations from the Contract Documents in the final report.

B. Final Inspection:

- 1. After initial inspection is complete and documentation by random checks verifies that testing and balancing are complete and accurately documented in the final report, request that a final inspection be made by Architect.
- 2. The TAB contractor's test and balance engineer shall conduct the inspection in the presence of Construction Manager
- 3. Owner shall randomly select measurements, documented in the final report, to be rechecked. Rechecking shall be limited to either 10 percent of the total measurements recorded or the extent of measurements that can be accomplished in a normal 8-hour business day.
- 4. If rechecks yield measurements that differ from the measurements documented in the final report by more than the tolerances allowed, the measurements shall be noted as "FAILED."
- 5. If the number of "FAILED" measurements is greater than 10 percent of the total measurements checked during the final inspection, the testing and balancing shall be considered incomplete and shall be rejected.

C. TAB Work will be considered defective if it does not pass final inspections. If TAB Work fails, proceed as follows:

1. Recheck all measurements and make adjustments. Revise the final report and balancing device settings to include all changes; resubmit the final report and request a second final inspection.
 2. If the second final inspection also fails, Owner may contract the services of another TAB contractor to complete TAB Work according to the Contract Documents and deduct the cost of the services from the original TAB contractor's final payment.
- D. Prepare test and inspection reports.

3.11 ADDITIONAL TESTS

- A. Within 90 days of completing TAB, perform additional TAB to verify that balanced conditions are being maintained throughout and to correct unusual conditions.
- B. Seasonal Periods: If initial TAB procedures were not performed during near-peak summer and winter conditions, perform additional TAB during near-peak summer and winter conditions.

END OF SECTION 230593

SECTION 230700 – HVAC INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

1. Insulation Materials:
 - a. Mineral fiber.
2. Fire-rated insulation systems.
3. Insulating cements.
4. Adhesives.
5. Mastics.
6. Factory-applied jackets.
7. Field-applied jackets.
8. Tapes.
9. Securements.
10. Corner angles.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Include thermal conductivity, thickness, and jackets (both factory and field applied, if any).
- B. Shop Drawings:
 1. Detail application of protective shields, saddles, and inserts at hangers for each type of insulation and hanger.
 2. Detail attachment and covering of heat tracing inside insulation.
 3. Detail insulation application at pipe expansion joints for each type of insulation.
 4. Detail insulation application at elbows, fittings, flanges, valves, and specialties for each type of insulation.
 5. Detail removable insulation at piping specialties, equipment connections, and access panels.
 6. Detail application of field-applied jackets.
 7. Detail application at linkages of control devices.
 8. Detail field application for each equipment type.

- C. Qualification Data: For qualified Installer.
- D. Material Test Reports: From a qualified testing agency acceptable to authorities having jurisdiction indicating, interpreting, and certifying test results for compliance of insulation materials, sealers, attachments, cements, and jackets, with requirements indicated. Include dates of tests and test methods employed.
- E. Field quality-control reports.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the Department of Labor, Bureau of Apprenticeship and Training.
- B. Fire-Test-Response Characteristics: Insulation and related materials shall have fire-test-response characteristics indicated, as determined by testing identical products per ASTM E 84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing and inspecting agency.
 - 1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
 - 2. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.

1.6 COORDINATION

- A. Coordinate size and location of supports, hangers, and insulation shields specified in Division 23 Section "Hangers and Supports for HVAC Piping and Equipment."
- B. Coordinate clearance requirements with piping Installer for piping insulation application, duct Installer for duct insulation application, and equipment Installer for equipment insulation application. Before preparing piping and ductwork Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.

1.7 SCHEDULING

- A. Schedule insulation application after pressure testing systems and, where required, after installing and testing heat tracing. Insulation application may begin on segments that have satisfactory test results.

- B. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS

- A. Comply with requirements in Part 3 schedule articles for where insulating materials shall be applied.
- B. Products shall not contain asbestos, lead, mercury, or mercury compounds.
- C. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.
- D. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.
- E. Mineral-Fiber Blanket Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 553, Type II and ASTM C 1290, Type I III with factory-applied FSK jacket. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. CertainTeed Corp.; Duct Wrap.
 - b. Johns Manville; Microlite.
 - c. Knauf Insulation; Duct Wrap.
 - d. Manson Insulation Inc.; Alley Wrap.
 - e. Owens Corning; All-Service Duct Wrap.
- F. Mineral-Fiber Board Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 612, Type IA or Type IB. For duct and plenum applications, provide insulation with factory-applied ASJ. For equipment applications, provide insulation with factory-applied ASJ. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. CertainTeed Corp.; Commercial Board.
 - b. Fibrex Insulations Inc.; FBX.
 - c. Johns Manville; 800 Series Spin-Glas.
 - d. Knauf Insulation; Insulation Board.
 - e. Manson Insulation Inc.; AK Board.
 - f. Owens Corning; Fiberglas 700 Series.
- G. Mineral-Fiber, Preformed Pipe Insulation:
 - 1. Products: Subject to compliance with requirements, provide one of the following:

- a. Fibrex Insulations Inc.; Coreplus 1200.
 - b. Johns Manville; Micro-Lok.
 - c. Knauf Insulation; 1000 Pipe Insulation.
 - d. Manson Insulation Inc.; Alley-K.
 - e. Owens Corning; Fiberglas Pipe Insulation.
2. Products: Subject to compliance with requirements, provide one of the following:
- a. CertainTeed Corp.; CrimpWrap.
 - b. Johns Manville; MicroFlex.
 - c. Knauf Insulation; Pipe and Tank Insulation.
 - d. Manson Insulation Inc.; AK Flex.
 - e. Owens Corning; Fiberglas Pipe and Tank Insulation.

2.2 ADHESIVES

- A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated, unless otherwise indicated.
- B. ASJ Adhesive and FSK Jacket Adhesive: Comply with MIL-A-3316C, Class 2, Grade A for bonding insulation jacket lap seams and joints.
1. Products: Subject to compliance with requirements, provide one of the following:
- a. Childers Products, Division of ITW; CP-82.
 - b. Foster Products Corporation, H. B. Fuller Company; 85-20.
 - c. ITW TACC, Division of Illinois Tool Works; S-90/80.
 - d. Marathon Industries, Inc.; 225.
 - e. Mon-Eco Industries, Inc.; 22-25.
2. For indoor applications, use adhesive that has a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- C. PVC Jacket Adhesive: Compatible with PVC jacket.
1. Products: Subject to compliance with requirements, provide one of the following:
- a. Dow Chemical Company (The); 739, Dow Silicone.
 - b. Johns-Manville; Zeston Perma-Weld, CEEL-TITE Solvent Welding Adhesive.
 - c. P.I.C. Plastics, Inc.; Welding Adhesive.
 - d. Speedline Corporation; Speedline Vinyl Adhesive.
2. For indoor applications, use adhesive that has a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.3 MASTICS

- A. Materials shall be compatible with insulation materials, jackets, and substrates; comply with MIL-C-19565C, Type II.
- B. Vapor-Barrier Mastic: Water based; suitable for indoor and outdoor use on below ambient services.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Childers Products, Division of ITW; CP-35.
 - b. Foster Products Corporation, H. B. Fuller Company; 30-90.
 - c. ITW TACC, Division of Illinois Tool Works; CB-50.
 - d. Marathon Industries, Inc.; 590.
 - e. Mon-Eco Industries, Inc.; 55-40.
 - f. Vimasco Corporation; 749.
 - 2. Water-Vapor Permeance: ASTM E 96, Procedure B, 0.013 permats 43-mildry film thickness.
 - 3. Service Temperature Range: Minus 20 to plus 180 deg F
 - 4. Solids Content: ASTM D 1644, 59 percent by volume and 71 percent by weight.
 - 5. Color: White.
- C. Breather Mastic: Water based; suitable for indoor and outdoor use on above ambient services.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Childers Products, Division of ITW; CP-10.
 - b. Foster Products Corporation, H. B. Fuller Company; 35-00.
 - c. ITW TACC, Division of Illinois Tool Works; CB-05/15.
 - d. Marathon Industries, Inc.; 550.
 - e. Mon-Eco Industries, Inc.; 55-50.
 - f. Vimasco Corporation; WC-1/WC-5.
 - 2. Water-Vapor Permeance: ASTM F 1249, 3 permsat 0.0625-inchdry film thickness.
 - 3. Service Temperature Range: Minus 20 to plus 200 deg F
 - 4. Solids Content: 63 percent by volume and 73 percent by weight.
 - 5. Color: White.

2.4 FACTORY-APPLIED JACKETS

- A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:
 - 1. ASJ: White, kraft-paper, fiberglass-reinforced scrim with aluminum-foil backing; complying with ASTM C 1136, Type I.
 - 2. FSK Jacket: Aluminum-foil, fiberglass-reinforced scrim with kraft-paper backing; complying with ASTM C 1136, Type II.

- 1) Dow Chemical Company (The); Saran 540 Vapor Retarder Film and Saran 560 Vapor Retarder Film.

2.5 FIELD-APPLIED JACKETS

- A. Field-applied jackets shall comply with ASTM C 921, Type I, unless otherwise indicated.
- B. PVC Jacket: High-impact-resistant, UV-resistant PVC complying with ASTM D 1784, Class 16354-C; thickness as scheduled; roll stock ready for shop or field cutting and forming. Thickness is indicated in field-applied jacket schedules.
 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Johns Manville; Zeston.
 - b. P.I.C. Plastics, Inc.; FG Series.
 - c. Proto PVC Corporation; LoSmoke.
 - d. Speedline Corporation; SmokeSafe.
 2. Adhesive: As recommended by jacket material manufacturer.
 3. Color: White.
 4. Factory-fabricated fitting covers to match jacket if available; otherwise, field fabricate.
 - a. Shapes: 45- and 90-degree, short- and long-radius elbows, tees, valves, flanges, unions, reducers, end caps, soil-pipe hubs, traps, mechanical joints, and P-trap and supply covers for lavatories.
 5. Factory-fabricated tank heads and tank side panels.

2.6 TAPES

- A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C 1136.
 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0835.
 - b. Compac Corp.; 104 and 105.
 - c. Ideal Tape Co., Inc., an American Biltrite Company; 428 AWF ASJ.
 - d. Venture Tape; 1540 CW Plus, 1542 CW Plus, and 1542 CW Plus/SQ.
 2. Width: 3 inches.
 3. Thickness: 11.5 mils.
 4. Adhesion: 90 ounces force/inch in width.
 5. Elongation: 2 percent.
 6. Tensile Strength: 40 lbf/inch in width.
 7. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.
- B. PVC Tape: White vapor-retarder tape matching field-applied PVC jacket with acrylic adhesive. Suitable for indoor and outdoor applications.

1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0555.
 - b. Compac Corp.; 130.
 - c. Ideal Tape Co., Inc., an American Biltrite Company; 370 White PVC tape.
 - d. Venture Tape; 1506 CW NS.
2. Width: 2 inches.
3. Thickness: 6 mils.
4. Adhesion: 64 ounces force/inch in width.
5. Elongation: 500 percent.
6. Tensile Strength: 18 lbf/inch in width.

2.7 SECUREMENTS

A. Bands:

1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Childers Products; Bands.
 - b. PABCO Metals Corporation; Bands.
 - c. RPR Products, Inc.; Bands.
2. Aluminum: ASTM B 209, Alloy 3003, 3005, 3105, or 5005; Temper H-14, 0.020 inch thick, 1/2 inch wide with wing or closed seal.
3. Springs: Twin spring set constructed of stainless steel with ends flat and slotted to accept metal bands. Spring size determined by manufacturer for application.

B. Insulation Pins and Hangers:

1. Capacitor-Discharge-Weld Pins: Copper- or zinc-coated steel pin, fully annealed for capacitor-discharge welding, 0.106-inch diameter shank, length to suit depth of insulation indicated.
 - a. Products: Subject to compliance with requirements, provide one of the following:
 - 1) AGM Industries, Inc.; CWP-1.
 - 2) GEMCO; CD.
 - 3) Midwest Fasteners, Inc.; CD.
 - 4) Nelson Stud Welding; TPA, TPC, and TPS.

C. Staples: Outward-clinching insulation staples, nominal 3/4-inch wide, stainless steel or Monel.

2.8 CORNER ANGLES

- A. PVC Corner Angles: 30 mils thick, minimum 1 by 1 inch, PVC according to ASTM D 1784, Class 16354-C. White or color-coded to match adjacent surface.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions for compliance with requirements for installation and other conditions affecting performance of insulation application.
 - 1. Verify that systems and equipment to be insulated have been tested and are free of defects.
 - 2. Verify that surfaces to be insulated are clean and dry.
 - 3. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.
- B. Coordinate insulation installation with the trade installing heat tracing. Comply with requirements for heat tracing that apply to insulation.
- C. Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless-steel surfaces, use demineralized water.

3.3 GENERAL INSTALLATION REQUIREMENTS

- A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of equipment, ducts and fittings, and piping including fittings, valves, and specialties.
- B. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of equipment, duct system, and pipe system as specified in insulation system schedules.
- C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.
- D. Install insulation with longitudinal seams at top and bottom of horizontal runs.
- E. Install multiple layers of insulation with longitudinal and end seams staggered.
- F. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.
- G. Keep insulation materials dry during application and finishing.
- H. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.
- I. Install insulation with least number of joints practical.

- J. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.
1. Install insulation continuously through hangers and around anchor attachments.
 2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
 3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
 4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.
- K. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.
- L. Install insulation with factory-applied jackets as follows:
1. Draw jacket tight and smooth.
 2. Cover circumferential joints with 3-inch wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches o.c.
 3. Overlap jacket longitudinal seams at least 1-1/2 inches. Install insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 2 inches o.c.
 - a. For below ambient services, apply vapor-barrier mastic over staples.
 4. Cover joints and seams with tape as recommended by insulation material manufacturer to maintain vapor seal.
 5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to duct and pipe flanges and fittings.
- M. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.
- N. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.
- O. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.
- P. For above ambient services, do not install insulation to the following:
1. Vibration-control devices.
 2. Testing agency labels and stamps.
 3. Nameplates and data plates.
 4. Manholes.
 5. Handholes.
 6. Cleanouts.

3.4 PENETRATIONS

- A. Insulation Installation at Roof Penetrations: Install insulation continuously through roof penetrations.
1. Seal penetrations with flashing sealant.
 2. For applications requiring only indoor insulation, terminate insulation above roof surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
 3. Extend jacket of outdoor insulation outside roof flashing at least 2 inches below top of roof flashing.
 4. Seal jacket to roof flashing with flashing sealant.
- B. Insulation Installation at Aboveground Exterior Wall Penetrations: Install insulation continuously through wall penetrations.
1. Seal penetrations with flashing sealant.
 2. For applications requiring only indoor insulation, terminate insulation inside wall surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
 3. Extend jacket of outdoor insulation outside wall flashing and overlap wall flashing at least 2 inches.
 4. Seal jacket to wall flashing with flashing sealant.
- C. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.
- D. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Install insulation continuously through penetrations of fire-rated walls and partitions. Terminate insulation at fire damper sleeves for fire-rated wall and partition penetrations. Externally insulate damper sleeves to match adjacent insulation and overlap duct insulation at least 2 inches.
1. Comply with requirements in Division 07 Section "Penetration Firestopping"irestopping and fire-resistive joint sealers.
- E. Insulation Installation at Floor Penetrations:
1. Duct: Install insulation continuously through floor penetrations that are not fire rated. For penetrations through fire-rated assemblies, terminate insulation at fire damper sleeves and externally insulate damper sleeve beyond floor to match adjacent duct insulation. Overlap damper sleeve and duct insulation at least 2 inches.
 2. Pipe: Install insulation continuously through floor penetrations.
 3. Seal penetrations through fire-rated assemblies. Comply with requirements in Division 07 Section "Penetration Firestopping."

3.5 GENERAL PIPE INSULATION INSTALLATION

- A. Requirements in this article generally apply to all insulation materials except where more specific requirements are specified in various pipe insulation material installation articles.
- B. Insulation Installation on Fittings, Valves, Strainers, Flanges, and Unions:
1. Install insulation over fittings, valves, strainers, flanges, unions, and other specialties with continuous thermal and vapor-retarder integrity, unless otherwise indicated.
 2. Insulate pipe elbows using preformed fitting insulation or mitered fittings made from same material and density as adjacent pipe insulation. Each piece shall be butted tightly against adjoining piece and bonded with adhesive. Fill joints, seams, voids, and irregular surfaces with insulating cement finished to a smooth, hard, and uniform contour that is uniform with adjoining pipe insulation.
 3. Insulate tee fittings with preformed fitting insulation or sectional pipe insulation of same material and thickness as used for adjacent pipe. Cut sectional pipe insulation to fit. Butt each section closely to the next and hold in place with tie wire. Bond pieces with adhesive.
 4. Insulate valves using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. For valves, insulate up to and including the bonnets, valve stuffing-box studs, bolts, and nuts. Fill joints, seams, and irregular surfaces with insulating cement.
 5. Insulate strainers using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. Fill joints, seams, and irregular surfaces with insulating cement. Insulate strainers so strainer basket flange or plug can be easily removed and replaced without damaging the insulation and jacket. Provide a removable reusable insulation cover. For below ambient services, provide a design that maintains vapor barrier.
 6. Insulate flanges and unions using a section of oversized preformed pipe insulation. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker.
 7. Cover segmented insulated surfaces with a layer of finishing cement and coat with a mastic. Install vapor-barrier mastic for below ambient services and a breather mastic for above ambient services. Reinforce the mastic with fabric-reinforcing mesh. Trowel the mastic to a smooth and well-shaped contour.
 8. For services not specified to receive a field-applied jacket except for flexible elastomeric and polyolefin, install fitted PVC cover over elbows, tees, strainers, valves, flanges, and unions. Terminate ends with PVC end caps. Tape PVC covers to adjoining insulation facing using PVC tape.
 9. Stencil or label the outside insulation jacket of each union with the word "UNION." Match size and color of pipe labels.
- C. Insulate instrument connections for thermometers, pressure gages, pressure temperature taps, test connections, flow meters, sensors, switches, and transmitters on insulated pipes, vessels, and equipment. Shape insulation at these connections by tapering it to and around the connection with insulating cement and finish with finishing cement, mastic, and flashing sealant.

- D. Install removable insulation covers at locations indicated. Installation shall conform to the following:
1. Make removable flange and union insulation from sectional pipe insulation of same thickness as that on adjoining pipe. Install same insulation jacket as adjoining pipe insulation.
 2. When flange and union covers are made from sectional pipe insulation, extend insulation from flanges or union long at least two times the insulation thickness over adjacent pipe insulation on each side of flange or union. Secure flange cover in place with stainless-steel or aluminum bands. Select band material compatible with insulation and jacket.
 3. Construct removable valve insulation covers in same manner as for flanges except divide the two-part section on the vertical center line of valve body.
 4. When covers are made from block insulation, make two halves, each consisting of mitered blocks wired to stainless-steel fabric. Secure this wire frame, with its attached insulation, to flanges with tie wire. Extend insulation at least 2 inches over adjacent pipe insulation on each side of valve. Fill space between flange or union cover and pipe insulation with insulating cement. Finish cover assembly with insulating cement applied in two coats. After first coat is dry, apply and trowel second coat to a smooth finish.
 5. Unless a PVC jacket is indicated in field-applied jacket schedules, finish exposed surfaces with a metal jacket.

3.6 FLEXIBLE ELASTOMERIC INSULATION INSTALLATION

- A. Seal longitudinal seams and end joints with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.
- B. Insulation Installation on Pipe Flanges:
1. Install pipe insulation to outer diameter of pipe flange.
 2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
 3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of sheet insulation of same thickness as pipe insulation.
 4. Secure insulation to flanges and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.
- C. Insulation Installation on Pipe Fittings and Elbows:
1. Install mitered sections of pipe insulation.
 2. Secure insulation materials and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.
- D. Insulation Installation on Valves and Pipe Specialties:
1. Install preformed valve covers manufactured of same material as pipe insulation when available.
 2. When preformed valve covers are not available, install cut sections of pipe and sheet insulation to valve body. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.

3. Install insulation to flanges as specified for flange insulation application.
4. Secure insulation to valves and specialties and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

3.7 MINERAL-FIBER INSULATION INSTALLATION

A. Insulation Installation on Straight Pipes and Tubes:

1. Secure each layer of preformed pipe insulation to pipe with wire or bands and tighten bands without deforming insulation materials.
2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
3. For insulation with factory-applied jackets on above ambient surfaces, secure laps with outward clinched staples at 6 inches o.c.
4. For insulation with factory-applied jackets on below ambient surfaces, do not staple longitudinal tabs but secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.

B. Insulation Installation on Pipe Flanges:

1. Install preformed pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with mineral-fiber blanket insulation.
4. Install jacket material with manufacturer's recommended adhesive, overlap seams at least 1 inch, and seal joints with flashing sealant.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install preformed sections of same material as straight segments of pipe insulation when available.
2. When preformed insulation elbows and fittings are not available, install mitered sections of pipe insulation, to a thickness equal to adjoining pipe insulation. Secure insulation materials with wire or bands.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed sections of same material as straight segments of pipe insulation when available.
2. When preformed sections are not available, install mitered sections of pipe insulation to valve body.
3. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
4. Install insulation to flanges as specified for flange insulation application.

E. Blanket Insulation Installation on Ducts and Plenums: Secure with adhesive and insulation pins.

1. Apply adhesives according to manufacturer's recommended coverage rates per unit area, for 100 percent coverage of duct and plenum surfaces.
 2. Apply adhesive to entire circumference of ducts and to all surfaces of fittings and transitions.
 3. Install capacitor-discharge-weld pins and speed washers on sides and bottom of horizontal ducts and sides of vertical ducts as follows:
 - a. On duct sides with dimensions 18 inches and smaller, place pins along longitudinal centerline of duct. Space 3 inches maximum from insulation end joints, and 16 inches o.c.
 - b. On duct sides with dimensions larger than 18 inches, place pins 16 inches o.c. each way, and 3 inches maximum from insulation joints. Install additional pins to hold insulation tightly against surface at cross bracing.
 - c. Pins may be omitted from top surface of horizontal, rectangular ducts and plenums.
 - d. Do not overcompress insulation during installation.
 - e. Impale insulation over pins and attach speed washers.
 - f. Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation facing.
 4. For ducts and plenums with surface temperatures below ambient, install a continuous unbroken vapor barrier. Create a facing lap for longitudinal seams and end joints with insulation by removing 2 inches from 1 edge and 1 end of insulation segment. Secure laps to adjacent insulation section with 1/2-inch outward-clinching staples, 1 inch o.c. Install vapor barrier consisting of factory- or field-applied jacket, adhesive, vapor-barrier mastic, and sealant at joints, seams, and protrusions.
 - a. Repair punctures, tears, and penetrations with tape or mastic to maintain vapor-barrier seal.
 - b. Install vapor stops for ductwork and plenums operating below 50 deg F at 18-foot intervals. Vapor stops shall consist of vapor-barrier mastic applied in a Z-shaped pattern over insulation face, along butt end of insulation, and over the surface. Cover insulation face and surface to be insulated a width equal to 2 times the insulation thickness but not less than 3 inches.
 5. Overlap unfaced blankets a minimum of 2 inches on longitudinal seams and end joints. At end joints, secure with steel bands spaced a maximum of 18 inches o.c.
 6. Install insulation on rectangular duct elbows and transitions with a full insulation section for each surface. Install insulation on round and flat-oval duct elbows with individually mitered gores cut to fit the elbow.
 7. Insulate duct stiffeners, hangers, and flanges that protrude beyond insulation surface with 6-inch- wide strips of same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with pins spaced 6 inches o.c.
- F. Board Insulation Installation on Ducts and Plenums: Secure with adhesive and insulation pins.
1. Apply adhesives according to manufacturer's recommended coverage rates per unit area, for 100 percent coverage of duct and plenum surfaces.
 2. Apply adhesive to entire circumference of ducts and to all surfaces of fittings and transitions.

3. Install either capacitor-discharge-weld pins and speed washers or cupped-head, capacitor-discharge-weld pins on sides and bottom of horizontal ducts and sides of vertical ducts as follows:
 - a. On duct sides with dimensions 18 inches and smaller, place pins along longitudinal centerline of duct. Space 3 inches maximum from insulation end joints, and 16 inches o.c.
 - b. On duct sides with dimensions larger than 18 inches, space pins 16 inches o.c. each way, and 3 inches maximum from insulation joints. Install additional pins to hold insulation tightly against surface at cross bracing.
 - c. Pins may be omitted from top surface of horizontal, rectangular ducts and plenums.
 - d. Do not overcompress insulation during installation.
 - e. Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation facing.
4. For ducts and plenums with surface temperatures below ambient, install a continuous unbroken vapor barrier. Create a facing lap for longitudinal seams and end joints with insulation by removing 2 inches from 1 edge and 1 end of insulation segment. Secure laps to adjacent insulation section with 1/2-inch outward-clinching staples, 1 inch o.c. Install vapor barrier consisting of factory- or field-applied jacket, adhesive, vapor-barrier mastic, and sealant at joints, seams, and protrusions.
 - a. Repair punctures, tears, and penetrations with tape or mastic to maintain vapor-barrier seal.
 - b. Install vapor stops for ductwork and plenums operating below 50 deg F at 18-foot intervals. Vapor stops shall consist of vapor-barrier mastic applied in a Z-shaped pattern over insulation face, along butt end of insulation, and over the surface. Cover insulation face and surface to be insulated a width equal to 2 times the insulation thickness but not less than 3 inches.
5. Install insulation on rectangular duct elbows and transitions with a full insulation section for each surface. Groove and score insulation to fit as closely as possible to outside and inside radius of elbows. Install insulation on round and flat-oval duct elbows with individually mitered gores cut to fit the elbow.
6. Insulate duct stiffeners, hangers, and flanges that protrude beyond insulation surface with 6-inch- wide strips of same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with pins spaced 6 inches o.c.

3.8 FIELD-APPLIED JACKET INSTALLATION

- A. Where PVC jackets are indicated, install with 1-inch overlap at longitudinal seams and end joints; for horizontal applications, install with longitudinal seams along top and bottom of tanks and vessels. Seal with manufacturer's recommended adhesive.
 1. Apply two continuous beads of adhesive to seams and joints, one bead under lap and the finish bead along seam and joint edge.

3.9 DUCT INSULATION SCHEDULE, GENERAL

A. Plenums and Ducts Requiring Insulation:

1. Indoor, concealed supply and outdoor air.
2. Indoor, exposed supply and outdoor air.
3. Indoor, concealed return located in unconditioned space.
4. Indoor, exposed return located in unconditioned space.
5. Indoor, concealed, Type I, commercial, kitchen hood exhaust.
6. Indoor, exposed, Type I, commercial, kitchen hood exhaust.
7. Indoor, concealed oven and warewash exhaust.
8. Indoor, exposed oven and warewash exhaust.
9. Indoor, concealed exhaust between isolation damper and penetration of building exterior.
10. Indoor, exposed exhaust between isolation damper and penetration of building exterior.
11. Outdoor, concealed supply and return.
12. Outdoor, exposed supply and return.

B. Items Not Insulated:

1. Fibrous-glass ducts.
2. Metal ducts with duct liner of sufficient thickness to comply with energy code and ASHRAE/IESNA 90.1.
3. Factory-insulated flexible ducts.
4. Factory-insulated plenums and casings.
5. Flexible connectors.
6. Vibration-control devices.
7. Factory-insulated access panels and doors.

3.10 INDOOR DUCT AND PLENUM INSULATION SCHEDULE

A. Concealed, medium pressure, supply-air duct insulation shall be the following:

1. Mineral-Fiber Blanket: 2 inches nominal density.

B. Concealed, low pressure, supply-air duct insulation shall be the following:

1. Mineral-Fiber Blanket: 2 inches nominal density.

C. Concealed, transfer / return -air duct insulation shall be the following:

1. Duct Liner: 1 inches nominal density.

3.11 PIPING INSULATION SCHEDULE, GENERAL

A. Acceptable preformed pipe and tubular insulation materials and thicknesses are identified for each piping system and pipe size range. If more than one material is listed for a piping system, selection from materials listed is Contractor's option.

B. Items Not Insulated: Unless otherwise indicated, do not install insulation on the following:

1. Drainage piping located in crawl spaces.
2. Underground piping.
3. Chrome-plated pipes and fittings unless there is a potential for personnel injury.

3.12 INDOOR PIPING INSULATION SCHEDULE

A. Heating-Hot-Water Supply and Return, 200 Deg F and Below:

1. NPS 1-1/4 and Smaller: Insulation shall be the following:
 - a. Mineral-Fiber, Preformed Pipe, Type I: 1-1/2 inch thick.
2. NPS 1-1/2 and Larger: Insulation shall be the following:
 - a. Mineral-Fiber, Preformed Pipe, Type I: 2 inch thick.

3.13 INDOOR, FIELD-APPLIED JACKET SCHEDULE

- A. Install jacket over insulation material. For insulation with factory-applied jacket, install the field-applied jacket over the factory-applied jacket.
- B. If more than one material is listed, selection from materials listed is Contractor's option.
- C. Ducts and Plenums, Concealed:
 1. None.
- D. Ducts and Plenums, Exposed:
 1. None.
- E. Equipment, Concealed:
 1. None.
- F. Equipment, Exposed, up to 48 Inches in Diameter or with Flat Surfaces up to 72 Inches:
 1. None.
- G. Equipment, Exposed, Larger Than 48 Inches in Diameter or with Flat Surfaces Larger Than 72 Inches:
 1. None.
- H. Piping, Concealed:
 1. None.
- I. Piping, Exposed:

1. None.

END OF SECTION 230700

SECTION 233113 - METAL DUCTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Single-wall rectangular ducts and fittings.
 - 2. Single-wall round ducts and fittings.
 - 3. Sheet metal materials.
 - 4. Sealants and gaskets.
 - 5. Hangers and supports.

1.3 PERFORMANCE REQUIREMENTS

- A. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1-2004.

1.4 INFORMATIONAL SUBMITTALS

- A. Product Data: For each type of the following products:
 - 1. Liners and adhesives.
 - 2. Sealants and gaskets.
- B. Coordination Drawings: Plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
 - 1. Duct installation in congested spaces, indicating coordination with general construction, building components, and other building services. Indicate proposed changes to duct layout.
 - 2. Suspended ceiling components.
 - 3. Structural members to which duct will be attached.
 - 4. Size and location of initial access modules for acoustical tile.
 - 5. Penetrations of smoke barriers and fire-rated construction.
 - 6. Items penetrating finished ceiling including the following:
 - a. Lighting fixtures.
 - b. Air outlets and inlets.
 - c. Speakers.

- d. Sprinklers.
 - e. Access panels.
 - f. Perimeter moldings.
- C. Welding certificates.
- D. Field quality-control reports.

1.5 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel according to the following:
- 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel," for hangers and supports.
 - 2. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum," for aluminum supports.
 - 3. AWS D9.1M/D9.1, "Sheet Metal Welding Code," for duct joint and seam welding.

PART 2 - PRODUCTS

2.1 SINGLE-WALL RECTANGULAR DUCTS AND FITTINGS

- A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" based on indicated static-pressure class unless otherwise indicated.
- B. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 1-4, "Transverse (Girth) Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
- C. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 1-5, "Longitudinal Seams - Rectangular Ducts," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
- D. Elbows, Transitions, Offsets, Branch Connections, and Other Duct Construction: Select types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 2, "Fittings and Other Construction," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

2.2 SINGLE-WALL ROUND DUCTS AND FITTINGS

- A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 3, "Round, Oval, and Flexible Duct," based on indicated static-pressure class unless otherwise indicated.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Lindab Inc.
 - b. McGill AirFlow LLC.
 - c. SEMCO Incorporated.
 - d. Sheet Metal Connectors, Inc.
 - e. Spiral Manufacturing Co., Inc.
- B. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-2, "Transverse Joints - Round Duct," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
- C. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-1, "Seams - Round Duct and Fittings," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
 1. Fabricate round ducts larger than 90 inches in diameter with butt-welded longitudinal seams.
 2. Fabricate flat-oval ducts larger than 72 inches in width (major dimension) with butt-welded longitudinal seams.
- D. Tees and Laterals: Select types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-4, "90 Degree Tees and Laterals," and Figure 3-5, "Conical Tees," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

2.3 SHEET METAL MATERIALS

- A. General Material Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.
- B. Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.
 1. Galvanized Coating Designation: G90.
 2. Finishes for Surfaces Exposed to View: Mill phosphatized.
- C. Stainless-Steel Sheets: Comply with ASTM A 480/A 480M, Type 304 or 316, as indicated in the "Duct Schedule" Article; cold rolled, annealed, sheet. Exposed surface finish shall be No. 2B, No. 2D, No. 3, or No. 4 as indicated in the "Duct Schedule" Article.
- D. Reinforcement Shapes and Plates: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.

1. Where black- and galvanized-steel shapes and plates are used to reinforce aluminum ducts, isolate the different metals with butyl rubber, neoprene, or EPDM gasket materials.
- E. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

2.4 SEALANT AND GASKETS

- A. General Sealant and Gasket Requirements: Surface-burning characteristics for sealants and gaskets shall be a maximum flame-spread index of 25 and a maximum smoke-developed index of 50 when tested according to UL 723; certified by an NRTL.
- B. Two-Part Tape Sealing System:
 1. Tape: Woven cotton fiber impregnated with mineral gypsum and modified acrylic/silicone activator to react exothermically with tape to form hard, durable, airtight seal.
 2. Tape Width: 3 inches.
 3. Sealant: Modified styrene acrylic.
 4. Water resistant.
 5. Mold and mildew resistant.
 6. Maximum Static-Pressure Class: 10-inch wg, positive and negative.
 7. Service: Indoor and outdoor.
 8. Service Temperature: Minus 40 to plus 200 deg F.
 9. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum.
 10. For indoor applications, use sealant that has a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- C. Water-Based Joint and Seam Sealant:
 1. Application Method: Brush on.
 2. Solids Content: Minimum 65 percent.
 3. Shore A Hardness: Minimum 20.
 4. Water resistant.
 5. Mold and mildew resistant.
 6. VOC: Maximum 75 g/L (less water).
 7. Maximum Static-Pressure Class: 10-inch wg, positive and negative.
 8. Service: Indoor or outdoor.
 9. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum sheets.
- D. Solvent-Based Joint and Seam Sealant:
 1. Application Method: Brush on.
 2. Base: Synthetic rubber resin.
 3. Solvent: Toluene and heptane.
 4. Solids Content: Minimum 60 percent.
 5. Shore A Hardness: Minimum 60.
 6. Water resistant.

7. Mold and mildew resistant.
8. For indoor applications, use sealant that has a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
9. VOC: Maximum 395 g/L.
10. Maximum Static-Pressure Class: 10-inch wg, positive or negative.
11. Service: Indoor or outdoor.
12. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum sheets.

E. Flanged Joint Sealant: Comply with ASTM C 920.

1. General: Single-component, acid-curing, silicone, elastomeric.
2. Type: S.
3. Grade: NS.
4. Class: 25.
5. Use: O.
6. For indoor applications, use sealant that has a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

F. Flange Gaskets: Butyl rubber, neoprene, or EPDM polymer with polyisobutylene plasticizer.

G. Round Duct Joint O-Ring Seals:

1. Seal shall provide maximum leakage class of 3 cfm/100 sq. ft. at 1-inch wg and shall be rated for 10-inch wg static-pressure class, positive or negative.
2. EPDM O-ring to seal in concave bead in coupling or fitting spigot.
3. Double-lipped, EPDM O-ring seal, mechanically fastened to factory-fabricated couplings and fitting spigots.

2.5 HANGERS AND SUPPORTS

- A. Hanger Rods for Noncorrosive Environments: Cadmium-plated steel rods and nuts.
- B. Hanger Rods for Corrosive Environments: Electrogalvanized, all-thread rods or galvanized rods with threads painted with zinc-chromate primer after installation.
- C. Strap and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," [Table 4-1](#), "Rectangular Duct Hangers Minimum Size," and [Table 4-2](#), "Minimum Hanger Sizes for Round Duct."
- D. Steel Cables for Galvanized-Steel Ducts: Galvanized steel complying with ASTM A 603.
- E. Steel Cables for Stainless-Steel Ducts: Stainless steel complying with ASTM A 492.
- F. Steel Cable End Connections: Cadmium-plated steel assemblies with brackets, swivel, and bolts designed for duct hanger service; with an automatic-locking and clamping device.
- G. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.

H. Trapeze and Riser Supports:

1. Supports for Galvanized-Steel Ducts: Galvanized-steel shapes and plates.
2. Supports for Stainless-Steel Ducts: Stainless-steel shapes and plates.
3. Supports for Aluminum Ducts: Aluminum or galvanized steel coated with zinc chromate.

PART 3 - EXECUTION

3.1 DUCT INSTALLATION

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of duct system. Indicated duct locations, configurations, and arrangements were used to size ducts and calculate friction loss for air-handling equipment sizing and for other design considerations. Install duct systems as indicated unless deviations to layout are approved on Shop Drawings and Coordination Drawings.
- B. Install ducts according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" unless otherwise indicated.
- C. Install round ducts in maximum practical lengths.
- D. Install ducts with fewest possible joints.
- E. Install factory- or shop-fabricated fittings for changes in direction, size, and shape and for branch connections.
- F. Unless otherwise indicated, install ducts vertically and horizontally, and parallel and perpendicular to building lines.
- G. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.
- H. Install ducts with a clearance of 1 inch, plus allowance for insulation thickness.
- I. Route ducts to avoid passing through transformer vaults and electrical equipment rooms and enclosures.
- J. Where ducts pass through non-fire-rated interior partitions and exterior walls and are exposed to view, cover the opening between the partition and duct or duct insulation with sheet metal flanges of same metal thickness as the duct with sound caulk. Overlap openings on four sides by at least 1-1/2 inches.
- K. Where ducts pass through fire-rated interior partitions and exterior walls, install fire dampers. Comply with requirements in Division 23 Section "Air Duct Accessories" for fire and smoke dampers.
- L. Protect duct interiors from moisture, construction debris and dust, and other foreign materials.

3.2 INSTALLATION OF EXPOSED DUCTWORK

- A. Protect ducts exposed in finished spaces from being dented, scratched, or damaged.
- B. Trim duct sealants flush with metal. Create a smooth and uniform exposed bead. Do not use two-part tape sealing system.
- C. Grind welds to provide smooth surface free of burrs, sharp edges, and weld splatter. When welding stainless steel with a No. 3 or 4 finish, grind the welds flush, polish the exposed welds, and treat the welds to remove discoloration caused by welding.
- D. Maintain consistency, symmetry, and uniformity in the arrangement and fabrication of fittings, hangers and supports, duct accessories, and air outlets.
- E. Repair or replace damaged sections and finished work that does not comply with these requirements.

3.3 DUCT SEALING

- A. Seal ducts for duct static-pressure, seal classes, and leakage classes specified in "Duct Schedule" Article according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

3.4 HANGER AND SUPPORT INSTALLATION

- A. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 4, "Hangers and Supports."
- B. Building Attachments: Concrete inserts, powder-actuated fasteners, or structural-steel fasteners appropriate for construction materials to which hangers are being attached.
 - 1. Where practical, install concrete inserts before placing concrete.
 - 2. Install powder-actuated concrete fasteners after concrete is placed and completely cured.
 - 3. Use powder-actuated concrete fasteners for standard-weight aggregate concretes or for slabs more than 4 inches thick.
 - 4. Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes or for slabs less than 4 inches thick.
 - 5. Do not use powder-actuated concrete fasteners for seismic restraints.
- C. Hanger Spacing: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 4-1, "Rectangular Duct Hangers Minimum Size," and Table 4-2, "Minimum Hanger Sizes for Round Duct," for maximum hanger spacing; install hangers and supports within 24 inches of each elbow and within 48 inches of each branch intersection.
- D. Hangers Exposed to View: Threaded rod and angle or channel supports.
- E. Support vertical ducts with steel angles or channel secured to the sides of the duct with welds, bolts, sheet metal screws, or blind rivets; support at each floor and at a maximum intervals of 16 feet.

- F. Install upper attachments to structures. Select and size upper attachments with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

3.5 CONNECTIONS

- A. Make connections to equipment with flexible connectors complying with Division 23 Section "Air Duct Accessories."
- B. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for branch, outlet and inlet, and terminal unit connections.

3.6 PAINTING

- A. Paint interior of metal ducts that are visible through registers and grilles and that do not have duct liner. Apply one coat of flat, black, latex paint over a compatible galvanized-steel primer. Paint materials and application requirements are specified in Division 09 painting Sections.
- B. Provide paint grip ductwork in all exposed ceilings.

3.7 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Leakage Tests:
 - 1. Comply with SMACNA's "HVAC Air Duct Leakage Test Manual." Submit a test report for each test.
 - 2. Test the following systems:
 - a. Ducts with a Pressure Class Higher Than 3-Inch wg: Test representative duct sections totaling no less than 25 percent of total installed duct area for each designated pressure class.
 - 3. Disassemble, reassemble, and seal segments of systems to accommodate leakage testing and for compliance with test requirements.
 - 4. Test for leaks before applying external insulation.
 - 5. Conduct tests at static pressures equal to maximum design pressure of system or section being tested. If static-pressure classes are not indicated, test system at maximum system design pressure. Do not pressurize systems above maximum design operating pressure.
- C. Duct system will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports.

3.8 START UP

- A. Air Balance: Comply with requirements in Division 23 Section "Testing, Adjusting, and Balancing for HVAC."

3.9 DUCT SCHEDULE

A. Supply Ducts:

1. Ducts Connected to Air Terminal Units:
 - a. Pressure Class: Positive 2-inch wg.
 - b. Minimum SMACNA Seal Class: A.
 - c. SMACNA Leakage Class for Rectangular: 3.
 - d. SMACNA Leakage Class for Round and Flat Oval: 3.
2. Ducts Connected to Variable-Air-Volume Air-Handling Units:
 - a. Pressure Class: Positive 4-inch wg.
 - b. Minimum SMACNA Seal Class: A.
 - c. SMACNA Leakage Class for Rectangular: 3.
 - d. SMACNA Leakage Class for Round and Flat Oval: 3.

B. Return Ducts:

- a. Pressure Class: Positive or negative 2-inch wg.
- b. Minimum SMACNA Seal Class: B.
- c. SMACNA Leakage Class for Rectangular: 6.
- d. SMACNA Leakage Class for Round and Flat Oval: 6.

C. Exhaust Ducts:

1. Ducts Connected to Fans Exhausting (ASHRAE 62.1, Class 1 and 2) Air:
 - a. Pressure Class: Negative 2-inch wg.
 - b. Minimum SMACNA Seal Class: C if negative pressure, and A if positive pressure.
 - c. SMACNA Leakage Class for Rectangular: 12.
 - d. SMACNA Leakage Class for Round and Flat Oval: 6.

D. Liner:

1. Return Air Ducts: Flexible elastomeric, 1 inch thick.
2. Transfer Ducts: Flexible elastomeric, 1 inch thick.

E. Elbow Configuration:

1. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-2, "Rectangular Elbows."
 - a. Velocity 1000 fpm or Lower:
 - 1) Radius Type RE 1 with minimum 0.5 radius-to-diameter ratio.
 - 2) Mitered Type RE 4 without vanes.
 - b. Velocity 1000 to 1500 fpm:

- 1) Radius Type RE 1 with minimum 1.0 radius-to-diameter ratio.
 - 2) Radius Type RE 3 with minimum 0.5 radius-to-diameter ratio and two vanes.
 - 3) Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-3, "Vanes and Vane Runners," and Figure 2-4, "Vane Support in Elbows."
- c. Velocity 1500 fpm or Higher:
- 1) Radius Type RE 1 with minimum 1.5 radius-to-diameter ratio.
 - 2) Radius Type RE 3 with minimum 1.0 radius-to-diameter ratio and two vanes.
 - 3) Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-3, "Vanes and Vane Runners," and Figure 2-4, "Vane Support in Elbows."
2. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-2, "Rectangular Elbows."
- a. Radius Type RE 1 with minimum 1.5 radius-to-diameter ratio.
 - b. Radius Type RE 3 with minimum 1.0 radius-to-diameter ratio and two vanes.
 - c. Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-3, "Vanes and Vane Runners," and Figure 2-4, "Vane Support in Elbows."
3. Round Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-3, "Round Duct Elbows."
- a. Minimum Radius-to-Diameter Ratio and Elbow Segments: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 3-1, "Mitered Elbows." Elbows with less than 90-degree change of direction have proportionately fewer segments.
 - 1) Velocity 1000 fpm or Lower: 0.5 radius-to-diameter ratio and three segments for 90-degree elbow.
 - 2) Velocity 1000 to 1500 fpm: 1.0 radius-to-diameter ratio and four segments for 90-degree elbow.
 - 3) Velocity 1500 fpm or Higher: 1.5 radius-to-diameter ratio and five segments for 90-degree elbow.
 - 4) Radius-to Diameter Ratio: 1.5.
 - b. Round Elbows, 12 Inches and Smaller in Diameter: Stamped or pleated.
 - c. Round Elbows, 14 Inches and Larger in Diameter: Standing seam.
- F. Branch Configuration:
1. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-6, "Branch Connections."
 - a. Rectangular Main to Rectangular Branch: 45-degree entry.
 - b. Rectangular Main to Round Branch: Spin in.

2. Round and Flat Oval: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-4, "90 Degree Tees and Laterals," and Figure 3-5, "Conical Tees." Saddle taps are permitted in existing duct.
 - a. Velocity 1000 fpm or Lower: 90-degree tap.
 - b. Velocity 1000 to 1500 fpm: Conical tap.
 - c. Velocity 1500 fpm or Higher: 45-degree lateral.

END OF SECTION 233113

SECTION 233300 - AIR DUCT ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Manual volume dampers.
 - 2. Turning vanes.
 - 3. Access doors

1.3 INFORMATIONAL SUBMITTALS

- A. Product Data: For each type of product.
 - 1. For duct silencers, include pressure drop and dynamic insertion loss data. Include breakout noise calculations for high transmission loss casings.
- B. Shop Drawings: For duct accessories. Include plans, elevations, sections, details and attachments to other work.
 - 1. Detail duct accessories fabrication and installation in ducts and other construction. Include dimensions, weights, loads, and required clearances; and method of field assembly into duct systems and other construction. Include the following:
 - a. Special fittings.
 - b. Manual volume damper installations.
 - c. Control-damper installations.
 - d. Fire-damper, smoke-damper, combination fire- and smoke-damper, ceiling, and corridor damper installations, including sleeves; and duct-mounted access doors and remote damper operators.
 - e. Duct security bars.
 - f. Wiring Diagrams: For power, signal, and control wiring.

1.4 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which ceiling-mounted access panels and access doors required for access to duct accessories are shown and coordinated with each other, using input from Installers of the items involved.
- B. Source quality-control reports.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For air duct accessories to include in operation and maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Fusible Links: Furnish quantity equal to 10 percent of amount installed.

PART 2 - PRODUCTS

2.1 ASSEMBLY DESCRIPTION

- A. Comply with NFPA 90A, "Installation of Air Conditioning and Ventilating Systems," and with NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."
- B. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.

2.2 MATERIALS

- A. Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.
 - 1. Galvanized Coating Designation: G90.
 - 2. Exposed-Surface Finish: Mill phosphatized.
- B. Aluminum Sheets: Comply with ASTM B 209 (ASTM B 209M), Alloy 3003, Temper H14; with mill finish for concealed ducts and standard, 1-side bright finish for exposed ducts.
- C. Extruded Aluminum: Comply with ASTM B 221 (ASTM B 221M), Alloy 6063, Temper T6.
- D. Reinforcement Shapes and Plates: Galvanized-steel reinforcement where installed on galvanized sheet metal ducts; compatible materials for aluminum and stainless-steel ducts.
- E. Tie Rods: Galvanized steel, 1/4-inch (6-mm) minimum diameter for lengths 36 inches (900 mm) or less; 3/8-inch (10-mm) minimum diameter for lengths longer than 36 inches (900 mm).

2.3 MANUAL VOLUME DAMPERS

- A. Manufacturers:
 - 1. Air Balance, Inc.

2. METALAIRE, Inc.
 3. Nailor Industries Inc.
 4. Penn Ventilation Company, Inc.
 5. Ruskin Company.
 6. Vent Products Company, Inc.
- B. General Description: Factory fabricated, with required hardware and accessories. Stiffen damper blades for stability. Include locking device to hold single-blade dampers in a fixed position without vibration. Close duct penetrations for damper components to seal duct consistent with pressure class.
1. Pressure Classes of 3-Inch wg or Higher: End bearings or other seals for ducts with axles full length of damper blades and bearings at both ends of operating shaft.
- C. Standard Volume Dampers: Multiple- or single-blade, parallel- or opposed-blade design as indicated, standard leakage rating, with linkage outside airstream, and suitable for horizontal or vertical applications.
1. Steel Frames: Hat-shaped, galvanized sheet steel channels, minimum of 0.064 inch thick, with mitered and welded corners; frames with flanges where indicated for attaching to walls and flangeless frames where indicated for installing in ducts.
 2. Roll-Formed Steel Blades: 0.064-inch- thick, galvanized sheet steel.
 3. Blade Axles: Galvanized steel.
 4. Bearings: Stainless-steel sleeve.
 5. Tie Bars and Brackets: Galvanized steel.
- D. Jackshaft: 1-inch- diameter, galvanized-steel pipe rotating within pipe-bearing assembly mounted on supports at each mullion and at each end of multiple-damper assemblies.
1. Length and Number of Mountings: Appropriate to connect linkage of each damper in multiple-damper assembly.
- E. Damper Hardware: Zinc-plated, die-cast core with dial and handle made of 3/32-inch- thick zinc-plated steel, and a 3/4-inch hexagon locking nut. Include center hole to suit damper operating-rod size. Include elevated platform for insulated duct mounting.
- F. Provide volume dampers at all supply/return/exhaust diffuser locations.
- 2.4 TURNING VANES
- A. Fabricate to comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for vanes and vane runners. Vane runners shall automatically align vanes.
- B. Manufactured Turning Vanes: Fabricate 1-1/2-inch- wide, single-vane, curved blades of galvanized sheet steel set 3/4 inch o.c.; support with bars perpendicular to blades set 2 inches o.c.; and set into vane runners suitable for duct mounting.
1. Manufacturers:
 - a. Ductmate Industries, Inc.

- b. Duro Dyne Corp.
- c. METALAIRE, Inc.
- d. Ward Industries, Inc.

2.5 DUCT-MOUNTED ACCESS DOORS

- A. General Description: Fabricate doors airtight and suitable for duct pressure class.
- B. Door: Double wall, duct mounting, and rectangular; fabricated of galvanized sheet metal with insulation fill and thickness as indicated for duct pressure class. Include vision panel where indicated. Include 1-by-1-inch butt or piano hinge and cam latches.
 - 1. Manufacturers:
 - a. American Warming and Ventilating.
 - b. CESCO Products.
 - c. Ductmate Industries, Inc.
 - d. Flexmaster U.S.A., Inc.
 - e. Greenheck.
 - f. McGill AirFlow Corporation.
 - g. Nailor Industries Inc.
 - h. Ventfabrics, Inc.
 - i. Ward Industries, Inc.
 - 2. Frame: Galvanized sheet steel, with bend-over tabs and foam gaskets.
 - 3. Provide number of hinges and locks as follows:
 - a. Less Than 12 Inches Square: Secure with two sash locks.
 - b. Up to 18 Inches Square: Two hinges and two sash locks.
 - c. Up to 24 by 48 Inches: Three hinges and two compression latches.
 - d. Sizes 24 by 48 Inches and Larger: One additional hinge.
- C. Seal around frame attachment to duct and door to frame with neoprene or foam rubber.
- D. Insulation: 1-inch- thick, fibrous-glass or polystyrene-foam board.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install duct accessories according to applicable details in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for metal ducts and in NAIMA AH116, "Fibrous Glass Duct Construction Standards," for fibrous-glass ducts.
- B. Install duct accessories of materials suited to duct materials; use galvanized-steel accessories in galvanized-steel and fibrous-glass ducts, stainless-steel accessories in stainless-steel ducts, and aluminum accessories in aluminum ducts.

- C. Install volume dampers at points on supply, return, and exhaust systems where branches extend from larger ducts. Where dampers are installed in ducts having duct liner, install dampers with hat channels of same depth as liner, and terminate liner with nosing at hat channel.
 - 1. Install steel volume dampers in steel ducts.
 - 2. Install aluminum volume dampers in aluminum ducts.
- D. Install volume dampers at all ventilation outlets for balancing.
- E. Set dampers to fully open position before testing, adjusting, and balancing.
- F. Install test holes at fan inlets and outlets and elsewhere as indicated.
- G. Install fire dampers according to UL listing.
- H. Install duct access doors on sides of ducts to allow for inspecting, adjusting, and maintaining accessories and equipment at the following locations:
 - 1. On both sides of duct coils.
 - 2. Upstream and downstream from duct filters.
 - 3. At outdoor-air intakes and mixed-air plenums.
 - 4. At drain pans and seals.
 - 5. Downstream from manual volume dampers, control dampers, backdraft dampers, and equipment.
 - 6. Adjacent to and close enough to fire or smoke dampers, to reset or reinstall fusible links. Access doors for access to fire or smoke dampers having fusible links shall be pressure relief access doors and shall be outward operation for access doors installed upstream from dampers and inward operation for access doors installed downstream from dampers.
 - 7. At each change in direction and at maximum 50-foot (15-m) spacing.
 - 8. Upstream[and downstream] from turning vanes.
 - 9. Upstream or downstream from duct silencers.
 - 10. Control devices requiring inspection.
 - 11. Elsewhere as indicated.
- I. Install access doors with swing against duct static pressure.
- J. Access Door Sizes:
 - 1. One-Hand or Inspection Access: 8 by 5 inches
 - 2. Two-Hand Access: 12 by 6 inches
 - 3. Head and Hand Access: 18 by 10 inches
 - 4. Head and Shoulders Access: 21 by 14 inches
 - 5. Body Access: 25 by 14 inches
 - 6. Body plus Ladder Access: 25 by 17 inches
- K. Label access doors according to Section 230553 "Identification for HVAC Piping and Equipment" to indicate the purpose of access door.
- L. For fans developing static pressures of 5-inch wg (1250 Pa) and more, cover flexible connectors with loaded vinyl sheet held in place with metal straps.

- M. Connect terminal units to supply ducts directly or with maximum 12-inch lengths of flexible duct. Do not use flexible ducts to change directions.
- N. Connect diffusers or light troffer boots to ducts directly or with maximum 60-inch lengths of flexible duct clamped or strapped in place.
- O. Install duct test holes where required for testing and balancing purposes.
- P. Install thrust limits at centerline of thrust, symmetrical on both sides of equipment. Attach thrust limits at centerline of thrust and adjust to a maximum of 1/4-inch (6-mm) movement during start and stop of fans.

3.2 FIELD QUALITY CONTROL

- A. Tests and Inspections:
 - 1. Operate dampers to verify full range of movement.
 - 2. Inspect locations of access doors and verify that purpose of access door can be performed.
 - 3. Operate fire, smoke, and combination fire and smoke dampers to verify full range of movement and verify that proper heat-response device is installed.
 - 4. Inspect turning vanes for proper and secure installation.
 - 5. Operate remote damper operators to verify full range of movement of operator and damper.

3.3 ADJUSTING

- A. Final positioning of manual-volume dampers is specified in Division 23 Section "Testing, Adjusting, and Balancing."

END OF SECTION 233300

SECTION 233713 - DIFFUSERS, REGISTERS, AND GRILLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

PART 2 - PRODUCTS

- 2.1 Provided by owner

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas where diffusers, registers, and grilles are to be installed for compliance with requirements for installation tolerances and other conditions affecting performance of equipment.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install diffusers, registers, and grilles level and plumb.
- B. Ceiling-Mounted Outlets and Inlets: Drawings indicate general arrangement of ducts, fittings, and accessories. Air outlet and inlet locations have been indicated to achieve design requirements for air volume, noise criteria, airflow pattern, throw, and pressure drop. Make final locations where indicated, as much as practical. For units installed in lay-in ceiling panels, locate units in the center of panel. Where architectural features or other items conflict with installation, notify Architect for a determination of final location.
- C. Install diffusers, registers, and grilles with airtight connections to ducts and to allow service and maintenance of dampers, air extractors, and fire dampers.

3.3 ADJUSTING

- A. After installation, adjust diffusers, registers, and grilles to air patterns indicated, or as directed, before starting air balancing.

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CORDOGAN CLARK & ASSOCIATES
BID SET

END OF SECTION 233713

SECTION 260100 - BASIC ELECTRICAL MATERIALS AND METHODS

26-1 GENERAL INSTRUCTIONS.

1. All requirements under division one and the general supplementary conditions of these specifications shall be a part of this section. Each contractor shall be responsible for becoming thoroughly familiar with all its contents as to requirements which affect this division or section. The work required under this section includes all material, tools, equipment, appliances, hoisting, excavation, backfill, restoration, and labor required to complete all the work as required by the drawings and specifications or reasonably inferred to be necessary to facilitate each system functioning as indicated by the design and the equipment specified. Total installation is to conform to all codes and standards affecting the work. Coordinate with the owner. The contractor shall do all alterations and rework required for the proper integration of new with existing areas.

2. Inspection of site.

The contractor shall personally inspect the site of the proposed work and become fully informed as to the conditions under which the work is to be done. Use field measurements and observations to prepare bid. Commencement of work infers acceptance of all existing conditions.

3. Material and workmanship.

All material and apparatus shall be new and in first class condition. All material and apparatus shall have markings or nameplate identifying the manufacturer and providing sufficient reference to establish quality, size, and capacity. All workmanship shall comply with published industry standards, including NECA/NEIS, NECA-1-2010, and the American Electrician's Handbook, latest edition. OSHA rules, regulations, and requirements are a part of this contract. Electrical contractor shall follow them as well as state and local requirements for the safety of workers on the job and passers-by.

4. Coordination.

The contractor shall coordinate all work with other contractors and subcontractors so that various components of the electrical system will be installed at the proper time, will fit the available space, and will allow proper service access to all equipment. The contractor shall refer to architectural, structural, and mechanical drawings and relevant equipment drawings to determine the extent of clear spaces. The contractor shall make all offsets required to clear equipment, beams, and other structural members, and to facilitate concealing conduit in the manner anticipated in the design. The contractor shall provide materials with trim which will fit properly the types of ceiling, wall, or floor finish actually installed.

5. Dimensions and layout.

The drawings are schematic in nature and not intended to show every accessory or component necessary for a complete installation. Figured dimensions shall be taken in preference to scale dimensions. Determine exact locations by job measurements, by checking the requirements of other trades, and by reviewing all contract documents. The contractor shall be held responsible for errors which could have been avoided by proper checking and inspection.

6. Minor Electrical Demolition.

- a. The Owner determines which sections (if any) of the existing Fire Alarm and/or Fire Suppression systems shall remain in service during demolition.
- b. The Owner determines which sections (if any) of an existing telephone system shall remain in service during demolition.

- c. The drawings are intended to indicate the scope of work required and do not indicate every box, conduit, or wire that must be removed. **THE CONTRACTOR SHALL VISIT THE SITE PRIOR TO SUBMITTING A BID AND VERIFY EXISTING CONDITIONS.**
- d. Where walls, ceilings, structures, etc., are indicated as being removed on general drawings, the Contractor shall be responsible for the removal of all electrical equipment, devices, fixtures, raceways, wiring, systems, etc., from the removed area.
- e. Where ceilings, walls, structures, etc., are temporarily removed and replaced by others, this Contractor shall be responsible for the removal, storage, and replacement of equipment, devices, fixtures, raceways, wiring, systems, etc.
- f. Verify that abandoned wiring and equipment serve only abandoned equipment or facilities. Extend conduit and wire to facilities and equipment that will remain in operation following demolition. Extension of conduit and wire to equipment shall be compatible with the surrounding area.
- g. Coordinate scope of work with all other Contractors and the Owner at the project site. Schedule removal of equipment and electrical service to avoid conflicts.
- h. Bid submittal shall mean the Contractor has visited the project site and has verified existing conditions and scope of work.
- i. Maintain existing Fire Alarm and/or Fire Suppression Systems as required by Owner.
 - a. Temporary disabling of an in-service system requires that the Owner be notified 24 hours in advance.
- j. Existing Electrical Service: Maintain existing system in service.
- k. Disconnect electrical systems in walls, floors, structures, and ceilings scheduled for removal.
- l. Provide temporary wiring and connections to maintain existing systems in service during construction. When work must be performed on energized equipment or circuits, use personnel experienced in such operations. Assume all equipment and systems must remain operational unless specifically noted otherwise on drawings.
- m. The E.C. is responsible for all temporary lighting and power in all work areas per Division 1. Comply with NECA 200-2010.
- n. Remove, relocate, and extend existing installations to accommodate new construction.
- o. Remove abandoned wiring and raceway to source of supply.
- p. Remove exposed abandoned raceway, including abandoned raceway above accessible ceiling finishes. Cut raceway flush with walls and floors, and patch surfaces. Remove all associated clamps, hangers, supports, etc. associated with raceway removal.
- q. Disconnect abandoned outlets and remove devices. Remove abandoned outlets if conduit servicing them is removed. Provide blank cover for abandoned outlets that are not removed. Patch openings created from removal of devices to match surrounding finishes.
- r. Disconnect and remove abandoned panel-boards and distribution equipment.
- s. Disconnect and remove electrical devices and equipment serving utilization equipment that has been removed.
- t. Disconnect and remove abandoned luminaires. Remove brackets, stems, hangers, and other accessories. Provide for proper recycling or disposal of existing lamps and ballasts removed from the site in accordance with EPA and State of Illinois regulations.
- u. Repair adjacent construction and finishes damaged during demolition and extension work. Patch openings to match existing surrounding finishes.
- v. Maintain access to existing electrical installations that remain active. Modify installation or provide access panel as appropriate.
- w. Extend existing installations using materials and methods compatible with existing electrical installations, or as specified.

- x. HID and fluorescent lamps, determined by the Toxicity Characteristic Leachate procedure (TCLP), to be hazardous waste shall be disposed of in a permitted hazardous waste disposal facility or by a permitted lamp recycler.
- y. Regulatory Requirements: Comply with governing EPA notification regulations before beginning demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- z. Floor slabs may be post-tensioned. X-ray all penetrations prior to cutting and/or drilling to avoid any tension cables or utilities encased in floor construction.
- aa. Floor slabs may contain conduit systems. The Contractor is responsible for taking any measures required to ensure no conduits or other services are damaged. This includes X-ray or similar non-destructive means.
- bb. The Contractor is responsible for all costs incurred in repair, relocations, or replacement of any cables, conduits, or other services if damaged without proper investigation.
- cc. Distribution and Branch Panelboards: Clean exposed surfaces and check tightness of electrical connections. Lubricate where required. Replace damaged circuit breakers and provide closure plates for vacant positions. Provide typed circuit directory showing revised circuiting arrangement.

6. Ordinances and codes.

Contractor's performance, workmanship, and materials shall comply with state and local building codes, NFPA codes as referenced therein, local amendments, industry standards (NEMA, NECA, etc.), and/or all other applicable codes and ordinances. Contractor shall comply with rules and regulations of the public utilities and municipal departments affected as applicable. Obtain and pay all permits, unless stipulated otherwise in other Division 1. Contractor shall be held responsible for any violations of law. Contractor shall maintain all necessary signal lights and guards for the safety of the public. See drawings for additional information.

7. Substitutions:

- a. The specification provides that the base bid of all contractors shall include the products specifically named, the contractor being permitted to submit in the form of alternates with his proposal products of any other manufacturers for similar use, provided the difference in cost, if any, is specified in each case. The terms "approved" or "approved equal" shall mean approved by the architect as an acceptable alternate bid. The term "equal" or "available manufacturers" shall mean products similar or identical in appearance, function, or specification to a basis-of-design product and manufactured to directly compete with, replace, or supersede the specified product. The architect shall have final authority as to whether a substitution is an acceptable replacement to the specified item. The proposed substitution may also be rejected for aesthetic reasons. In the event of rejection, the specified item shall be furnished.
- b. Value Substitutions: The contractor is completely responsible for all substitutions, changes, or deletions of work or products proposed to and accepted by the owner or architect in lieu of specified, and shall hold the owner and architect harmless for any liabilities created by such changes. As much as is possible, such proposals for change shall indicate how the specified design goals, the work of other trades, and the construction schedule are expected to be impacted. The contractor is responsible for research of all codes and standards applicable to the proposed change, professional design services necessary to implement the change, re-submittals for state and municipal permits and additional fees invoked by the change, and notification of and coordination with other trades impacted by the change. After acceptance of a change proposal by the owner or architect, the contractor shall notify them within ten calendar days of any unexpected discovered conditions that may impact the work. After this period, the contractor shall not be excused from any liabilities created by their own proposed change(s) and shall be responsible for any discovered costs incurred by anyone due to the change(s).

8. Adjusting, aligning, and testing.

All electrical equipment on this project furnished under this division and all electrical equipment furnished by others and installed by the electrical contractor shall be adjusted, aligned, and tested for proper operation by the electrical contractor. Complete wiring systems shall be free from faults. All motors shall be verified for proper rotation and protection. The contractor shall maintain on the project premises the following at all times: a true rms reading voltmeter and ammeter, a megger insulation resistance tester. The contractor shall provide test data readings as requested or as required.

9. Operation and maintenance instructions.

Submit to the architect three copies, unless indicated otherwise in Division 1, of maintenance and operation instruction manuals appropriately bound into manual form including record copies of the following, revised if necessary to show system and equipment as actually installed: manufacturer catalog sheets, wiring diagrams, maintenance instructions, operating instructions, parts lists. Contractor shall also provide adequate owner's staff training at the termination of the work. Electronic submittals are acceptable with the approval of the owner and/or architect.

11. Start up of systems and Commissioning.

Prior to startup of the electrical systems, the contractor shall check all components and devices, lubricate items accordingly, and tighten all screwed and bolted connections. Adjust taps on each transformer for rated secondary voltage. Check and record building's service entrance voltage, grounding conditions, ground resistance, and proper phasing. Balance all single phase loads at each panelboard; redistribute branch circuit connections until balance is achieved. Replace all burned-out lamps. Touch-up paint all marred equipment finishes. After all systems have been inspected and adjusted, confirm all operating features required by the drawings and specifications and make final adjustments as necessary.

Commissioning.

All electrical systems shall be commissioned by the contractor in accordance with applicable section of IECC 2012 and with NECA 90-2009 (or latest iteration), Recommended Practice for Commissioning Building Electrical Systems (ANSI), available from NECA Order Desk at (301)215-4504, orderdesk@necanet.org, or www.neca-neis.org/catalog. Documentation shall be included in the close-out documents.

12. Guarantee.

The contractor shall guarantee against defective workmanship and material for a period of one year from date of substantial completion. Guarantee shall include material to be replaced and all labor required. Manufacturers' standard guarantees and warranties of longer duration shall be in force.

26-2 ELECTRICAL INSTALLATION.

1. Cleaning.

Dirt and refuse resulting from the performance of the work shall be removed from the premises as required to prevent accumulation. The contractor shall cooperate in maintaining reasonably clean premises at all times. Immediately prior to final inspection, the contractor shall make a final cleanup of dirt and refuse resulting from his work. The contractor shall clean all material and equipment installed under the electrical contract. Dirt, dust, plaster, stains, and foreign matter shall be removed from all surfaces. Damaged finishes shall be touched up and restored to their original condition.

2. Cutting and patching.

This contractor shall do all cutting of walls, floors, ceiling etc. as required to install work under this section. The contractor shall obtain permission of the architect or owner before doing any cutting or coring. All holes shall be cut as small as possible. Contractor shall patch walls, floors, etc. as required by work under this section. All patching/repairs shall match the original finish and construction, and be approved by the architect.

3. Rough-in.

Coordinate without delay all roughing-in with general construction. All conduit rough-in shall be concealed except in unfinished areas and where otherwise shown.

4. Conduit.

All conduits shall be run concealed except where otherwise noted (see Section 6 below). All conduits associated with the electrical service or run underground, exposed to weather, or other hazardous conditions shall be rigid. All other conduit may be EMT where approved by local code. Install PVC exposed in corrosive areas such as pools and pool pump rooms and chemical rooms as permitted. PVC in or under slab shall be an acceptable substitute when allowed by local code, and where it is changed to rigid at least 10'-0" before it exits the slab. Minimum conduit size for power applications is 3/4" trade size; minimum conduit size for low voltage applications is 1" trade size; minimum size embedded conduit is 3/4" trade size; maximum size embedded in toppings is 1" trade size. Use flexible metal conduit or liquidtight flexible metal conduit for connections to vibrating equipment, transformer, lighting troffers, and the like. All conduits shall be provided with an insulated equipment grounding conductor.

6. Conduit installation.

Comply with NECA 101-2013.

All wiring shall be run in conduit, except that low voltage power limited cable may be installed concealed using open wiring methods where acceptable to the local AHJ. Conduit shall be installed concealed above suspended ceilings, in wall cavities, or below floors wherever possible or unless noted otherwise on the plans. Notify the architect where concealment is not possible, and provide surface metallic raceway manufactured for the purpose. Run parallel to building lines. Conduit shall be installed to requirements of structure and to requirements of all other work on the project. Conduit shall be installed to clear all openings, depressions, pipes, ducts, reinforcing steel, etc. Conduits shall be installed continuous between connections with a minimum possible number of bends and not more than four 90-degree bends between boxes. Bends shall be smooth and even and shall be made without flattening conduit or flaking enamel or galvanizing. Long radius elbows shall be used where necessary or specified. No short radius bends. Conduits shall be securely fastened in place with approved straps, hangers, and steel supports as required. Groups of horizontal conduit runs shall be clamped to steel channels and suspended from inserts or anchors spaced not more than 10 feet apart. Vertical feeder conduits shall be securely clamped to structural steel members attached to structure. Cable clamps shall be installed for support of vertical feeders where required. Conduit supports shall be added within 12" at one end of all bends. Conduit shall not be supported from suspended ceiling components. Conduit ends shall be reamed before installation and all conduits shall be thoroughly cleaned before installation and kept clean after installation. Openings in boxes shall be plugged or covered as required to keep conduit clean during construction and all conduit shall be fished clear of obstructions before the pulling of wires. All conduits shall be of ample size for pulling of wire and shall not be smaller than code requirements. All electrical work shall be protected against damage during construction. Any work damaged or moved out of line after roughing-in shall be repaired to meet engineer's approval without additional cost to the owner. Conduit termination at panelboards, switchboards, motor control equipment and junction boxes shall be aligned and installed true and plumb. Install approved expansion fittings where conduit passes through expansion joints. Install a pull wire in each empty conduit which is left by the contractor for installation

of wires or cables by others. Make all joints and connections in a manner which will insure mechanical strength and electrical continuity. Thru-wiring of light fixtures is not permitted except in fluorescent channels. Conduit seals shall be installed on all conduits passing from non-conditioned to conditioned spaces and in all conduit penetrations of freezer and cooler walls. Furnish and install the necessary junction boxes, couplings, supports, adapters, etc., to form a complete assembly. Conduits shall be identified for voltage per ANSI A13.1.

7. Conduit sizes indicated on the plan are intended to represent the minimum size required to accommodate the specified conductors. The contractor shall select larger trade sizes and longer radius bends where necessary to alleviate jamming and excessive pulling tension due to distance, number of bends, and the like.

8. Bushings and locknuts.

Where conduits enter boxes they shall be rigidly clamped to the box by interior and exterior locknuts or approved fittings, and the conduit end capped with suitable bushing. Pre-insulated fittings are acceptable; provide bonding at concentric knockouts as applicable.

9. Wire.

All building wire shall have copper conductors, with U.L. label and 600-volt insulation. All wire shall be run in conduit. All exterior wire shall be XHHW stranded below grade; thermoplastic types not acceptable. Interior feeder and branch circuit wire shall be type THHN/THWN for interior applications; use XHHW where a circuit extends beyond the foundation. All wire #10 and smaller shall be solid or stranded per contractor discretion unless otherwise required; wire larger than #10 shall be stranded. Wire within continuous fixture channels shall be type THHN. All branch circuit wire shall be not smaller than #12 awg wire. If no wire size is indicated on the drawings for a branch circuit, provide #12 awg wire and 20a circuit breaker. Non-power limited control wire shall have 600-v insulation and be the proper type, size, construction, and number as required by the equipment manufacturer.

10. Wiring installation.

All wiring shall be installed in approved raceway and enclosures, except where low voltage wire is allowed to be installed via open methods. Support all wire and cables in vertical installations as required by code by installing cable supports or plug-type conduit riser supports. All wire and cable in conduit shall be continuous without taps or splices. All splices or taps shall occur in approved boxes and enclosures and shall be kept to the minimum required, and shall be made with approved solderless connections. All splices, taps, and joints shall be insulated as required by code. All materials used to terminate, splice, or tap conductors shall be designed for the purpose, properly sized, U.L. listed for the specific application and conductors involved, and installed in strict accordance with the manufacturer's specifications using specified tools. Where wire is indicated to be installed, but the connection is indicated "future" or "by others", contractor shall leave a minimum of 3 feet of slack at the box, taping the ends of the conductors.

Conductors shall have insulation of the proper color to match NEC color code table and as indicated below. In larger wire sizes where properly colored insulations are not available, the contractor shall install listed vinyl plastic identification tape of the appropriate color at all termination points, junction boxes, and pull boxes.

120/208-volt system: phase A, black; phase B, red; phase C, blue; neutral, white; ground, green.

277/480-volt system: phase A, brown; phase B, orange; phase C, yellow; neutral, gray; ground, green with white stripe.

All terminal blocks and wire terminals for control wiring shall be properly numbered for identification with listed vinyl stick-on markers or equivalent. Identify fire alarm wiring per NEC 760.

Wiring to low voltage wiring systems shall comply with NEC Section 411 and other sections referenced therein.

Use consistent identification designations throughout Project. Install identifying devices before installing ceilings and similar concealment.

11. Cable Ties.

1. General-Purpose Cable Ties: Fungus inert, self-extinguishing, one piece, self-locking, Type 6/6 nylon.
 - a. Minimum Width: 3/16 inch (5 mm).
 - b. Tensile Strength at 73 deg F (23 deg C), According to ASTM D 638: 12,000 psi (82.7 MPa).
 - c. Temperature Range: Minus 40 to plus 185 deg F (Minus 40 to plus 85 deg C).
 - d. Color: Black except where used for color-coding.
2. UV-Stabilized Cable Ties: Fungus inert, designed for continuous exposure to exterior sunlight, self-extinguishing, one piece, self-locking, Type 6/6 nylon.
 - a. Minimum Width: 3/16 inch (5 mm).
 - b. Tensile Strength at 73 deg F (23 deg C), According to ASTM D 638: 12,000 psi (82.7 MPa).
 - c. Temperature Range: Minus 40 to plus 185 deg F (Minus 40 to plus 85 deg C).
 - d. Color: Black.
3. Plenum-Rated Cable Ties: Self-extinguishing, UV stabilized, one piece, self-locking.
 - a. Minimum Width: 3/16 inch (5 mm).
 - b. Tensile Strength at 73 deg F (23 deg C), According to ASTM D 638: 7000 psi (48.2 MPa).
 - c. UL 94 Flame Rating: 94V-0.
 - d. Temperature Range: Minus 50 to plus 284 deg F (Minus 46 to plus 140 deg C).
 - e. Color: Black

11. Junction boxes.

Provide junction boxes, pull boxes, cabinets, and wireways wherever necessary for proper installation of various electrical systems according to the National Electrical Code and where indicated on the drawings. Size as required for the specific function or as required by the NEC, whichever is more restrictive. Junction boxes shall be minimum 4" square or larger, with galvanized cover.

12. Outlet boxes.

All outlet boxes including switch, receptacle, and outlets, shall be manufactured for the purpose, and sized as required per NEC. All boxes shall be set in walls, columns, floors, or ceilings in finished areas so as to be flush with the finished surface and be accurately set and rigidly secured in position. When using spring steel or similar clips to mount a box to a stud, also provide matching far side box supports. Provide plaster rings, extension rings, and masonry rings as required for flush mounting.

13. Outlet locations.

Outlets are only approximately located on the plans, and great care must be used in the actual location by consulting the various large scale detailed drawings and equipment cuts, or by securing definite locations from the architect. The height of outlets shall be installed according to the device height detail provided

on the plans, or as otherwise required by locally accepted accessibility rules, or to accommodate casework heights.

14. Wiring devices.

Comply with NECA 130-2010, Standard for Installing and Maintaining Wiring Devices.

Furnish and install outlets and switches where shown or required. Minor changes relative to the location of electrical equipment may be made by this contractor to comply with the structural and building requirements as determined in the course of construction. All outlets and switches must be of the same manufacturer and not mixed on the project. Color of toggles and receptacles shall be brown in wood surfaces and white for painted surfaces. All switches shall be minimum 20-amp commercial grade equal to Hubbell CS120 series. All receptacles shall be minimum 20-amp commercial grade equal to the Hubbell CRxx family; provide GFCI protection wherever required by code and tamper resistant devices where indicated. Other devices shown but not specified above shall be of the same construction quality as defined above. Receptacles shall be oriented vertically with the ground prong up or horizontally with the neutral up to match a building standard or where a specific orientation is required by local code.

15. Cover plates.

All commercial switch and outlet plates shall be brushed stainless steel. Contractor shall verify the desired material with the architect before installation. Device plates in unfinished spaces shall be compliant stamped steel ("garvin") type manufactured for the purpose; trim covers in damp locations shall be weatherproof as indicated below. Group switches serving the same area under multi-gang trim plates. Plates shall be set plumb, parallel, and flush with the wall finish.

16. Weatherproof covers.

Weatherproof cover plates shall be cast metal with neoprene gasketing and not relying on the device for the integrity of its attachment to the box. Raintite covers shall be durable cast metal with molded metal "in-use" covers that protect cords that are plugged in. Devices shall be listed weather-resistant type.

17. Firestopping.

This contractor shall seal all penetrations through fire rated floor and wall assemblies in accordance with the NFPA codes and UL wall construction types. The sealing system shall be capable of passing a three-hour test, per ASTM E-814 (UL 1479). Penetration sealing system shall be acceptable to the AHJ (E.C. to verify) and installed per the manufacturers recommendations. Use silicon type where accumulation of water is an issue. PVC conduit may not be used as a sleeve through fire rated partitions for any reason.

18. Roof penetrations.

Provide gasketed roof portals (equal to Portals Plus) listed for use with the roofing material as required. All roof penetrations shall be leaktight at the termination of the work.

19. Access doors.

Provide access doors in ceilings, walls, etc. where indicated or required for access to or to maintain work installed under this section. Provide fire rated type in fire-resistance rated elements, gasketed type in showers and locker rooms and similar areas. Milcor or equal.

20. Equipment identification.

This contractor shall furnish and install equipment identification nameplates on all panelboards, safety switches, starters, dimmers, drives, and the like, and wherever mandated by code. Nameplates shall be engraved phenolic plastic, and shall be firmly attached to the equipment. Nameplates shall clearly identify each item, its voltage, and what it controls.

21. Plenum spaces.

All equipment and wiring methods in ceiling cavities used as environmental air plenums shall be approved for the application and conform to the NEC.

22. Seismic Bracing.

Verify seismic rating of the structure with the structural plans. Provide approved engineered seismic bracing or anchors where required for lay-in fixtures, cable trays, conduits, enclosures, and the like as required by code.

26-3. ELECTRICAL SERVICE AND GROUNDING.

1. Connection to serving utilities (when applicable).

Contractor shall provide proper termination, metering provisions, grounding, etc., for electrical services for connection by the serving utility in strict compliance with the requirements of all codes having jurisdiction and the rules of the serving utility involved. All service terminations and connection points shall be verified in the field by this contractor, and he shall work in conjunction with the utility involved in the installation of all service equipment and cable. This contractor shall provide all conduit, cable, accessories, etc. specified by the utility. The contractor shall notify the utility company involved within two weeks after notice to proceed, of all required information necessary in order for the utility to supply the project without delay.

2. Grounding.

Furnish and install a complete bonded grounding electrode system complying with the latest applicable edition of the National Electrical Code. The electrical service, all transformers, raceways, frames, and the like shall be effectively grounded by this contractor in a thorough and efficient manner in conformance with the NEC. All raceways shall contain an equipment grounding conductor; raceways shall not be relied upon as an effective ground return path. Voltage drop shall not exceed 2%.

3. Unless superseded by locally accepted codes and standards, grounding and bonding shall be performed in accordance with NECA 331-2004 (or latest applicable iteration), Standard for Installing Bonding and Service Entrance Grounding.

26-4. DISTRIBUTION AND CONTROL EQUIPMENT.

1. Power distribution panels.

Circuit breaker Types: Panels installed as service entrance equipment shall be permanently marked to identify it as suitable for use as service entrance equipment with number and size breakers as scheduled. Panels shall have copper bus and be braced for available inrush (E.C. to verify with utility). Branch breakers shall have an engraved phenolic nameplate for circuit identification. Panels shall have a hinged, lockable door to cover the circuit breaker handles. A typewritten circuit directory shall be installed on the inside face of the door; provide warning labels indicating arc-flash hazard and mandatory working clearances.

2. Panelboards.

Comply with NECA 407-2009, Recommended Practice for Installing and Maintaining Panelboards. New panelboards shall be equal to Square D NQ or NF series as applicable, unless necessary to match an existing building standard. The panelboards shall be complete with thermal magnetic plastic case circuit breakers of the bolt-on type assembled in a finished cabinet. All 2 and 3-pole breakers shall have common trip. Breakers used as switches shall be marked "SWD." and approved for the purpose. Breakers serving hvac equipment shall be rated HACR type. Provide copper bussed panels, unless indicated

otherwise on the plans, and braced for available inrush (E.C. to verify). Load Centers with plug-in circuit breakers shall be installed only where indicated and shall be acceptable to the local AHJ. Panelboard or load center construction shall be of NEMA design suitable for the environment into which it is installed.

3. Existing panelboards.

New circuit breakers required to be installed in existing panelboards or load centers shall be of the same manufacturer, type, and AIC rating as the existing circuit breakers. The new breaker shall be listed for the application; breakers may not be field modified and otherwise improperly forced into place. Provide new typewritten panel directories showing assignments of all circuits affected by the work.

4. Disconnect switches.

Contractor shall furnish and install fused or non-fused safety switches as noted or required. Provide NEMA heavy duty externally operable type. Fuse holders shall have Class R rejection feature. Construction shall be of a NEMA design suitable for the environment into which it is installed. In kitchen applications, provide NEMA 4X compact non-metallic types equal to Bussman EFJ/ENF series, Hubbell HBLDS3 series, or similar. Manually test all safety switches for proper operation prior to energizing.

5. Fuses.

Fuses shall be of the size and type required. Fuses larger than 600-amp shall be Class L current limiting type. Fuses for motors shall be class RK5 time-delay type. All fuses shall have a minimum 100kaic rating. When applicable, comply with NECA 700-2010, Standard for Installing Overcurrent Protection to Achieve Selective Coordination.

6. Dry-type transformers (where applicable).

Dry-type transformers shall be 150-degree temp rise above 40-degree ambient rated. Insulating materials shall exceed NEMA ST20 standards and be rated for 220-degree c UL component recognized insulation system. Phase, voltage, and size shall be as noted on the drawings. Sound level shall not exceed 45 db per NEMA standards. Units larger than 24kva shall have four 2.5% full capacity primary taps. Units up to 225 kva shall be mounted on vibration isolation pads with a .25" static deflection. Conduit connections to transformers shall be made with flexible metallic conduit with at least 6" of slack in all directions. Transformer enclosures shall be ventilated and be fabricated of heavy gauge sheet steel construction. Maintain minimum NEC clearances and manufacturer required clearances.

7. Variable frequency drives are specified in Division 26 2923 when applicable.

8. For new buildings with emergency power sources and utility services in excess of 1200-amperes, engage the distribution equipment manufacturer's engineering services to provide a selective coordination fault-current study of the electrical distribution system from normal and alternate power sources using a computer software program to plot and diagram time-current-characteristic curves and report recommended settings and ratings of all overcurrent protective devices. The study shall include arcing faults, simultaneous faults, explicit negative sequence, and mutual coupling in zero sequence as deemed necessary by the engineer.

26-5. LIGHT FIXTURES, LAMPS, BALLASTS.

1. Light fixtures shown on the electrical drawings represent general arrangements only. Refer to architectural drawings for more exact locations or specific directions. Coordinate locations with all other trades before installation to avoid conflicts. Light fixture locations in mechanical rooms shall be coordinated with final installed piping and ductwork layouts.

2. Light fixtures.

Light fixtures as scheduled on drawings shall be furnished complete with lamps and ballasts. Provide all material and labor to securely hang fixtures, clean them, and make them completely ready for use. Provide all accessories necessary for a complete installation. Provide proper trim to fit each ceiling condition actually encountered. When required to do so, provide additional approved supports connected to structure to conform to UBC 25-231 seismic requirements. Through wiring of fixtures is not allowed except for fluorescent channels or as manufactured for the purpose. Each recessed troffer fixture must be connected by a whip (maximum 6' long) to a junction box.

3. Lamps.

When applicable, lamps for all lighting fixtures shall be provided and installed by this contractor. Provide lamps or light generators as scheduled on the drawings. In all cases fluorescent lamps shall be compatible with the specified fixture. All linear fluorescent lamps shall be T8 type with 4000k phosphors, unless otherwise indicated. Exterior fixtures must have lamps providing at least 60 lumens per watt. The use of incandescent lamps is not acceptable.

4. Ballasts.

All fluorescent ballasts shall be thermally protected against overheating, minimum ETL-CBM Class P, and comply with the National Ballast Energy law. Sound levels shall not exceed Class A ambient noise levels. Indoor fluorescent ballasts shall: be electronic type suitable for operating specified amps; total allowable harmonic distortion less than 20%; 20khz frequency or greater; operate with no visible flicker; withstand line transients as defined in ANSI/IEEE C62.41, Category A; compliant with applicable FCC requirements. Compact fluorescent ballasts shall provide end-of-life protection.

5. LED Luminaire Requirements

- a. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- b. NRTL Compliance: Luminaires shall be listed and labeled by an NRTL.
- c. Recessed Fixtures: Comply with NEMA LE 4.
 1. CRI of minimum 85. CCT of 4000 K nominal.
 2. Minimum rated life of 60,000 hours at 70% lumen output; nominal 116 lumens per watt efficacy..
 3. Standard internal dimmable driver unless otherwise scheduled.
 4. Nominal Operating Voltage: 120 V ac or 277 V ac as applicable.
 - f. Lens Thickness for lensed troffers: At least .095 minimum unless otherwise indicated.
 6. Housings: as indicated by the basis-of-design products.
- d. Strip Light
 1. Integral junction box with conduit knockout entries.
 2. Acrylic lens as scheduled.
 3. Minimum lumens as scheduled. Minimum allowable efficacy of 100 lumens per watt
- e. Surface Mount, Linear.
 1. Minimum lumens as scheduled. Minimum allowable efficacy of 82 lumens per watt.
 2. Standard dimmable driver unless otherwise scheduled.
- f. Warranty Period: five years from date of completion.

LED power supplies and dimming modules shall be matched to the lighting product by the manufacturer. Power supplies shall have protection against open circuit, short circuit, overload, overheating, and transient surge conditions and meet the highest industry standards. Outputs shall be UL Class 2. Dimming shall be full range (nominal) where feasible, and dimming equipment shall be as recommended

by the manufacturer. LED sources shall have the efficacy and color specified, be compliant with the latest applicable iteration of IESNA LM-70 AND LM-79, have a DOE lighting fact sheet available, and be listed for the use.

26-6. MISCELLANEOUS ELECTRICAL

1. Wiring of mechanical equipment.

Furnish and install all power wiring and all line voltage control or interlock wiring of all units, pumps, fans, water heaters, air handlers, kitchen equipment, and other equipment and appliances as specified or as scheduled elsewhere in the documents or otherwise indicated or inferred by the body of drawings.

Connect per manufacturer's wiring diagrams to be furnished with equipment. Furnish and install all loose disconnects and starters needed or required. After installation the contractor shall verify that each motor load has the correct phase rotation and permanently indicate the rotation on the equipment or its controller or disconnect. This contractor shall verify the actual wire sizing amps for mechanical equipment from the equipment nameplate; electrical installation shall be based on actual required amperages, which may vary from the wire and equipment sizes shown on the drawings. Properly sized electrical wiring and equipment shall be furnished without extra cost to the contract. The contractor shall notify the architect of all changes to be made in the electrical installation due to equipment variances so that the impact on the feeders, panels, fuses, and breaker sizes can be checked prior to the installation. This contractor shall be responsible for coordinating with the mechanical, refrigeration, and plumbing contractors to verify the actual wire sizing amps and correct sizes of all overload heaters and the like for all equipment.

2. Temperature control.

Temperature control wiring is specified under Division 23. When indicated in those specifications, include the control wiring in the electrical work. Where responsibility for the work is not assigned to others, it shall be a part of the electrical contract.

3. Telecommunications systems.

Where the plans call for telecommunications wiring to be part of this contract, provide all telecommunication wiring, termination, and testing per Owner's standard, and comply with BICSI and EIA/TIA standards. In any case, the E.C. shall provide outlet boxes and pathways, such as stubs, sleeves, seals, and the like, as necessary or required to accommodate the work indicated on the plans.

4. Time switches.

Provide time switches with number and type of contacts, sequence, and voltage necessary to accommodate the work. Time switches for exterior lighting control shall be electronic digital astronomic type with manual bypass switch, suitable NEMA enclosure, and battery backup. Provide photocells, contactors, relays, or other controls as required or as indicated. Master lighting controls shall be as specified on the plans; wallbox timers and other controls shall be as scheduled in the symbols legend.

5. Contactors.

Contactors for use with time switches for remote-controlled installations shall be NEMA types, electrically or mechanically held as applicable, and rated for the tungsten or ballast loads indicated. Contactors may be integrated into the respective controlling panelboards at contractor's option.

6. Miscellaneous equipment and connections when applicable.

Provide final power hook-ups to furniture panels; extend telecom wiring into furniture panels and terminate at jacks mounted into modular outlets furnished by others. Where applicable, include empty whips as applicable when installing an empty conduit system for wiring by others.

7. Fire alarm.

The electrical contractor shall include pathways such as raceways, outlet boxes, stub-ups, sleeves, line voltage wiring, power hook-ups, and any other anecdotal materials and labor necessary to support fire alarm work by the Owner's designated vendor. Install special backboxes furnished by the vendor. Coordinate with the owner and AHJ. All NEW fire alarm raceways and outlet boxes shall be identified by a red finish. Job practices shall conform to NECA 305-2010, Standard for Fire Alarm Job Practices. When indicated on the plan, the E.C. shall include the cost of fire alarm design, plan review, provision, installation, testing, and acceptance.

8. Submittals.

a. In addition to Division 1, as applicable, submit for review product data for fixtures, lamps, utility metering equipment, distribution equipment (panels, transformers, and the like), overcurrent devices, loose starters, contactors, and disconnects, branch devices and trim plates, any product substituted for specified, and any product accepted during a "value engineering" process. Provide quantities as stipulated in Division 1, but no fewer than six sets. Submit shop or assembly drawings prior to distribution to field personnel. Electronic submittals are acceptable if approved by the owner and/or architect.

b. Submittals shall be made at the outset of the project and subsequent product releases scheduled in a timely manner. The contractor shall act promptly to determine lead times and accommodate product availability. The contractor shall prepare a list of released products and delivery dates coordinated with the project construction schedule for distribution to the architect, owner, and project manager. Advise the architect immediately of specified or needed products being unavailable or discontinued; any project delays or additional costs resulting from the contractor's neglect of this responsibility shall be at the cost of the contractor.

c. Provide close-out documents as stipulated by Division 1, but not less than all owner's manuals, certifications, and warranties. **PROVIDE COMPLETE DIMENSIONED AS-BUILT DRAWINGS.** Include installation instructions shipped with equipment.

9. Discretionary work. See Division 1 for discretionary work requirements. Where not specified in Division 1, provide the following:

a. Five duplex GFI receptacles on a new circuit within the building (maximum 125' lineal) to be installed as directed in the field by the owner.

b. Five telecommunications stub-ups to be installed as directed in the field by the owner.

END OF SECTION 260100

SECTION 270001 – COMMUNICATIONS (GENERAL)

QUALIFICATIONS/PERSONNEL

- The communications cabling system installation work detailed in these standards shall be carried out by a specialist installer, trained and certified by PANDUIT and capable of providing a system warranty as described herein.
- The Cabling Contractor shall have a Registered Communications Distribution Designer (RCDD) or equal as a permanent member of staff. The RCDD shall be in good standing with the Building Industry Consulting Service International (BICSI) and shall have a current registration.
- The Contractor shall hold a valid State Contractors License for the duration of the project. The installer shall be responsible for obtaining permits and other requirements for performing work on this project.
- The Cabling Contractor shall provide an on-site manager responsible for all Communication work. This individual shall be the single point of contact for the duration of the project.
- The Air Blown Fiber®, each bidder must submit current documentation signed by Sumitomo Electric Lightwave representative stating the Contractor is authorized and certified by Sumitomo Electric Lightwave to provide the FutureFLEX® Air Blown Fiber® cable products installation and warranty certification. Each bidder must also submit documentation with the bid, listing the names of employees that will be used on this project indicating their experience, level of expertise, and certificates of training signed by Sumitomo Electric Lightwave representatives.
- The Contractor shall furnish and install all Tube Cables, Tube Couplings, Tube Distribution Units (TDUs), Fiber Bundles, connectors, and equipment as shown on the drawings and per Sumitomo Recommended Procedures (SRP's).

DEFINITIONS

- Telecommunications Closet (TC): The generic term, this refers to the equipment rooms in which telecommunications cabling terminates. These rooms also house network, video and telephone electronics.
- Building Distribution Facility (BDF): The —Main wiring switching for the building
- Intermediate Distribution Facility (IDF): A secondary wiring switching room
- Horizontal Cabling: Cabling runs from Work Station to IDF or BDF.
- Backbone: Linkage from BDF to IDF.
- House Count: The Contractor shall cross-connect the first (BLUE) pair of each new workstation cable to the riser backbone to link the telecommunications closet to the next closet in the hierarchy. The cross connects wire of colors matching the color of the station cabling conductors (BLUE) shall be used for each cross connect.
- Backbone transmission media may be:
 - o Traditional and Air Blown Optical fiber
 - o Twisted-pair copper
 - o Coaxial copper
 - o A combination of the above
 - o Miscellaneous support facilities
- Material needed for the proper termination and installation of the backbone cables:
 - o Cable support hardware
 - o Firestopping equipment and supplies
 - o Grounding hardware (TIA/EIA-607)
 - o Protection and security
- Inter-Building Cabling – First Level Backbone: provides the transmission path between adjacent

buildings. Includes Fiber Optic and copper cabling.

- Intra-Building Cabling – Second Level Backbone: Provides the transmission path to join the main Telecommunications Closet (or BDF) with other TC's (or IDF) located within the building. Includes Fiber Optic and copper cabling.
- Horizontal cabling and Work Station Cabling: Provides the link from offices, classrooms and common areas to the Telecommunications Closet (TC) serving the area and includes the following transmission media:
 - o 4-pair 100 Ohm Unshielded Twisted Pair (UTP) Category 5E
 - o 4-pair 100 Ohm Unshielded Twisted Pair (UTP) Category 6
 - o Fiber Optic Cable (Multi-Mode and Single-Mode)
 - o RG-6 Coax

QUALITY ASSURANCE

- Equipment and material shall be Underwriters Laboratories listed and labeled. The latest editions of the following codes, standards and guidelines are minimum requirements:
 - o City, State, and Federal codes.
 - o NFPA 70 National Fire Protection Agency
 - o National Electric Code (NEC 1999)
 - o Institute of Electrical and Electronic Engineers (IEEE)
 - o TIA/EIA-568-B.1 Commercial Building Telecommunication Cabling Standard.
 - o TIA/EIA-568-B.2 Commercial Building Telecommunication Cabling Standard.
 - o TIA/EIA-568-B-2.1 Commercial Building Telecommunication Cabling Standard Category 6.
 - o TIA/EIA-569 Commercial Building Standard for Telecommunications Pathways and Spaces.
 - o TIA/EIA-606 the Administration Standard for Telecommunications Infrastructure of Commercial Buildings.
 - o TIA/EIA-607 Commercial Building Grounding and Bonding Requirements for Telecommunications.
 - o TIA/EIA TSB-67 Transmission Performance specifications for Field Testing of Unshielded Twisted Pair Cabling Systems
 - o TIA/EIA TSB-72 Centralized Optical Fiber Cabling Guidelines.
 - o TIA/EIA TSB-75 Additional Horizontal Cabling Practices for Open Offices.
 - o Telecommunications Distribution Methods Manual, (BICSI).
 - o Manufacturers recommendations and installation guidelines.

WORK RESTRICTIONS AND PROCEDURES

GENERAL REQUIREMENTS

- The Cabling Contractor shall examine all drawings and specifications to familiarize themselves with the type of construction to be used, and the nature and extent of work provided by other trades.
- Beginning installation means Contractor accepts existing conditions.
- Contractor shall verify dimensions and the correct locations of hardware before proceeding with the installation of hardware, cabling and/or connections.
- The Cabling Contractor shall be responsible for identifying and reporting to the Owner any existing damage to walls, flooring, tiles and furnishings in the work area prior to start of work. All damage caused by the cable, raceway, or miscellaneous material to the interior surfaces during the communication installation shall be repaired by the Contractor. The repairs must match preexisting color and finish of walls, floors and ceilings. Any contractor damaged ceiling tiles are to be replaced to match color, size, style and texture and shall not be taken from Owner's

attic stock.

- The Cabling Contractor shall be responsible for securing all Telecommunications Rooms and offices when not in use. At no time shall the Telecommunications Room be unattended if unsecured.
- Contractor should assume that all installation work including cable placement, termination and testing shall be performed between the hours of 7:00 a.m. to 5:00 p.m. Monday through Friday unless stated otherwise in the bid.
- Qualified personnel utilizing state-of-the-art equipment and techniques shall complete all installation work.
- The Cable system will be tested and documented upon completion of the installation as defined in the section below.
- Products selection, installation plans and termination layouts must be reviewed and approved by the Owner prior to construction. The review does not exempt the Contractor from meeting any of the requirements stated in this document.

SUBMITTALS

- Contractor shall submit a two-foot section of cable(s) of the type(s) to be sent to the site for final approval by the College. This two-foot section shall have the manufacturer's cable markings visible. Upon request, samples from every reel sent to the site shall be provided.
- Contractor shall submit house count table in spreadsheet/tabular format with shop drawing submittals. House count table shall include house count and location id's.

DELIVERY, STORAGE AND HANDLING

- The Cabling Contractor shall be responsible for all deliveries of material construction site. The Owner will not accept deliveries.
- For purposes of bidding, it is to be assumed that the Owner will not provide storage facilities for material. Pending availability, however, this may be arranged subsequent to award.
- Cable shall be stored according to manufacturer's recommendations at a minimum. Cable must be stored in a location protected from vandalism and weather. If cable is stored outside, it must be covered with opaque plastic or canvas with provision for ventilation to prevent condensation and for protection from weather. Manufacturer's storage specifications - in particular, those relating to temperature - shall be followed. All storage costs shall be included in Contract price.
- Tools, materials and equipment shall be confined to area designated by the Owner. The Contractor shall clean up and dispose of all debris and rubbish resulting from work on a daily basis.
- The Contractor is responsible for the clean-up of the dust, debris, shipping and packaging material associated with their installation. The Owner's disposal containers, shall not to be utilized without written authorization.

BDF, IDF, MDF AND TC CLOSET LAYOUT AND REQUIREMENTS

GENERAL REQUIREMENTS:

- The assembly and installation of data racks, Contractor shall confirm counts with Owner. These racks will be secured to the walls by a ladder rack to be provided and installed by the data contractor. This ladder will run across the racks from wall to wall and be attached to the data racks. There will also be a "t" section of this rack, running from the ladder rack to the wall behind the data racks to allow for the data cabling to be routed to the patch panels. The data racks will need to be fastened to the floor.
- Proper HVAC shall be provided in order to maintain operating temperature of 68 deg. F to 70 deg. F with humidity between 40-60 RH.

- Adequate lighting shall be provided in front and behind data racks and equipment.

TELECOMMUNICATIONS CLOSETS, IDF, BDF (GENERAL):

- The dimensions of this closet should be 8' X 10', minimum or larger per Owner and design requirements.
- The communications closet shall have walls sealed or covered to reduce dust development.
- Suspended acoustical ceiling is required.
- Floor shall be sealed or tiled.
- General building storage or plumbing fixtures (e.g. janitor sinks) shall not be permitted.
- Each data rack will need a dedicated 110 V quad circuit with an additional twist lock in parallel. The outlets should be installed near the bottom of the rack. The twist lock specification is L5-20R NEMA 20A 125V 1HP.
- Security System equipment may be installed in this space. If so, one dedicated 20A circuit shall be provided. Verify location of outlet with Owner.
- Security System shall be mounted on 4' x 4' x 3/4" plywood minimum.
- Telephone equipment may be installed in this space. If so, two dedicated 110 V circuits shall be provided. One circuit shall be used by the local PBX, one circuit shall be used by the service providers connecting equipment.
- Grounding bar shall be installed near the phone and data equipment.
- Wall phone jack is required. Verify location with Owner.
- Two data jacks and two voice jacks required. Verify location with Owner.
- 4' x 8' x 3/4" plywood shall be mounted horizontally at 6'-0" (to top of plywood) above finished floor for telephone and cabling equipment.
- Proximity reader controllers can be installed in this space.
- Room shall be secured with proximity card reader and electric lock.
- Adequate lighting shall be provided in front and behind data racks and equipment.

IDF ROOM:

- IDF: The dimensions of this room should be 8' x 10' minimum or larger per Owner and design requirements.
- Design requirements, at a minimum, similar to TC.

BDF ROOM:

- BDF: The dimensions of this room shall be determined by the A/E and will be dependent on equipment quantities and clearances. It shall be no smaller than 8' x 10'.
- Design requirements, at a minimum, similar to TC.

SECTION 270002 – COMMUNICATIONS MATERIALS

VOICE UTP STATION CABLE

- Transmission characteristics of the cable shall meet full Category 5E performance as defined by the TIA/EIA-A-5 Transmission Performance Specifications and Technical Systems Bulletin (TSB) #36.
- Cables shall be Underwriters Laboratory (UL) listed, comply with Article 800 (Communications Circuits) of the National Electrical Code and shall meet the specifications of NEMA (low loss), UL 444, and ICEA.
- The jacket color for "Voice" Station Cables shall be GRAY.
- Voice Station Cables shall meet a CMR (Riser) or CMP (Plenum) rating depending on the particulars of the installation and be suitable for installation in the environments defined including free-air, in conduit, in cable tray and in modular furniture.
- Cable shall be packaged in a way that minimizes tangling and kinking of the cable during installation. Examples are open reels or packages, which incorporate a rotating reel.
- Voice UTP Station Cables shall be Panduit PUP5504IG-UY Category 5e plenum (CMP) Twisted 4-pair UTP copper cable or Panduit PUR5504IG-UY Category 5e riser (CMR) Twisted 4-pair UTP copper cable.

DATA UTP STATION CABLE

- Transmission characteristics of the cable shall meet full Category 6 performance as defined by TIA/EIA-568-B-2.1. Cable shall be UL and/or ETL verified Category 6.
- Cables shall be Underwriters Laboratory (UL) listed, comply with Article 800 (Communications Circuits) of the National Electrical Code and shall meet the specifications of NEMA (low loss), UL 444, and ICEA.
- The jacket color for Data Station Cables shall be BLUE.
- Data Station Cables shall meet a CMR (Riser) or CMP (Plenum) rating depending on the particulars of the installation and be suitable for installation in the environments defined including free-air, in conduit, in cable tray and in modular furniture.
- Cable shall be packaged in a way that minimizes tangling and kinking of the cable during installation. Examples are open reels or packages, which incorporate a rotating reel.
- Data UTP Station Cables shall be Panduit PUP6004BU-UY High Performance Category 6 plenum (CMP) Twisted 4-pair UTP copper cable or Panduit PUR6004BU-UY High Performance Category 6 riser (CMR) Twisted 4-pair UTP copper cable.

COAXIAL STATION CABLE

- Coaxial Station Cable shall be RG-6 coax.
- Cables shall incorporate a 20-AWG solid center conductor and a tinned copper double braid shield (98% coverage). Conductors shall be separated by polyethylene core insulation.
- Cables shall be suitable for installation "free-air" in COD building risers, above drop ceilings, in cable tray or in duct.
- Coaxial cable shall have the following nominal transmission characteristics:
 - 75-Ohm Characteristic Impedance
 - 66% Propagation Velocity
 - 1-pf/ft. Capacitance
- Coaxial station cabling shall be continuous and splice free.
- Coaxial Station Cable shall be Belden p/n 8281A (CMR), CommScope Catalog # 2227K (CMP).

TELECOMMUNICATIONS OUTLET

- At the workstation location, Station Cables shall each be secured in a housing, which shall also accommodate the termination assemblies for those cables. The combined assembly, referred to as the Telecommunications Outlet (TO), shall be modular in design and allow for flexibility in integrating the different configurations required at the site.
- There shall be one (1) basic Telecommunications Outlet configuration:
 - The "Copper-Only" Communication outlet that is capable of supporting only UTP and Coaxial Cabling.
- In addition, provision of a separate, "Voice Only" outlet that is installed to accommodate a wall-mounted Telephone Set shall be considered. This configuration, referred to as "Split Voice", can be used in concert with either of the above configurations.
- The color and material of the frame cover and inserts (if applicable) shall be Electric Ivory Plastic.
- The cover of the telecommunications outlet shall be secured to the base with a screw. The screw(s) shall, in turn, be hidden from view by a label or other covering to discourage casual access.

COPPER ONLY OUTLET

- The Copper-Only Outlet shall comply with the general requirements defined above and with the following *additional* requirements:
 - The Copper-Only Outlet shall provide adequate capacity to accommodate the following maximum configurations:
 - Two (2), four (4) or six (6) modular jacks (Voice or Data)
 - The same as above but one (1) "F" Connector substituted for one (1) modular jack.
 - All jacks and couplings shall mount on either the base of the unit or the cover.
 - The Copper-Only Outlet shall be available in both "flush" and surface mount designs and shall be adaptable to mounting on cellular floor presets or posttests poke thru or under floor wiring.
 - Where flush mounting is not possible, a Surface box shall be used. Surface Box shall be Panduit Single Gang One-piece Deep Box.
- Wall-Mounted Copper-Only Outlets
 - Wall mounted Copper-Only Telecommunications Outlets shall be Panduit CFPL2 2 Port CFPL4 4 Port and CFPL6 6 Port.
- Floor-mounted Copper Only Outlets
 - Floor-mounted Copper-only Outlets shall comply with the above general requirements plus the following:
 - Floor-mounted Copper-only Outlets shall be mounted in an aluminum floor "monument".
 - Communications jack assemblies shall mount on one side of the assembly and be sideways facing (parallel floor). Mounting plates shall be designed to accommodate the modular jack type installed.
 - A protective bracket shall be available to guard against damage to the jack assemblies or patch cord plugs.
 - "Copper-Only" Telecommunications Outlets shall be Walker 500HB (Monument) and 500B back plate, with 500DR front plate. Monument shall be fitted with adapter(s) appropriate for the floor-type being accessed.
 - Jack assemblies shall be mounted on Panduit CF1062 for 2 port and CF1064 for 4 port access. Bracket shall be 500-GUARD.
- Wall mounted Voice Only Outlet
 - Wall-mounted "Voice Only" Outlets shall consist of a mounting plate on which a telephone set may be mounted.

- o The Wall Plate shall be of Stainless Steel construction, mount on a standard single gang outlet box or bracket and include mating lugs for wall phone mounting.
- o The wall plate shall be Panduit KWP5EY or KWP6PY or equivalent and be fitted with one (1) voice jack meeting the criteria defined below.
- Station Voice Copper Termination at Media Outlet
 - o Station Voice Copper Cables shall each be terminated at the Media Outlet in an Eight-pin Modular Jack, Panduit CJE88T.
 - o Jacks are to be pinned per TIA/EIA-568B with the pairing as follows:
 - Pair 1 – Pins 5&4
 - Pair 2 - Pins 1&2
 - Pair 3 - Pins 3&6
 - Pair 4 - Pins 7&8
 - o The interface between the jack and the station cable shall be a 110-Style block. Blocks shall be designed to maintain the cable's pair twists as closely as possible to the point of mechanical termination.
 - o Voice Termination hardware shall meet Category 5E performance specifications as defined by TIA/EIA-A-5 and TSB40 specifications for connecting hardware.
 - o The color of the Voice Jack shall be WHITE.
 - o Voice Jack shall be Panduit CJ5E88T.
- Station Data Copper Termination at Outlet
 - o Station data copper cables shall each be terminated at the Media Outlet in an Eight-pin Modular Jack. Jack contacts shall have a minimum of 50-micro-inches of gold plating. Panduit CJ688T3.
 - o Jacks are to be pinned per EIA 568B with the pairing as follows:
 - Pair 1 - Pins 5&4
 - Pair 2 - Pins 1&2
 - Pair 3 - Pins 3&6
 - Pair 4 - Pins 7&8
 - o The interface between the jack and the station cable shall be a 110-Style block. Blocks shall be designed to maintain the cable's pair twists as closely as possible to the point of mechanical termination
 - o Data Termination hardware shall meet full Category 6 performance specifications as defined by TIA/EIA-568-B-2.1 and TSB-40A specifications for connecting hardware. All pair combinations must be considered, with the worst-case measurement being the basis for compliance. The Jack must be UL verified and listed. All pair combinations must be considered with the worst case measurement being the basis for compliance.
 - o The color of the Data Jack shall be BLACK.
 - o Data Jack shall be Panduit CJ688T3.

BACKBONE VOICE COPPER CABLE

- Voice Backbone Cable shall incorporate 24 AWG solid annealed Copper Conductors. Conductors shall be insulated with a thermoplastic skin. Maximum diameter of the insulated conductor shall be 0.048 in (1.22 mm).
- Conductors shall be twisted to form pairs and fully color-coded. Conductor twists shall be of varying lay lengths in order to minimize crosstalk.
- All conductors shall be continuous and splice free. Bridge taps are not permitted.
- Cables shall be Underwriters Laboratory (UL) listed, comply with Article 800 (Communications Circuits) of the National Electrical Code and shall meet the specifications of NEMA (low loss), UL 444, and ICEA.
- Cable shall meet the physical and electrical requirements of 100 Ohm "Backbone Cable" as defined by the EIA/TIA-568 Standard for Commercial Building Wiring.
- Inter-Building Cable shall conform to Category 5E performance specifications or better.
- Intra-Building Cable shall conform to Category 5E performance specifications or better.

- Conductors shall be identified by the insulation color of each conductor. The color code shall follow the industry standard composed of ten (10) distinctive colors to identify 25 pairs in accordance with ICEA publication S-80-576-1988. Marking of each mate of the primary
 - conductor in a pair with the color of that primary conductor is optional.
- When cables of larger than 25 pairs are required, the core shall be assembled into 25-pair sub-units, each color coded in accordance with ICEA publication S-80-576-1988. Cables with over 600 pairs shall have 25-pair binder groups combined into super units. These super units shall be wrapped with a solid color thread that follows the primary color scheme of white, red, black, Yellow and violet. Binder color code integrity shall be maintained wherever cables are spliced.
- In exterior applications, the cables shall contain an overall corrugated, coated aluminum shield that is electrically continuous over its entire length.
- The cables shall not incorporate a "T1" screen.
- The cable core shall be protected by a uniform, continuous thermoplastic jacket (sheath) the types specified below. The cable jacket shall be sequentially printed with a footage marker at regular intervals along its length.
- Backbone cabling (Copper/Fiber Optic) shall not share the same raceway or path with horizontal cabling.

INTRA-BUILDING VOICE COPPER CABLE

- Where installed in conduit, cable tray and/or in building riser shafts, cables shall be suitable for such installation and comply with the following *additional* requirements:
- Cables shall meet NEC Article 800 Type CMR.
- Cables shall be Air Core with an 8-mil ALVYN Sheath
- Cables shall be "ARMM" Series

BACKBONE FIBER OPTIC

- The fiber optic backbone cable may be a multimode fiber (62.5/125 μ m unless otherwise noted), single-mode fiber (8.3/125 μ m) or a combination of both.
- All indoor fiber shall have the designation of OFNR (Optical Fiber Non-conductive Riser for non-plenum environments and OFNP (Optical Fiber Non-conductive Plenum for plenum environments). The construction of all fiber optical cable shall be tight-buffered 900 μ m of distribution design.
- When installing the fiber optic backbone cable, ensure that the minimum cable bend radius and maximum vertical rise recommended by the fiber manufacture is not exceeded.
- All fiber shall be installed in the appropriately sized and correct environmental inner-duct system. No other fiber shall be installed in occupied inner-duct.
- All optical fiber shall be Panduit.

INTER-BUILDING CABLING (COPPER AND FIBER)

- All inter-building or outdoor communications cabling shall be placed in a rigid conduit system. The conduit system shall be suitable for direct burial or encased in concrete. The minimum requirements for the conduit system shall consist of one 4" conduit for copper environment and one 4" conduit for fiber environment.
- The conduit system designed for the copper environment shall not exceed the 40% fill ratio. All cables shall be installed at the same time and no other cables shall be installed after cable installation.
- The conduit system designed for the fiber environment shall have (3) one inch inner-duct installed the entire length of the system. Each inner-duct shall have pulling rope for fiber installation. All fiber shall be pulled in one continuous pull through inner-duct system and no other copper cable of fiber cable may be installed in the future.

- Outdoor copper & optical fiber types shall be determined based on environmental and system applications at time of installation.
- All copper backbone cabling shall be Panduit.
- All optical fiber backbone cabling shall be Panduit.

MISCELLANEOUS MATERIALS

- Equipment Rack and Associated Hardware
 - Communications equipment rack and cabinets shall be properly anchored at top and bottom.
 - Racks shall be anchored to floor with properly sized drop-in anchors with appropriately sized bolts and washers. All racks and cabinets shall be attached to ladder rack system. If ladder rack system does exist, coordinate with project manager.
 - Horizontal cable management hardware shall be positioned on the equipment racks to allow for an orderly routing of copper and fiber optic jumpers.
 - Jumper Management Panels shall incorporate Horizontal and Vertical distribution rings to accommodate a defined routing of individual jumper cables. Horizontal distribution rings shall be 3" x 3.5" (minimum dimension) and mounted on a 3.5" painted steel plate.
 - Each Jumper Management Panel shall be supplied with a minimum of (10) releasable cable support ties. Ties shall be minimum 6-inches in length.
 - Vertical Jumper Rings shall be positioned on each rack upright equidistant between each Horizontal Management Panel installed.
 - There shall not be more than (3) three Panduit 48 port patch panels per rack.
 - Relay Racks Panduit NetFrame NFR84 Jumper Management Panels shall be Panduit CMPHH2. Vertical Jumper rings shall be Panduit CMVDRC or equivalent. Releasable cable support ties shall be Panduit HL T21-X0 (BLACK).
- Surface Raceway
 - The installation of surface mounted outlets and surface mounted station cable is anticipated at some locations where solid walls inhibit the installation of cable behind the wall. Nonmetallic surface raceway shall be used – no exposed cable shall be permitted.
 - The surface raceway shall have a screw-applied base and have a snap on cover. The use of double-sided tape to anchor the raceways will not be permitted.
 - Both the base and cover shall be manufactured of rigid PVC compounds and be suitable for painting.
 - The raceway shall be of a color fitting the décor of the area and be paintable (by others). Approval of samples by the Engineer prior to installation is required (Upon request by Owner). All fittings including, but not limited to, extension boxes, elbows, tees, fixture boxes and fittings shall match the color of the raceway.
 - Fittings and couplings shall be sized to insure that Category 5E, 6 and fiber optic cables that are routed through them do not exceed their recommended minimum bend radius requirements.
 - The raceway and all system devices must be UL Listed and exhibit nonflammable self-extinguishing characteristics, tested to specifications of the UL94V-0.
 - Raceway shall be sized to accommodate a 50% increase in the number of cables initially installed while maintaining a fill (ratio of cable area vs. raceway area) no greater than 60%. A nominal cable diameter of 0.2" (Voice and Data Cables) should be assumed.
 - The non-metallic raceway shall be Panduit *Pan-Way L Series*.

- Bonding and Grounding
 - o All bonding conductors shall have green insulation and be copper. The minimum bonding conductor size shall be No. 6 AWG (TIA/EIA-607 5.1.3).
 - o All Telecommunication Closets (TC) shall be equipped with a ground bus bar capable of terminating multiple #6 AWG ground cable conductors. All TC's ground bus bars shall be labeled TGB (Telecommunications Grounding Bulbar). TGB shall have a #6AWG cable conductor continuously run to the TMGB (Telecommunications Main Grounding Bulbar). The TMGB shall be bonded to the Main Building Grounding Electrode.

SECTION 270003 – COMMUNICATIONS TERMINATIONS

COPPER TERMINATION HARDWARE AT TELECOMMUNICATIONS CLOSETS

- At the Telecommunications Closet(s), all Copper Cables shall be organized in a fashion compliant with established cabling standards at the College. Where adding to an existing installation, termination components shall be integrated into the existing plan and consider equipment positioning and labeling.
- The Contractor shall cross-connect the first 1st (BLUE) pair of each new workstation cable to the riser backbone to link the telecommunications closet to the next closet in the hierarchy. The cross-connects wire of colors matching the color of the station cabling conductors (BLUE) shall be used for each cross-connect.
- Each 4- or 5-pair group shall be positioned on the terminating hardware in numerical order based on Pair Count or Telecommunications Outlet I.D. with the lowest I.D. Number or Pair first.
- Termination hardware shall be suitable for mounting on walls, in racks, or in distribution frames. Wall mounted cross-connect fields and frames shall be arranged to allow for easy expansion.
- The Contractor shall provide house count to Owner.

VOICE COPPER TERMINATION AT TC (BACKBONE & STATION)

- At the Telecommunications Closet(s), each Voice "Backbone" Cable and 4-pair "Voice" Station cable and shall be terminated on high-density horizontal blocks. Each horizontal row of the cross-connect block must be capable of terminating one (1) twenty-five pair binder group (Tie Cables) or six (6) four pair groups (Station Cables). Where station cables are installed on 110 blocks, the 25th position of each horizontal voice block shall remain vacant.
- Backbone and Station blocks shall be segregated clearly identifying their function.
- The blocks shall be designed to maintain the cable's pair twists as closely as possible to the point of mechanical termination. The installer shall insure that the twists are preserved to within 1-inch if the termination.
- Blocks shall identify pair position by a color designation - Blue, Orange, Green, Brown and Slate (if applicable).
- The mechanical terminations shall:
 - o Have the ability of terminating 22 - 26 AWG plastic insulated, solid and stranded copper conductors.
 - o Provide a direct connection between the cable and jumper wires.
 - o Insert less than 0.02 dB of attenuation @ 100 MHz
- Blocks shall be designed as to allow for cables to be fed from above or below.
- The Voice Termination Hardware shall be Panduit PAN-Punch 110 Cross Connect System. Wall mounted hardware shall be equipped with legs and shall consist of 300- (P110BW300-X) Wiring Blocks configured with P110CB4-X (4-pair) or P110CB5-X (5-pair) Connecting Blocks for Station and Backbone cabling, respectively.

DATA PATCH PANEL

- Copper Data Station Cables shall each be terminated at their designated TC to a Panduit patch panel.
- Category 6 performance per TIA/EIA T568B.2.1 must be maintained by the panel as a system and include this interface. All pair combinations must be considered, with the worst-case measurement being the basis for compliance.

- Jacks are to be pinned per TIA/EIA T568B with the pairing as follows:
 - Pair 1 - Pins 5&4
 - Pair 2 - Pins 1&2
 - Pair 3 - Pins 3&6
 - Pair 4 - Pins 7&8
- Panels shall incorporate cable support and/or strain relief mechanisms to secure the horizontal cables at the termination block and to insure that all manufacturers minimum bend radius specifications are adhered to.
- When multiple floors are being serviced in a closet, each floor should have separate patch panels. Each patch panel should start with lowest sequential number starting with one per each floor, per each closet and then increment by one until each panel is full or no more drops available on that floor with its closest closet. If possible the patch panel for each floor should be installed on a separate rack.
- Contractor shall discuss the use of 24 port patch panel with the owner before usage. Use of 24 port patch panel is discouraged.

COAXIAL PATCH PANEL

- All installed coaxial cables shall be terminated at both the TC and TO locations in a male "F" - Connector matched to the cable type. Connectors may be "Crimp" or "solder" type.
- Each terminated coaxial cable shall be then mated with a female "F" Connector coupling which is, in turn, mounted on a rack-mountable panel.
- Panels shall be of painted steel.
- Coaxial Patch Panels shall be Semtron "JP" Series" or equivalent.

INTER-BUILDING CABLING (COPPER & FIBER)

- Fiber optic backbone shall be terminated as SC in accordance with approved materials list.

SECTION 270004 – COMMUNICATIONS INSTALLATION

- The installation shall follow recognized industry recommendations including those defined by the:
 - o TIA/EIA-568-B.1 Commercial Building Wiring Standard
 - o TIA/EIA-568-B.2 Commercial Building Wiring Standard
 - o TIA/EIA-568-B.2.1 Commercial Building Wiring Standard
 - o TIA/EIA-569 Commercial Building Standard for Pathways and Spaces
 - o TIA/EIA-606 Labeling Guidelines
 - o TIA/EIA-607 Grounding
 - o National Electrical Code (NEC; 1999)
 - o BICSI TDM Manual
 - o Applicable State and Local Codes
- Cable Pathways (Renovation Projects)
 - o Renovation Projects: The Contractor is responsible for verifying the availability of riser access between floors. Where required, the contractor shall core new risers.
 - o All Projects: All new riser holes shall be fitted with sleeves. All riser holes used for the installation, both new and existing, shall be firestopped upon completion of cable installation.
- Cable Installation
 - o All cables, termination components and support hardware shall be furnished, tested, installed and wired by the Contractor.
 - o During pulling operation an adequate number of workers shall be present to allow cable observation at all points of duct entry and exit as well as the feed cable and operate pulling machinery.
 - o Cable pulling shall be done in accordance with cable manufacturer's recommendations and ANSI/IEEE C2 standards. Recommended pulling tensions shall not be exceeded.
 - o Manufacturers minimum bend radius specifications shall follow in handling, installation and securing of all cables. Any cable bent or kinked to radius less than recommended dimension shall not be installed.
 - o All cables shall be installed splice-free.
 - o Cable sheaths shall be protected from damage from sharp edges during and after installation.
 - o Where a cable passes over a sharp edge, a bushing or grommet shall be used to protect the cable.
 - o All cable shall be free of tension at both ends. In cases where the cable must bear some stress, Kellum grips may be used to spread the strain over a longer length of cable.
 - o Ventilation of buildings on the Glen Ellen Campus includes both ducted and ceiling-plenum air return designs as follows:
 - Plenum Return Sites:
 - IC, SRC and PE
 - Ducted Return Sites:
 - M, K & L Buildings, OCC, and Arts Center
 - COD Satellite sites vary by location.
 - o The contractor is responsible for verifying cabling requirements prior to construction to insure that the installation is compliant with all code restrictions.
 - o All openings made to accommodate the installation of any cable shall be sleeved and fire stopped per prevailing code requirements upon completion of cable installation.
 - o At no time shall horizontal cabling share the same raceway or path with Backbone cabling.

HORIZONTAL CABLING STATION

- All Cables and Termination hardware shall be technically compliant with and installed in accordance with TIA-568A, TIA-568-B.2.1 (Standard for Commercial Building Wiring), TIA-569, TSB 36 and TSB-40.
- Where installed free-air, Station Cable shall run at right angles and be kept clear of other trades work. Cables shall be supported according to code utilizing Caddy type J-Hooks mountings and anchored to ceiling concrete, or structural steel beams. The Contractor shall not exceed the maximum cable limit of the cable supports. Cables shall not be attached to existing cabling, plumbing or steam piping, ductwork, ceiling supports or electrical or communications conduit. Supports should be spaced at a maximum 5-foot interval unless limited by building construction. Cable shall never be laid directly on the ceiling grid.
- The maximum Station Cable length shall not exceed 295-feet (90-meters) in order to meet data communications performance specifications. This length is measured from the termination panel in the Telecommunications Closet to the Outlet and must include any slack required for the installation and termination. The Contractor is responsible for installing station cabling in a fashion as to avoid unnecessarily long runs. Any area that cannot be reached within the above constraints should be identified and reported to the College prior to installation. The College must approve any plan changes.
- Slack cable shall be left above each Work Station to allow for repair and/or future office rearrangements without re-cabling. These "service loops" shall be secured at the last cable support (e.g. Caddy type J-Hook) before the cable leaves the ceiling and shall be coiled from 100% to 200% of the cable recommended minimum bend radius. Slack lengths are as follows:
 - At any location where cables are installed into movable partition walls or modular furniture via a service Pole, approximately 6 feet of slack shall be left for each station cable under 250-feet in length.
- To reduce or eliminate EMI, the following minimum distances shall be adhered to. In particular, regard must be paid to the routing of cable and avoidance of potentially disruptive sources of electrical noise such as motors and fluorescent lighting. The contractor shall notify the College if installation conditions inhibit these guidelines.
 - No less than (5) five inches from power lines of 2kVa.
 - No less than (30) thirty inches from high voltage lighting (including fluorescent lighting).
 - No less than (39) thirty-nine inches from power lines of 5kVa or greater.
 - No less than (39) thirty-nine inches from transformers and motors.
- Care should be taken in the use of cable ties to secure and anchor the station cabling. Ties should not be over tightened as to compress the cable jacket. No sharp burrs should remain where excess length of the cable tie has been cut.

BACKBONE VOICE COPPER CABLE

- Backbone Voice Copper Cable shall be sized to provide a minimum of 2-pairs per outlet planned in the area plus 30% for growth.
- The outer metallic sheath of the Voice Backbone Cable shall be grounded to either (1) the Telecommunications Grounding Busbar (TGB) or (2) an existing backbone cable shield using a #6 AWG solid copper conductor (GREEN jacket). The grounding plan should be devised as to avoid the potential for ground loops through multiple ground points.

FIBER OPTIC CABLE

- At TC locations, provision shall be made to protect exposed fiber optic cables and secure the cable in the transition from cable tray, conduit and/or innerduct to the termination enclosure.
- A minimum of 5-meters (~ 15-feet) of slack Inter- and Intra-Building Fiber Optic Cable shall be provided at each TC. This slack is exclusive of the length of fiber that is required to accommodate termination requirements and is intended to provide for cable repair and/or equipment relocation. The cable slack shall be stored in a suitable enclosure to protect the cable from damage.
- Where fiber optic cable is installed in innerduct, the innerduct(s) shall be secured in a fashion as to insure their stability. This may be through fastening to the wall for the riser chase closet or through the installation of a small diameter rigid conduit. The only acceptable residual tension on the fiber optic cable is that due to its own weight.

TELECOMMUNICATIONS OUTLET

- Telecommunications Outlets shall be positioned at a height matching existing services. Where no guide is available, outlets shall be mounted with the center of the outlet 18-inches above floor height unless instructed otherwise by the College.
- Positioning of wall-mounted telephone outlets should be in compliance with the provisions of the Americans with Disabilities Act (ADA).
- Outlets shall be securely mounted and level.
- All unused slots or positions in the Telecommunications Outlet shall be covered with blank inserts.
- At the Outlet location, subsurface routing of cables inside "fishable" walls is preferred. Where this cannot be accommodated, however, station cable shall be routed via surface raceway. Raceway should be of adequate dimensions to allow for installation of the cable in compliance with the manufacturers specification including bend radius, crush and tensile limits. Exposed surface raceway should be paintable and fit the decor of the space. Telecommunication Outlet installation on sheetrock walls shall be preceded by the installation of a bracket which mounts securely to the sheetrock (e.g. "Caddy" or "MPLS" Bracket). The Outlet Frame shall, in turn, be secured to the bracket. Telecommunications Outlets shall not be screwed directly to the sheetrock.

COPPER TERMINATION HARDWARE

- Copper Termination Hardware at TC
 - o At the Telecommunications Closets, all Data and Voice Cables shall be positioned on termination hardware in sequence of the Outlet I.D. starting with the lowest number. All four pairs, terminating on each voice modular jack shall appear on the Telecommunications Closet 110 blocks. Termination Hardware (Blocks and Patch Panels) Positioning and Layout must be reviewed and approved by the College prior to construction. The review does not exempt the Contractor from meeting any of the requirements stated in this document.
 - o Except in the IC PBX Room, Voice Termination Hardware shall be wall mounted on plywood board. The contractor shall neatly route and secure new cables via cable management hardware (e.g. D Rings and cable guides) from cable tray to the cable termination hardware. Old cable ties shall be removed and replaced with Velcro style cable wraps to maintain a tidy appearance. Cables shall be fed from below the Termination Hardware in a manner that will facilitate growth.

- o The Height of the Voice Termination Field shall not exceed 6-feet (72-inches) above floor level to facilitate cable maintenance. Backbone Cabling should be positioned to the Left; Station cabling to the Right.
- o Where multiple floors are served from a single TC, the Termination Field for each floor shall be segregated from each of the others. Following the standard established at the site, each cross connect field for a given floor is positioned in a separate vertical column (Voice). Spare capacity should be considered in the design and be provided for each grouping.
- o At the Voice Termination Blocks (all 110-type interface), the installer shall insure that the twists in each Voice Cable pair are preserved to within 1.0-inch of the termination. The cable jacket shall be removed only to the extent required to make the termination.
- o Where Voice Termination Hardware is wall mounted, Horizontal Troughs incorporating split plastic distribution rings shall be provided by the Contractor to accommodate routing of jumpers. Troughs shall be positioned at the top of each column of termination blocks and between each 300-pair wiring block. Troughs shall be Panduit P110JTW.
- o The Contractor shall cross-connect the first 1st (BLUE) pair of each new workstation cable to the riser backbone to link the telecommunications closet to the next closet in the hierarchy. The cross-connects wire of colors matching the color of the station cabling conductors (BLUE) shall be used for each cross-connect.
- o In new installations, a jumper wire spool holder shall be installed at the Telecommunications Closet(s). One full (1000-foot) spool of 24-AWG one-pair jumper wires, one spool each white-blue/blue shall be supplied with the holder. The holder shall be designed for use as a spool holder and shall mount securely to the plywood or ladder rack (above the Voice Field).
- o The Contractor shall provide house count to Owner
- Data Patch Panel
 - o At the Data Patch Panel 110-type interface, the installer shall insure that the twists in each Data Cable pair are preserved to within 0.5-inch of the termination. The cable jacket shall be removed only to the extent required to make the termination.

MISCELLANEOUS MATERIALS INSTALLATION

- Jumper Management Hardware
 - o Horizontal cable management hardware shall be positioned on the equipment racks to allow for an orderly routing of copper and fiber optic jumpers. At minimum, these Jumper Management Panels shall be positioned:
 - Horizontal management shall be placed above and below each forty-eight (48) port Data Patch Panels.
 - Horizontal management shall be placed above and below each fiber Optic HDC (Station fiber).
 - Horizontal management shall be placed above and below each pair (2) of Fiber Optic Termination Panels (Backbone).
- Surface Raceway
 - o Where Outlets are installed in areas where the walls cannot be fished, the Station Cabling serving these outlets shall be covered with raceways. No exposed wire shall be permitted within offices, laboratories, conference rooms, classrooms, etc.
 - o The base and cover of the raceway shall be of PVC have a screw applied base and have a snap on cover. Both the base and cover shall be manufactured of rigid natural PVC compounds. The raceway must be UL Listed and exhibit nonflammable self-extinguishing characteristics.
 - o The raceway shall originate from a surface mounted Outlet box, have a screw-applied base and terminate above the ceiling. A fitting designed for the raceway shall be used to conceal the ceiling penetration.

- o Surface mounting of an outlet intended for flush-mount installation shall be preceded by the installation of a Surface Box ("Back-box") onto which the outlet frame is mounted.
- o The contractor shall be responsible for all penetrations required to accommodate the raceway in making any transitions between office areas and hallways or other common areas through which the raceway may be routed. All cut molding sections shall be patched and painted upon completion of the raceway installation.
- o All cuts and penetrations must be patched and painted. Upon completion of installation, raceways must be cleaned of all fingerprints, soil, etc.
- Firestop Systems
 - o All penetrations through fire rated building structures, walls, and floors; shall be sealed with an appropriate Firestop system. The requirements applies-to through penetrations (complete penetration) and membrane penetrations (through one side of a hollow fire rated structure). Any penetrating items i.e., riser slots and sleeves, cables, conduit, cable tray, and raceways, etc. shall be properly firestopped.
 - o All Firestop systems shall be installed in accordance with the manufacture's recommendations and shall be completely installed and available for inspection by the College.
- Bonding, Grounding and Electrical Protection
 - o All Telecommunications Equipment and raceways shall be properly grounded in accordance with TIA/EIA-607 the NFPA 70 (National Electrical Code), and all other applicable codes and regulations.
 - o The major components of the telecommunications grounding and bonding infrastructure are as follows:
 - The bonding conductor for telecommunications
 - The Telecommunications Main Grounding Busbar (TMGB)
 - The Telecommunications Grounding Busbar (TGB)
 - The Telecommunications Bonding Backbone (TBB)
 - The Telecommunications Bonding Backbone Interconnecting Bonding Conductor (TBBIBC). The conductors used to bond the components to the TMGB &the TGB's
 - o All bonding conductors and connectors shall be listed for the purpose intended and approved by a Nationally Recognized Testing Laboratory (NRTL).
 - o Route ground conductors to provide the shortest, most direct path from point to point.
 - o Splices in bonding or grounding conductors are not allowed. The minimum bend radius of the conductors shall be eight inches (8").
 - o The TMGB and the TGB's shall be electro-tin plated and insulated from the supporting structure by at least two inches.
 - o If an electrical sub-panel resides in a Telecommunications Room, that panel must have a #6 AWG bonding conductor from the TGB to electrical panel ground bar.
 - o All Telecommunication Closets (TC) shall be equipped with a ground bus bar capable of terminating multiple #6 AWG ground cable conductors. All TC's ground bus bars shall be labeled TGB (Telecommunications Grounding Bulbar). TGB shall have a #6AWG cable conductor continuously run to the TMGB (Telecommunications Main Grounding Bulbar). The TMGB shall be bonded to the Main Building Grounding Electrode.
 - o All racks, metallic backboards, cable sheaths, metallic strength members, splice cases, cable trays, ladder racks, etc. entering or residing in all Telecommunications Rooms. Shall be grounded to the respective TGM or TMGB using a minimum #6 AWG stranded copper bonding conductor and 2-hole compression connectors. Provide a ground bar at the base of each rack for equipment connections.
 - o All incoming outdoor cables shall be terminated on the appropriate sized protector, and all protectors shall be attached to the TMGB via a #6 AWG stranded conductor.
 - o All ground cables shall be labeled with the proper FROM - TO (Origination Point to Destination Point) designation.

SECTION 27 0005 – COMMUNICATIONS LABELING

- The Telecommunications Administration System shall meet or exceed TIA/EIA-606-A standards.
- All Telecommunications Outlets, Data Patch Panel, Voice Termination Blocks AND CABLES shall be clearly labeled using a Code identifying each Information Outlet location as unique throughout the COD Campus. This code, which will identify cabling and terminations at both IDF and Media Outlet locations, shall be as follows:
 - o BB-XCC-F-###A
 - BB= the designation to identify the specific building
 - XCC = the Telecommunications Closet (TC) serving that jack. The TC is designated by Floor (XX) and their geographic location on that floor (CC) (e.g. Northwest, Southeast, etc.).
 - F = the Floor on which the jack is located.
 - ### = a sequential number assigned to that jack.
 - A = Alpha designation used ONLY if multiple jacks of a given type (e.g. Voice or Data) are housed in the same Outlet assembly.
 - For example, "IC-2NW-3-123" designates the 123rd jack on the 3rd Floor served from the IDF in the Northwest area of the 2nd Floor of the IC building. If multiple Data cables would be contained in the outlet, they would be identified as "A", "B", "C", and so on.
- This numbering sequence plus a two (2) character Building Designator shall be utilized in the Cable Management System for identification of station cabling. Building designations are as follows:
 - o Arts Center = AR
 - o Instructional Center = IC
 - o K Building = KK
 - o L Building = LL
 - o M Building = MM
 - o Open Campus Center (OCC) = OC
 - o Physical Education = PE
 - o Seaton Computing Center = SC
 - o Student Resource Center (SRC) = SR
 - o Student Services Center (SSC) = SS
 - o WDCB Tower = JJ
 - o Westmont Center = WC
 - o Naperville Center = NC
 - o Davea (Addison) = AD
 - o Bloomingdale Center = BC
 - o Lisle Center = LC
 - o Carol Stream Community Education Center = CC
 - o West Chicago Community Education Center = WE
 - o H Building = HH
 - o BIC Annex = BA
 - o Early Childhood Education Center = EC
 - o Technical Education Center = TE
 - o Business & Community Education Center = BC
 - o Parking Structure = PG
 - o Health and Science Center = HS
 - o Culinary and Hospitality Center (CHC) = CH
 - o Homeland Security Education Center (HEC) = HE

- Where adding to an existing installation, cable identification numbering must be integrated into the established plan and must be approved by the Owner.
- Where adding to an installation, both voice and data numbering must remain in a "matched" sequence. Throughout the school, at each location has the "same" numbering on the faceplate ID for both voice and data. Example: If the 4th location in a series is a "voice only" location, then the data patch panel would be skipping number 4 in its sequence. Therefore, if the numbers are continuing, (assuming the "next" location is both voice and data) the data patch panel's next number would be 5 (skipping # 4) with NO blank data jacks open on the data patch panel. By the same description, if a location in a series is a "data only", the voice designation strip would represent a "skip" in its sequence. Again the arrangement of the added cables would leave NO blanks on the 110-voice frame.
- ALL labeling shall be machine generated (Panduit) in black ink on white background tags and be permanent. NO HAND WRITTEN LABELS SHALL BE ALLOWED.
- Cables
 - o ALL Cables shall be identified AT BOTH ENDS using a self-laminating tag wrapped around the cable (e.g. not a "flag"). The Contractor shall use labeler. Cable labels shall indicate cable designation and destination. In Station cables, for example, this designation shall be the Telecommunications Outlet identification.
- Telecommunications Outlets
 - o Telecommunications Outlets are to be labeled (1) on the cover of the assembly, (2) on the base of the assembly (if applicable) and (3) on each cable terminated at that location.
 - o Where multiple cables of a given type (e.g. "Data") are contained in a single outlet, the alpha-designator ("A", "B", "C", and so on) those jack positions shall be so labeled.
- Data Patch Panels
 - o Data Patch panels shall be clearly labeled as to the destination and position of each cable terminated on that panel. Cables shall be positioned in sequence of Outlet I.D.
 - o The TC designator may be omitted on each jack position provided that the panel itself includes the TC designator.
 - o Station cables shall be labeled within 4-inches of the cable choke at Data Patch Panels.
- Voice Termination Block
 - o Each horizontal row (in pairs) of the Voice Termination Block shall be labeled with "Designation Strips" which identify the destination and position of each cable terminated on that block.
 - o Designation Strips shall be color coded to indicate the block's application. Color-coding shall be as follows:
 - Inter-Building Cable (e.g. IC-PE or OCC-"K") = Brown
 - Intra-Building Cable (MDF-IDF) = White
 - Station Cable = Blue
 - o Blocks on which "Station" Cabling is terminated will be labeled as to identify Telecommunications Outlet I.D.s. Voice termination blocks on which "Backbone" or "Tie" Cabling is terminated will be labeled to identify Pair Count are identified (e.g. 1-25, 26-50, etc.). Assignment of Pair Count(s) shall consider the existing count and must be approved by Owner.

SECTION 270006 – COMMUNICATIONS TESTING

- Upon completion of installation work, the contractor shall visually inspect all cabling and terminations to insure that they are complete and conform to the requirements defined herein.
- The contractor shall provide to the College a written certification that this inspection has been made.
- All cable sub-systems (e.g. Inter-building, Intra-Building and Station) must be tested independently. Testing of these sub-systems cannot be combined (e.g. through interconnection).
- Contractor shall conduct acceptance testing according to a schedule coordinated with the College. Representatives of the College may be in attendance to witness the test procedures. The contractor shall offer adequate advance notice to the College as to allow for such participation.
- The Contractor is responsible for supplying all test equipment and personnel to conduct acceptance test.
If any link is found to be outside the specification defined herein, that cable and the associated terminations (if applicable) shall be replaced at the expense of the contractor. The applicable tests shall then be repeated.
- All backbone fiber must be tested bidirectional using OTDR. OTDR graphs and lengths of run must be included. Results shall be provided to Owner.
- Voice Backbone Testing
 - All testing shall include the installed termination hardware as part of the test path. Length of the run must be given on test results. Backbone cables shall be tested between TC's and include termination blocks.
 - All cable pairs shall be verified for pair validity, continuity (opens/shorts), and polarity (tip/ring). Split or miss-positioned pairs must be identified and corrected.
 - Inter- and Intra-Building copper cables may have a maximum failure rate of 3% based on total pair count. All bad pairs must be identified and documented.
- Voice UTP Station Cable Testing
 - The Specification of Field Test Requirements for a Balanced Twisted-Pair Cabling System.
 - Cat 5e Installation: field test requirements upon completion of the installation
 - Every cabling link in the installation shall be tested in accordance with the
 - Telecommunications Industry Association (TIA) standard ANSI/TIA/EIA-568-B.1 (most current version).
 - Optional Requirements
 - Upon Owner request, a representative of the end-user may select a random sample of 5% of the installed links. The representative (or his authorized delegate) shall test these randomly selected links and the results are to be stored in accordance with the prescriptions in Section I.C. The results obtained shall be compared to the data provided by the installation contractor. If more than 2% of the sample results differ in terms of the pass/fail determination, the installation contractor under supervision of the end user representative shall repeat 100% testing and the cost shall be borne by the installation contractor.
- Data UTP Station Cable Testing
 - Cat 6 Installation: field test requirements upon completion of the installation.
 - Every cabling link in the installation shall be tested in accordance with the Telecommunications Industry Association (TIA) standard ANSI/TIA/EIA-568-B.1 (most current version). Length of the run must be given on test results.
 - Optional Requirements:
 - A representative of the end-user may select a random sample of 5% of the installed links. The Owner shall test these randomly selected links and the results shall be stored.

- Field Test Specifications to the data provided by the installation contractor. If more than 2% of the sample results differ in terms of the pass/fail determination, the installation contractor under supervision of the end-user representative shall repeat 100% testing and the cost shall be borne by the installation contractor.
- Optical Fiber and Air Blown Fiber Testing
 - All fiber testing shall be performed on all fibers in the completed end to end system.
 - Testing shall consist of a bi-directional end to end OTDR trace performed per EIA/TIA 455-61 or a bi-directional end to end power meter test performed per EIA/TIA 455-53A.
 - The system loss measurements shall be provided at 850 and 1310 nanometers for multimode fibers and 1310 and 1550 for single mode fibers.
 - Pre-installation cable testing
 - The Contractor shall test all lightguide cable prior to the installation of the cable.
 - The Contractor shall assume all liability for the replacement of the cable should it be found defective at a later date.
 - Loss Budget
 - Fiber links shall have a maximum loss of:
 - Allowable cable loss per km (km of fiber in link) + (.4dB) (number of connectors) = maximum allowable loss
 - A mated connector to connector interface is defined as a single connector.
 - Loss numbers for the installed link shall be calculated by taking the sum of the bi-directional measurements and dividing that sum by two.
 - Any link not meeting the requirements of the standard shall be brought into compliance by the contractor, at no charge to Owner.
 - Documentation shall be provided in both hard copy and electronic, in a format as agreed by the Owner.
 - Air Blown Fiber Tube Cable Tests (Refer to Master Format Division 1-33-26)
 - Pressure Tests and Obstruction Tests shall be submitted to the Owner's Representative on appropriate forms. Forms are included in certified contractor's manual. The form must be completed, signed and turned over to the Owner.
 - Sumitomo Electric - Bundled Fiber Optics Testing shall be submitted to the engineer and copies to the Owner's Representative. Submit manufacturer's test reports for each reel of fiber bundle provided prior to installation.
 - Submit Contractor's on-reel test results at 850 and 1300 nm for multi-mode and 1310 and 1550nm for Single-mode.
 - Submit Contractor's test results after bundled fiber terminations are installed.
 - Submit soft copy bundled fiber optic cable OTDR test results on compact disc (CD). The test results will need to include all results including the fiber map (graph). Provide proprietary software on the CD to enable viewing of the soft-copy test results.
- Station Coaxial Cable Testing
 - Station Coaxial Cable Testing shall be tested to verify cable length and to test for cable faults and breaks. A step-function high resolution Time Domain Reflectometer shall be employed for this test, such as the Tektronix 1502C or the Hewlett Packard 1415A. The results shall be automatically plotted on an X-Y plotter with a Y-axis voltage reflection coefficient resolution of .001 per division. The X-axis will resolve down to 1" of cable. The TDR will sweep the cable at a rate no greater than 50' per second, or such lower rate as necessary to resolve cable faults to the 1" and .001 VRC level.

- o The cables shall be terminated with its characteristic impedance. Where required, an appropriate matching pad shall be used to match the analyzer to the cable.
- o A Cable shall be rejected if any single fault is observed of amplitude greater than 0.003 voltage reflection coefficient. Characteristic impedance shall also be measured at 5% of nominal value.
- o Cyclic faults (such as cable reel stress and die draw-down) shall be limited to a voltage reflection coefficient of 0.005.

TEST RESULT DOCUMENTATION AND FOLLOW UP

- In system documentation, contractor shall provide test results and describe the conduct of the tests. Test documentation shall include a record of test frequencies or wavelengths, cable type, conductor pair and cable I.D. (e.g. Outlet I.D.), measurement direction, test equipment type, model and serial number, date, reference setup, and crewmember name(s) and the length of the run. Where applicable, printouts generated for each cable by the wire test instrument (e.g. *Fluke DSP4300*) shall be submitted as part of the documentation package.
- At the request of the Owner, the contractor shall provide copies of original test results.
- The Owner may request that a 10% random field re-test be conducted on the cable system - at no additional cost - to verify documented findings. If findings contradict the documentation submitted by the Contractor, additional testing can be requested to the extent determined necessary by the Owner, including a 100% re-test. This re-test shall be at no additional cost to the Owner.
- Should it be determined by the Owner or A/E that the materials or any portion thereof furnished and installed fail to comply with the specifications defined herein, these materials and the related installation shall be rejected and replaced by the Contractor. All work disturbed by changes necessitated in consequence of said defects or imperfections shall be made good at the Contractor's expense. All replaced components shall be re-tested.

SECTION 27 0007 – COMMUNICATIONS DOCUMENTATION AND CLOSEOUT

- Upon completion of cable plant installation, the contractor shall provide a complete set of cable records documentation including:
 - o Test Data as defined above
 - o As-Built Drawings (where applicable)
 - o Input Data for Facilities Management System
- As built drawings
 - o Also see Division 01 of the Design and Engineering Criteria
 - o Contractor shall provide accurate as-built construction drawings.
 - o The drawing package shall include one or more of the following:
 - Floor plans showing (1) the location of all Telecommunications Outlets as installed and (2) paths by which all cables are routed.
 - Cable lengths as obtained through review of sheath footage markings.
 - Termination field, equipment rack and frame layouts.
 - o Numbering and drawing conventions used shall be consistent throughout all documentation provided and comply with established standards at the College. Telecommunications Outlet locations shall be identified by their sequential number as defined elsewhere in this document and include the Building Designator.
 - o All documentation, including hard copy and electronic forms (if applicable) shall become the property of the Owner.
 - o Documentation shall be submitted within ten (10) working days of the completion of testing.

SECTION 27 0008 – COMMUNICATIONS ACCEPTABLE MATERIAL LIST

The following products are acceptable to the Owner. Any variation shall be subject to review and acceptance by Owner.

| Mfgr | Mfgr PN | Description |
|-------------|----------------|--|
| Panduit | PUP5504IG-UY | Category 5e plenum (CMP) 4-pair UTP copper cable. Conductors are 24 AWG construction with HDPE insulation. Conductors are twisted in pairs and placed in a flame-retardant PVC jacket. |
| Panduit | PUR5504IG-UY | Category 5e riser (CMR) UTP 4-pair cable. Conductors are 24 AWG construction and protected in a flame-retardant PVC jacket. |
| Panduit | PUP6004BU-UY | High performance Category 6 plenum (CMP) 4-pair UTP copper cable. Copper conductors are 23 AWG construction with FEP insulation. Conductors are twisted in pairs, separated by an integrated pair divider, and placed in a low smoke, flame- retardant PVC jacket. |
| Panduit | PUR6004BU-UY | High performance Category 6 riser (CMR) 4-pair UTP copper cable. Copper conductors are 23 AWG construction with HDPE insulation. Conductors are twisted in pairs, separated by an integrated pair divider, and placed in a flame- retardant PVC jacket. |
| Panduit | CFPL2EI | CLASSIC FACEPLATE W/LABEL |
| Panduit | CFPL4EI | CLASSIC FACEPLATE W/LABEL |
| Panduit | CFPL6EI | CLASSIC FACEPLATE W/LABEL |
| Panduit | CF1062EIY | 106 FRAME - DATA - 2 PORT |
| Panduit | CF1064EIY | MINI-COM 106 FRAME |
| Panduit | JB1DEI-A | 1 PCS DEEP JUNCTION BOX** |
| Panduit | CFPL4BL | FURN. FACEPLATE 4 POS. W/LABEL&LABEL COV |
| Panduit | CJ5E88TGEI | MINICOM CAT5E JACK MODULE |
| Panduit | CJ688TGEI | MINICOM CAT6 JACK MODULE |
| Panduit | P110BW300-X | 110 WIRING BLOCK W/LEGS |
| Panduit | P110CB4-X | 110 CONNECTING BLOCK 4PR |
| Panduit | P110CB5-X | 110 CONNECTING BLOCK 5PR |
| Panduit | P110JTW-X | GIGA PUNCH JUMPER TROUGH |
| Panduit | DP485E88TGY | 48 PORT FLAT DP5E DATA |
| Panduit | DP48688TGY | 48 PORT FLAT DP6 DATA |
| Panduit | DP24688TGY | 24 PORT FLAT DP6 DATA |
| Panduit | DP245E88TGY | 24 PORT FLAT DP5E DATA |

| | | |
|---------|----------|--------------------------------------|
| Panduit | CMPHH2 | PANNET 2 RU HORZ. 3X5" D-RINGS FRONT |
| Panduit | NFR84 | PANNET NETFRAME RACK, 7FT |
| Panduit | NFDR4X6K | PANNET 4X6 D-RING KIT OF 8, PLASTIC |
| Panduit | HLT2I-X0 | TAK-TY LOOP TIE |

| Mfgr | Mfgr PN | Description |
|------------------------------|------------------|--|
| Panduit | DPLF | KIT- FRONT LABEL HOLDER |
| Panduit | DPLT | KIT - TOP LABEL HOLDER |
| Panduit | FRME1 | PANNET OPTICOM 1 RU BLACK ENCL |
| Panduit | FRME2 | PANNET OPTICOM 2 RU BLACK ENCL |
| Panduit | FRME3 | PANNET OPTICOM 3 RU BLACK ENCL |
| Panduit | FAPB | FIBER ADAPTER PANELS |
| Panduit | FAP6WBUDSCZ | FIBER ADAPTER PANEL W/6BU |
| Work Station Hardware | | |
| Panduit | CFPL2EI | Single gang, vertical faceplate accepts two <i>Mini-Com</i> ® Modules |
| Panduit | CFPL4EI | Single gang, vertical faceplate accepts four <i>Mini-Com</i> ® Modules |
| Panduit | CFPL6EI | Single gang, vertical faceplate accepts six <i>Mini-Com</i> ® Modules |
| Panduit | CFPF12EI-2G | Double gang, vertical faceplate frame and six flat inserts (two module spaces each). Accepts twelve <i>Mini-Com</i> ® Modules. |
| Panduit | JB1EI-A | Single gang one-piece outlet box with adhesive backing |
| Panduit | KWP5EY or KWP6PY | Stainless steel phone plate with <i>Giga-TX</i> ™ Style Category 5e or cat 6 Keystone Jack Module |
| Panduit | CFFP4BL | Faceplate snaps into industry standard knockouts found on modular furniture |
| Panduit | CJ5E88TGWH | Category 5e, RJ45, 8-position, 8-wire universal module |
| Panduit | CJ5E88TGBL | Category 5e, RJ45, 8-position, 8-wire universal module |
| Panduit | CMBEI-X | 1-position, reserves space for future use |

EXHIBIT B – REFERENCE DRAWINGS

COD SRC PATHWAYS OFFICES

425 Fawell Blvd.

COLLEGE OF DUPAGE

Glen Ellyn, IL 60137



·CORDOGAN, CLARK & ASSOCIATES, INC·

: ARCHITECTS · ENGINEERS :

PROJECT OVERVIEW: The College is constructing spaces for temporary use. Contract includes constructing the items as indicated on the drawings AND approximately 6 months later, returning to the space to demobilize all that was constructed, returning the space to its original condition. Carpet removed as shown on the demolition drawings will be stored on site and re-installed by this contractor. Data lines installed during this project will be coiled above ceiling and left in place. Items noted on the drawings as "provided by Owner" (grilles, diffusers, lights, doors/hardware) will be returned to Owner. All damage due to original finishes during construction will be repaired/painted/ceiling tiles replaced, etc by this contractor.

PROJECT INFORMATION: VICINITY MAP:

PROJECT ADDRESS: 425 Fawell Blvd.

PROJECT DESCRIPTION: Temporary office built-out

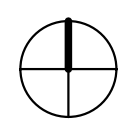
SITE ZONING: N/A

BUILDING SETBACK: NORTH BUILDING SETBACK: N/A
EAST BUILDING SETBACK: N/A
SOUTH BUILDING SETBACK: N/A
WEST BUILDING SETBACK: N/A

PARKING REQUIREMENTS: TOTAL PARKING SPACES: N/A
TOTAL ACCESSIBLE SPACES: N/A

LOT COVERAGE: N/A

CODE REQUIREMENTS: VARIANCE REQUESTED
INTERNATIONAL BUILDING CODE 2009
INTERNATIONAL MECHANICAL CODE 2009
INTERNATIONAL ENERGY CONSERVATION CODE 2015
NATIONAL ELECTRICAL CODE 2011
INTERNATIONAL PLUMBING CODE 2014
ILLINOIS ACCESSIBILITY CODE 1997



PROJECT LOCATION

SHEET LIST:

| SHEET LIST | |
|----------------------------|---|
| Sheet Number | Sheet Name |
| 1 - GENERAL | |
| T1.0 | COVER SHEET |
| T1.1 | GENERAL NOTES, ABBREVIATIONS & SYMBOLS LEGEND |
| 2 - ARCHITECTURAL | |
| A2.0 | PARTIAL DEMOLITION PLAN, PARTIAL FLOOR PLAN, PARTIAL REFLECTED CEILING PLAN, WALL TYPES & GENERAL NOTES |
| A3.0 | DETAILS & DOOR SCHEDULE |
| 3 - MECHANICAL | |
| M1.0 | PARTIAL MECHANICAL PLANS AND NOTES |
| 4 - ELECTRICAL | |
| E1.0 | PARTIAL ELECTRICAL PLAN |
| 5 - FIRE PROTECTION | |
| FP1.0 | PARTIAL FIRE PROTECTION PLAN |

TOTAL BUILDING AREA: LOWER LEVEL N/A
FIRST FLOOR LEVEL N/A
SECOND FLOOR LEVEL N/A
TOTAL N/A

TOTAL REMODEL AREA: LOWER LEVEL N/A
FIRST FLOOR LEVEL 2,700 SF
SECOND FLOOR LEVEL N/A
TOTAL 2,700 SF

OCCUPANCY: OFFICE

CONSTRUCTION TYPE: TYPE II B PROTECTED

EXIT WIDTH: MINIMUM DOOR WIDTH N/A
MINIMUM CORRIDOR WIDTH N/A

FIRE SPRINKLER DESIGN: AUTOMATIC - FULLY SPRINKLERED

CERTIFICATION

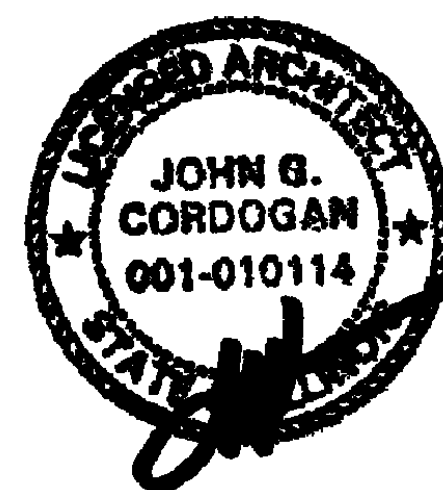
STATEMENT OF COMPLIANCE
"I have prepared, or caused to be prepared under my direct supervision, the attached plans and specifications and state that, to the best of my knowledge and belief and to the extent of my contractual obligation, they are in compliance with the Environmental Barriers Act (410 ILCS 25) and the Illinois Accessibility Code (71 Ill. Adm. Code 400)."

ILLINOIS DESIGN FIRM'S REGISTRATION NO.: 184.000.595-0007
 INDIANA DESIGN FIRM'S REGISTRATION NO.:
 MISSOURI DESIGN FIRM'S REGISTRATION NO.:

Signed: _____

ILLINOIS REGISTRATION NO.: NO. 10 10 114

Date: _____



SEAL

"I hereby certify these drawings have been prepared under my direct supervision and to the best of my knowledge comply with all applicable codes of Glen Ellyn, IL"

ELECTRIC ENERGY CODE VARIANCE REQUESTED: PROJECT TO BE TEMPORARY BUILT AND DISASSEMBLED IN 6 MONTHS. SPACE TO BE RETURNED TO ORIGINAL CONDITION AFTER DISASSEMBLY



ABBREVIATIONS:

| | | | |
|---|---|--|---|
| <p> Z ANGLE L CENTERLINE C CHANNEL D PENNY PL PLATE AB ANCHOR BOLT ABV. ABOVE ABC AGGREGATE BASE COURSE AC ACOUSTICAL ACC. ACCESS ACFL ACCESS FLOOR ACPL ACOUSTICAL PLASTER ACR ACRYLIC PLASTIC A.C.T. ACOUSTICAL CEILING TILE A/C AIR CONDITIONING A.D. AREA DRAIN ADA AMERICANS WITH DISABILITIES ACT ADD. ADDENDUM ADDN. ADDITION ADH. ADHESIVE ADJ. ADJACENT ADJT. ADJUSTABLE A.F.C. ABOVE FINISHED CEILING A.F.F. ABOVE FINISHED FLOOR A.G. ABOVE FINISHED GRADE AGG. AGGREGATE AL. ALUMINIUM ALT. ALTERNATE ANC. ANCHOR (-AGE) AND. AND A.P. ACCESS PANEL APPROX. APPROXIMATE ARCH. ARCHITECT ASB. ASBESTOS A.S.H. ABOVE SUSPENDED CEILING ASPH. ASPHALT A.T. ASPHALT TILE AUTO. AUTOMATIC B.BD. BULLETIN BOARD BD. BOARD BEL. BELOW BET. BETWEEN BJT. BITUMINOUS B.JOINT BUTT JOINT BLKG. BLOCKING BLDG. BUILDING BM. BEAM B.M. BENCHMARK B/O. BOTTOM OF BOTTOM B.P. BACK PLASTER B.PL. BEARING PLATE BRG. BEARING BRK. BRICK BRZ. BRONZE B.S. BOTH SIDES BSMT. BASEMENT B.U.R. BUILT-UP ROOFING B.V.L. BEVEL B.W. BOTHWAYS CAB. CABINET CAD. CADMIUM C.B. CATCH BASIN CAF. CEMENT CER. CERAMIC C.F.L. COUNTERFLASHING C.FT. CUBIC FOOT CG. CENTIGRAM C.G. CORNER GUARD C.I. CAST IRON C.I.P. CAST IN PLACE C.I.P.C. CAST IN PLACE CONCRETE CIR. CIRCLE CIRC. CIRCUMFERENCE CHAM. CHAMFER CHAN. CHANNEL C.H.D. CHALKBOARD C.HT. CEILING HEIGHT CHAN. CHANNEL C.J. CONTROL JOINT CK. CAULK (-ING) CL. CENTER LINE CLG. CEILING CL.C. CONTRACT LIMIT LINE CL.O.S. CLOSE CLR. CLEAR CLM. CLOSURE CLS. CENTIMETER C.M.T. CERAMIC MOSAIC TILE C.M.U. CONCRETE MASONRY UNIT C.O. CLEAN OUT COL. COLUMN COMB. COMBINATION COMPT. COMPARTMENT COMPO. COMPOSITION COMP. COMPRESS CONTR. CONTRACTOR CONC. CONCRETE CONN. CONNECTION CONST. CONSTRUCTION CONT. CONTINUOUS CORR. CORRUGATED C.PL. CEMENT PLASTER CR. COPPER CPT. CARPET CR. CHROMIUM CR.G. CROSS GRAIN CRS. COURSE CS. COUNTERSINK CSMT. CASSEMENT C.ST. CAST STONE CST.J. CONSTRUCTION JOINT C.T. CERAMIC TILE CTR. COUNTER CTS&K. COUNTERSUNK C.Y. CUBIC YARD D DRAIN D.A. DOUBLEACTING DECIB. DECIBEL DEM. DEMOLISH DEP. DEPRESSED D.F. DRINKING FOUNTAIN DH. DOUBLE HUNG DIAG. DIAGONAL DIAM. DIAMETER DIM. DIMENSION DISP. DISPENSER INCIN. INCINERATOR DIVISION D.L. DEAD LOAD DMT. DEMOUNTABLE DN. DOWN D.P. DAMP PROOFING DRP. DAMPER DR. DOOR DRB. DRAINBOARD D.S. DOWNSPOUT DSPR. DISPENSER D.T. DRAIN TILE DTA. DOVETAIL ANCHOR DTL. DETAIL D.T.S. DOVETAIL ANCHOR SLOT DW. DUMBWATER, DISHWASHER </p> | <p> E EAST (E) EXISTING EA. EACH E.B. EXPANSION BOLT E.D.F. ELECTRIC DRINKING FOUNTAIN E.F. EACH FLOOR JOINT E.J. EXPANSION JOINT EL. ELEVATION ELEC. ELECTRIC ELEV. ELEVATOR EMER. EMERGENCY ENCL. ENCLOSURE ENCL. ELECTRICAL PANEL BOARD EQ. EQUAL EQUIP. EQUIPMENT ESC. ESCALATOR E.T.R. EXISTING TO REMAIN E.W.C. ELECTRIC WATER COOLER EXCA. EXCAVATE EXIST. EXISTING EXH. EXHAUST EX.M.P. EXPANDED METAL PLATE EXP. EXPOSED EXPAN. EXPANSION EXTS. EXTRA STRONG EXT. EXTERIOR F.A. FIRE ALARM FAS. FASTENER F.B. FACE BRICK FBD. FIBERBOARD F.BR. FIRE BRICK F.C. FINISHED FLOOR BY OTHERS F.D. FLOOR DRAIN F.E. FIRE EXTINGUISHER F.E.C. FIRE EXTINGUISHER CABINET F.F. FACTORY FINISH F.F.E. FINISHED FLOOR ELEVATION F.F.L. FINISHED FLOOR LINE FGL. FIBERGLASS F.H.C. FIRE HOSE CABINET F.H.M.S. FLATHEAD MACHINE SCREW F.H.V.S. FIBER WOOD SCREW F.H.S. FIRE HOSE STATION FIN. FINISH FIXT. FIXTURE F.JT. FLUSH JOINT F.L. FLASHING FL.CO. FLOOR CLEANOUT FLR. FLOOR FLX. FLEXIBLE FLUOR. FLUORESCENT FN. FENCE F.O. FOUNDATION F.O. FINISHED OPENING F.O.C. FACE OF CONCRETE F.O.F. FACE OF FINISH F.O.M. FACE OF MASONRY F.O.S. FACE OF STUDS FP. FIREPROOF FPL. FIREPLACE F.PL. FLOOR PLATE FR. FRAME F.R.A. FRESH AIR F.R.C. FIRE-RESISTANT COATING FRG. FORGED F.R.T. FIRE-RETARDANT TREATED F.S. FULL SIZE FT. FEET FTG. FOOTING FUR. FURRED (-ING) FUT. FUTURE G. GRAM GA. GAUGE G.C. GENERAL CONTRACTOR GCMU. GLAZED CONCRETE MASONRY UNITS GD. GRADE G.F. GROUND FACE G.I. GALVANIZED IRON GKT. GASKET GL. GLASS GL.B. GLASS BLOCK GL.F. GLASS FIBER G.P. GALVANIZED PIPE GL.P. GYPSUM LATH GP.PL. GYPSUM PLASTER GP.T. GYPSUM TILE GRS. GRILLE GRD. GRID GRN. GRANITE GRND. GROUND G.S.S. GALVANIZED STEEL SHEET G.S.T. GLAZED STRUCTURAL TILE GT. GROUT GV. GALVANIZED GVL. GRAVEL GW.B. GYPSUM WALL BOARD GYP. GYPSUM GYP.BD. GYPSUM BOARD H.B. HOSE BIBB HBD. HARDBOARD H.C. HOLLOW CORE H.D. HEAVY DUTY HDN. HENDERER HDR. HEADER HDW. HARDWARE HDWD. HARDWOOD H.E.S. HIGH EARLY STRENGTH CEMENT H.H. HANDHOLE H.JT. HEAD JOINT HK. HOOK H.M. HOLLOW METAL HORIZ. HORIZONTAL H.P. HIGH POINT H.P. HIGH PRESSURE H.R. HAND RAIL HGT. HEIGHT HTG. HEATING HTR. HEATER HVAC. HEATING/VENTILATING/ AIR CONDITIONING H.W. HOT WATER H.W.H. HOT WATER HEATER HX. HEXAGONAL I.D. INSIDE DIAMETER ILK. INTERLOCK I.P.S. IRON PIPE SIZE IN. INCH INCIN. INCINERATOR INCL. INCLUDE INS.C. INSULATING CONCRETE INS.F. INSULATING FILL INSUL. INSULATION INT. INTERIOR INTM. INTERMEDIATE INV. INVERT JAN. JANITOR J.F. JOINT FILLER JT. JOINT JOIST </p> | <p> K KILO K THOUSAND KA CYLINDER LOCKS KEYS ALIKE KB KNIFE BRACE KC KITCHEN CABINET KD KNOCKOUT KIP THOUSAND POUNDS KIP FT THOUSAND FOOT/ POUNDS KIT KITCHEN KL.FIPS PER LINEAL FOOT KO KNOCKOUT KOP KNOCKOUT PANEL KPa KILOPASCAL KPL KICKPLATE KSF KIPS PER SQUARE FOOT KSI KIPS PER SQUARE INCH KWY KEYWAY L LENGTH LAB. LABORATORY LAD. LADDER LAM. LAMINATED LAV. LAVATORY L.B. LAG BOLT LBL. LABEL L.C. LIGHT CONTROL LOC. LOCATION LP. LIGHTPROOF L.P.T. LOW POINT LT. LIGHT LTL LINTEL LVR. LIFTER L.W. LIGHTWEIGHT L.W.C. LIGHT WEIGHT CONCRETE M. METER M. MASONRY MATL. MATERIAL MAX. MAXIMUM M.B. MACHINE BOLT MBR. MEMBER M.C. MEDICINE CABINET M.C.J. MASONRY CONTROL JOINT MECH. MECHANICAL MD. MEDIUM MET. METAL M.F.D. METAL FLOOR DECKING MFR. MANUFACTURER MH. MANHOLE M. MALLEABLE IRON MIN. MINIMUM MIR. MIRROR MISC. MISCELLANEOUS M.L. METAL LATH MLDG. MOULDING M.M. MILLIMETER MMB. MEMBRANE M.O. MASONRY OPENING MOD. MODULAR MOV. MOVABLE M.R. MOP RECEPTOR MRB. MARBLE M.R.D. METAL ROOF DECK MT. MOUNT (-ED) M.T.FR. METAL FURRING M.THR. METAL THRESHOLD MULL. MULLION MWK. MILLWORK N NORTH NAT. NATURAL N.G. NATURAL GRADE NI. NICKEL N.I.C. NOT IN CONTRACT NL. NAILABLE No. NUMBER NOM. NOMINAL N.T.S. NOT TO SCALE O.A. OVERALL OBS. OBSERVE O.C. ON CENTER O.D. OUTSIDE DIAMETER O.F.D. OVERFLOW DRAIN O.F.S. OVERFLOW SCUPPER O.H. OVERHEAD O.H.M.S. OVERHEAD MACHINE SCREW O.H.W.S. OVERHEAD WOOD SCREW O.P. OPEN-WEB JOIST OP. OPAQUE OPG. OPENING OPP. OPPOSITE OP.H. OPPOSITE HAND OP.S. OPPOSITE SURFACE PAR. PARALLEL P.B. PANIC BAR P.BD. PARTICLE BOARD P.C. PRECAST P.C.C. PRECAST CONCRETE P.C.F. POUNDS PER CUBIC FOOT PCP. PRECAST PANEL P.E. PORCELAIN ENAMEL PE. PEDESTAL PERF. PERFORATED PERI. PERIMETER PFB. PREFABRICATE PFN. PREFINISHED PG. PAGE P.G. PLATE GLASS PHT. PAPER TOWEL DISPENSER PL. PROPERTY LINE P.LAM. PLASTIC LAMINATE PLAS. PLASTER PLF. POUNDS PER LINEAL FOOT PLMB. PLUMBING PLYWD. PLYWOOD PNL. PANEL PR. PAIR PRF. PREFORMED P.S.C. PRESTRESSED CONCRETE P.S.I. POUNDS PER SQUARE INCH P.S.F. POUNDS PER SQUARE FOOT PT. PAINT PTC. POST-TENSIONED CONCRETE PTD. PAINTED P.T.D. PAPER TOWEL DISPENSER P.T.R. PAPER TOWEL RECEPTOR PTN. PARTITION PV. PAVE P.V.C. POLYVINYL CHLORIDE PVMT. PAVEMENT Q.T. QUARRY TILE QTY. QUANTITY </p> | <p> R RISER R. RADIUS R.A. RETURN AIR R.B. RUBBER BASE RBL. RUBBLE STONE R.F. RUBBER FLOOR R.C.P. REINFORCED CONCRETE PIPE RD. ROUND R.D. ROOF DRAIN R.E. REINFORCE REF. REFERENCE REFR. REFRIGERATOR REG. REGISTER REM. REMOVE REQ'D. REQUIRED RES. RESILIENT RET. RETURN REV. REVISION RFG. ROOFING RFH. ROOF HATCH R.H. RIGHT HAND RL. RAILING RM. ROOM R.O. ROUGH OPENING R.O.W. RIGHT OF WAY RVS. REVERSE RVT. RIVET R.W. RAINWATER CONDUCTOR S SOUTH S.C. SOLID CORE SCHED. SCHEDULE S.C.J. STUCCO CONTROL JOINT SCR. SCREW SCRN. SCREEN S.C.T. STRUCTURAL CLAY TILE S.D. STORM DRAIN SIDG. SIDING SEC. SECTION SECT. SECTION SEL. SELECT SH. SHEET GLASS SH. SHELF, SHELVING SHT. SHEET SHTH. SHEATHING SHO. SHOWER SIM. SIMILAR SFRM. SPRAY-APPLIED FIRE RESISTIVE MATERIAL SKL. SKYLIGHT SL. SLEEVES SLDG. SLIDING SM. SMOOTH SNT. SEALANT S.P. SOUND PROOF SPC. SPACER SPEC. SPECIFICATION SPK. SPEAKER SPL. SPECIAL SQ. SQUARE S.S. STAINLESS STEEL S&S. STAIN AND SEAL SSK. SERVICE SINK ST. STEEL STA. STATION STD. STANDARD STG. SEATING ST.STL. STAINLESS STEEL STO. STORAGE STR. STRUCTURAL STRUC. STRUCTURE SUSP. SUSPENDED SW.BD. SWITCHBOARD SYM. SYMMETRICAL SYN. SYNTHETIC SYS. SYSTEM T. TREAD T.B. TOWEL BAR T.C. TERRA COTTA T.C. TOP OF CURB T.D. TOP OF DECK T.G. TEMPERED GLASS T.&G. TONGUE AND GROOVE THK. THICK THR. THRESHOLD TKBD. TACKBOARD TKS. TACKSTRIP T.O. TOP OF TOL. TOLERANCE T.P.D. TOILET PAPER DISPENSER TPFN. TOILET PARTITION TR. TRANSOM T.S.D. TOP OF STEEL DECK T/SL. TOP OF SLAB T/STL. TOP OF STEEL T.V. TELEVISION T/W. TOP OF WALL TYP. TYPICAL TZ. TERRAZZO UC. UNDERCUT UNF. UNFINISHED U.N.O. UNLESS NOTED OTHERWISE UR. URINAL V. VENT VAR. VARNISH V.A.T. VINYL ASBESTOS TILE V.B. VAPOR BARRIER V.B. VINYL BASE V.C.T. VINYL COMPOSITION TILE VCP. VITREOUS CLAY PIPE VCT. VERTICAL VEST. VESTIBULE V.F. VINYL FABRIC V.G. VERTICAL GRAIN VJ. VINYL V-JOINT VNR. VENEER VRM. VERMICULITE V.T. VINYL TILE W WEST W WIDTH, WIDE W WITH W.B. WOOD BASE W.C. WATER CLOSET WD. WIDTH WDW. WINDOW W.F. WIDE FLANGE W.G. WIRE GLASS W.H. WALL HUNG W.H.T.R. WATER HEATER W.H.B. WHEEL BUMPER W.I. WROUGHT IRON W.M. WIRE MESH W.D. WITHOUT W.P. WATER PROOFING W.P.T. WORKING POINT W.R. WATER REPELLANT W.S. WATER STOP W.SCT. WAINSCOT W.T.W. WALL TO WALL W.W. WINDOW WALL W.W.F. WELDED WIRE FABRIC W.W.M. WELDED WIRE MESH </p> |
|---|---|--|---|

NOTES:

GENERAL CONDITIONS:

- ALL CONTRACTORS SHALL BE RESPONSIBLE TO INSTALL ALL ITEMS SPECIFIED USING CONSTRUCTION THAT WILL PROTECT AT ALL TIMES, PROPERTY AND PREVENT BODILY INJURY AND/OR DEATH. SPECIAL ATTENTION AND CAREFULLY RECALCULATION SHALL BE PAID BY THE CONTRACTORS IN SELECTING THE SAFEST METHODS OR MEANS FOR THE INSTALLATION.
- THE ARCHITECT/ENGINEER HAS NO CONTRACTUAL DUTY TO CONTROL THE SAFEST METHODS OR MEANS OF THE WORK, JOB SITE RESPONSIBILITIES, SUPERVISION OR TO SUPERVISE SAFETY AND SHALL NOT VOLUNTARILY ASSUME ANY SUCH DUTY OR RESPONSIBILITY.
- ALL WORK SHALL BE EXECUTED IN A WORKMAN LIKE MANNER AND IN STRICT ACCORDANCE WITH FEDERAL, STATE AND LOCAL CODES AND ORDINANCES AND ALL AUTHORITIES HAVING JURISDICTION AND ACCEPTED BY THE ARCHITECT AND LEFT IN PERFECT OPERATING CONDITION.
- ALL CONTRACTORS SHALL VISIT THE SITE AND BECOME FAMILIAR WITH ALL EXISTING CONDITIONS PRIOR TO SUBMITTING THE FINAL BID. IF THERE ARE ANY DISCREPANCIES, NOTIFY THE ARCHITECT AT ONCE.
- ALL CONTRACTORS SHALL CAREFULLY REVIEW THE DRAWINGS AND OTHER CONTRACT DOCUMENTS PRIOR TO SUBMITTING THE FINAL BID. IF THERE ARE ANY DISCREPANCIES, EACH CONTRACTOR SHALL NOTIFY THE ARCHITECT AT ONCE.
- ALL WORK SHALL BE PERFORMED IN A WORKMAN LIKE MANNER. EACH CONTRACTOR SHALL INCLUDE LABOR, MATERIALS, TOOLS, EQUIPMENT, ETC., FOR THE COMPLETE CONSTRUCTION OF WORK INDICATED AND SPECIFIED BY THE DRAWINGS AND SPECIFICATION. MATERIALS AS SPECIFIED ON DRAWINGS SHALL BE USED. SUBSTITUTIONS OF MATERIALS WILL NOT BE ALLOWED WITHOUT THE WRITTEN CONSENT OF THE OWNER. CONTRACTOR SHALL AMEND AND MAKE GOOD AT THEIR OWN COST, ANY DEFECTS OR OTHER FAULTS IN THEIR WORKMANSHIP AND/OR MATERIAL. CONTRACTOR IS TO CLEAN UP DEBRIS INSIDE AND OUTSIDE THE BUILDING SITE WHICH HAS BEEN CAUSED BY THEIR WORK.
- NON-BEARING PARTITIONS ARE TO BE LAID OUT SO THAT STOCK COMPONENTS WILL FIT EXACTLY WITHIN INDICATED DIMENSIONS. THE GENERAL TRADES CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND CONDITIONS BEFORE PROCEEDING WITH WORK AND NOTIFY ARCHITECT AT ONCE OF ANY DISCREPANCIES PRIOR TO COMMENCING WORK.
- PLUMBING SCHEMATIC DRAWINGS, HVAC DRAWINGS, SEWER MAINS, ELECTRICAL OUTLETS, SWITCHES, LIGHT LOCATIONS FOR ROUTING ALL PLUMBING, MECHANICAL AND ELECTRICAL WORK IS TO BE COORDINATED BETWEEN THE TRADES AFFECTED BY THE WORK AS PART OF THEIR INSTALLATION LAYOUT. NO PLUMBING, MECHANICAL OR ELECTRICAL INFORMATION IS TO BE SCALED FROM THE DRAWINGS. ON-SITE VERIFICATION OF ALL DIMENSIONS AND CONDITIONS SHALL BE THE RESPONSIBILITY OF EACH CONTRACTOR.
- DO NOT SCALE DRAWINGS.

GENERAL CONSTRUCTION NOTES:

- PROJECT COORDINATOR SHALL PROVIDE A LOGISTICS PLAN TO THE ARCHITECT AND OWNER FOR REVIEW AND APPROVAL PRIOR TO COMMENCING WORK. THE LOGISTICS PLAN IS TO INCLUDE ALL ROUTING OF VEHICLES, EQUIPMENT, DELIVERY LOCATIONS, FENCING, SECURITY MEASURES, ETC. ANY EXISTING CONDITIONS TO REMAIN THAT ARE DAMAGED DUE TO CONSTRUCTION ARE TO BE RESTORED TO THEIR ORIGINAL CONDITION. THIS INCLUDES, BUT IS NOT LIMITED TO, SIDEWALKS, LANDSCAPING, IRRIGATION, ROADS, PARKING LOTS, BUILDING CONSTRUCTION, ETC.
- EACH CONTRACTOR SHALL VERIFY AND BE RESPONSIBLE FOR ALL DIMENSIONS AND CONDITIONS AT THE BUILDING SITE AND REPORT ANY DISCREPANCIES TO THE ARCHITECT IN WRITING PRIOR TO PROCEEDING WITH THE WORK. WRITTEN DIMENSIONS ON DRAWINGS SHALL HAVE PRECEDENCE OVER SCALED DIMENSIONS.
- EACH CONTRACTOR SHALL BE RESPONSIBLE FOR UNLOADING, STORING, INSPECTION FOR DAMAGE WHEN RECEIVED AND LOSS FROM SITE AND/OR DAMAGE AFTER RECEIPT FOR ALL MATERIALS FURNISHED BY OWNER.
- NO PRODUCT SUBSTITUTION WILL BE ALLOWED WITHOUT THE WRITTEN APPROVAL OF THE OWNER OR OWNER'S REPRESENTATIVE.
- ALL WORK TO BE NEW EXCEPT WHERE INDICATED AS EXISTING.
- EACH CONTRACTOR SHALL INSURE THAT ALL BUILDING WORK SHALL COMPLY WITH APPLICABLE NATIONAL, STATE AND LOCAL CODES GOVERNING AUTHORITIES AND UNDERWRITER REGULATIONS.
- ALL OPENINGS AND OTHER PROVISIONS NECESSARY FOR INSTALLATION OF ARCHITECTURAL PLUMBING, MECHANICAL, FIRE PROTECTION, ELECTRICAL OR OWNER'S APPARATUS AND EQUIPMENT, MUST BE VERIFIED WITH THE SPECIFIC TRADES INVOLVED AND WITH OWNER'S REPRESENTATIVE PRIOR TO INSTALLATION AND MUST BE OF SIZE, LOCATION, CONFIGURATION, ETC., REQUIRED.
- ALL CONTRACTORS MUST EXERCISE EXTREME CARE SO AS NOT TO DAMAGE EXISTING CONSTRUCTION ITEMS AND SHALL BE RESPONSIBLE FOR INITIATING, MAINTAINING AND SUPERVISING ALL SAFETY PRECAUTIONS AND PROGRAMS IN CONNECTION WITH THE WORK.
- ALL NEW PARTITIONS WHICH ARE TO EXTEND TIGHT UP TO THE FLOOR OR ROOF CONSTRUCTION ABOVE, ARE TO BE CUT TO FIT AROUND BEAMS, JOISTS, DUCTS, CONDUITS, PIPES, HANGERS, ETC. ALL SUCH CUTS SHALL BE ACCURATE AND STRAIGHT AND BE SEALED WITH MORTAR OR TAPE AND COMPOUND AND MADE AIRTIGHT. REFER TO DETAILS -- & -/A -- FOR GWB TRANSITION DETAILS AND DETAIL 15A7.12 FOR MASONRY TRANSITION DETAIL
- AT ALL LOCATIONS WHERE FLOOR SLAB IS TO BE CUT TO PROVIDE FOR NEW FLOOR POWER OR PLUMBING, SLAB IS TO BE REPAIRED FLUSH WITH AND TO MATCH EXISTING ADJACENT FLOOR SLAB CONSTRUCTION.

GENERAL DEMOLITION NOTES (REMOVE IF ALL NEW CONSTRUCTION):

- INTERFERENCE OF DEMOLITION**
ALL CONTRACTORS: IF THE DEMOLITION CANNOT PROCEED BECAUSE OF UNFORESEEN EXISTING STRUCTURAL OR MECHANICAL, ETC. CONDITIONS, THE CONTRACTOR SHALL IMMEDIATELY REPORT THE CONDITION TO THE ARCHITECT.
- FIRE PROTECTION DURING DEMOLITION AND NEW CONSTRUCTION**
ALL CONTRACTORS: THE CONTRACTOR SHALL PROVIDE AND MAINTAIN ALL FIRE PROTECTION MEASURES AND EQUIPMENT DURING DEMOLITION AND NEW CONSTRUCTION AT THE DIRECTION OF THE FIRE PREVENTION OFFICER AT THE SUGAR GROVE FIRE PROTECTION DISTRICT OFFICE.
- COORDINATION OF DEMOLITION**
ALL CONTRACTORS SHALL PROCEED WITH THE DEMOLITION IN A LOGICAL ORDER AND SHALL COORDINATE THE DEMOLITION WITH OTHER TRADES. EACH PHASE OF THE DEMOLITION SHALL BE PRECEDED BY INVESTIGATION OF THE AREA FOR REMOVAL, RELOCATION, DISCONNECTION OR REROUTING OF EXISTING ELEMENTS. PRIORITY OF DEMOLITION SHOULD BE:
 - GENERAL TRADES CONTRACTOR: ARCHITECTURAL
 - HEATING, A/C AND VENTILATION CONTRACTORS: MECHANICAL WORK
 - FIRE PROTECTION CONTRACTOR: FIRE PROTECTION WORK
 - ELECTRICAL CONTRACTOR: ELECTRICAL WORK
 - PLUMBING CONTRACTOR: PLUMBING WORK

SYMBOLS LEGEND:

A2.1A SHEET NUMBER

SUB-DRAWING OR ENLARGED AREA
DRAWING OR FLOOR SERIES
DISCIPLINE

Room name
101
ROOM NAME (TOP)
ROOM NUMBER (BOTTOM)

INTERIOR ELEVATION
ELEVATION No. (OUTSIDE), SHEET No. (CENTER)

DETAIL REFERENCE
DETAIL No. (TOP), SHEET No. (BOTTOM)

SECTION REFERENCE
SECTION No. (TOP), SHEET No. (BOTTOM)

WALL SECTION REFERENCE
SECTION No. (TOP), SHEET No. (BOTTOM)

BUILDING COLUMN GRID LINE

KEYED DEMOLITION NOTE (SEE PLAN SHEET)

DOOR TAG

WINDOW TAG

PARTITION TYPE

ELEVATION MARKER

REVISION CLOUD AND TAG

NORTH ARROW

PLAN / ELEVATION / DETAIL / SECTION TITLE
View Name
1/8" = 1'-0"

DIMENSION STRING

1-HOUR RATED WALL

2-HOUR RATED WALL

2-HOUR RATED & SMOKE WALL

WHERE INDICATED ON THE DRAWINGS, "SALVAGE" ITEMS MUST BE CAREFULLY REPAIRED AND STORED IN SUCH A WAY AS TO PREVENT DAMAGE, TRANSPORT AND STORE ITEMS OFF-SITE OR WITHIN THE AREA OF WORK IN A LEGAL MANNER, UNLESS DIRECTED BY OWNER TO TRANSPORT SAID MATERIALS TO OWNER'S STORAGE AREA.

GENERAL TRADES CONTRACTOR: DOORS AND FRAMES THAT ARE TO BE REMOVED ARE INDICATED BY DASHED LINES ON THE DRAWINGS.

GENERAL TRADES CONTRACTOR: ANY EXISTING DOORS & FRAMES TO BE REMOVED, TO ALLOW THE OPENING TO BE FILLED AS PER THE NEW CONSTRUCTION DRAWINGS, SHALL BE REMOVED WITH THE ENTIRE FRAME, ANCHORS AND SILLS.

GENERAL TRADES CONTRACTOR: WHEN REMOVING PORTIONS OR COMPLETE INTERIOR WALLS, INVESTIGATION MUST BE MADE TO DETERMINE IF THE WALL IS BEARING STRUCTURAL LOADS. IF IT IS DETERMINED THAT THE WALL IS BEARING, NOTIFY THE ARCHITECT BEFORE PROCEEDING WITH DEMOLITION. IF THE WALL IS NON-BEARING, PROCEED WITH DEMOLITION TAKING CARE THAT INTERACTING WALLS OR REMAINING WALLS ARE CUT CLEAN TO MINIMIZE FILLING AND PATCHING OF THE REMAINING PARTITION.

GENERAL TRADES CONTRACTOR: IF THE REMOVAL OF AN INTERIOR PARTITION DISTURBS THE EXISTING CEILING THAT IS TO REMAIN, CARE MUST BE TAKEN TO REMOVE AS LITTLE OF THE CEILING AS POSSIBLE AND PROTECT THE ADJACENT CEILING FROM DAMAGE. (UNLESS NOTED OTHERWISE)

GENERAL TRADES CONTRACTOR: IF THE PARTITION DEMOLITION INVOLVES DEMOLITION OF THE FLOORING IN THE AREA, CARE IS TO BE TAKEN TO MINIMIZE DAMAGE TO THE EXISTING FLOORING.

ELECTRICAL CONTRACTOR: INVESTIGATE ALL EXISTING WIRING IN THE AREAS OF DEMOLITION TO DETERMINE WHICH CIRCUITS CAN BE ABANDONED, AND WHICH WIRING MUST BE MAINTAINED TO SUPPLY OTHER AREAS. REMOVE ALL WIRING AND CONDUITS TO BE ABANDONED. RELOCATE ALL CIRCUITS TO BE MAINTAINED OR CLEAR NEW CONSTRUCTION.

GENERAL CONTRACTORS: ALL FINISHES SHALL BE PATCHED TO MATCH FROM IMPLEMENTATION OF WORK.

PARTIAL REMOVAL OF EXISTING WALLS OR PARTITIONS

GENERAL TRADES CONTRACTOR: WHEN REMOVING PART OF A MASONRY WALL TO ALLOW FOR THE INSTALLATION OF A NEW DOOR, CUTTING OF THE NEW MASONRY OPENING SHOULD BE ACCOMPLISHED IN A MANNER THAT RESULTS IN AS SMOOTH AN OPENING AS POSSIBLE.

GENERAL TRADES CONTRACTOR: PROVIDE TEMPORARY SHORING, BRACING AND OTHER SUPPORT NECESSARY TO PREVENT MOVEMENT, SETTLEMENT, COLLAPSE OR OTHER DAMAGE TO THE STRUCTURE OR ADJACENT WALLS.

DEMOLITION OF MECHANICAL/PLUMBING/ELECTRICAL SYSTEMS

IT WILL BE THE ASSOCIATED CONTRACTOR'S RESPONSIBILITY TO MAINTAIN THE CONDITION OF ALL REMAINING PIPING, CONDUIT, EQUIPMENT, ETC. WITHIN THEIR SCOPE OF WORK DURING DEMOLITION.

ALL CONTRACTORS: NOTIFY OWNER PRIOR TO ANY DEMOLITION OF UTILITIES OR SERVICES WHICH MAY AFFECT REMAINING OCCUPIED AREAS.

GENERAL CONTRACTORS: MAKE NECESSARY MODIFICATIONS AND ADJUSTMENTS TO ALL MECHANICAL, PLUMBING, AND ELECTRICAL ITEMS AND EQUIPMENT, BOTH NEW AND EXISTING, AS MAY BE REQUIRED BY THESE ALTERATIONS AND ADDITIONS.

PLUMBING CONTRACTOR: CAP ALL PLUMBING ABANDONED DURING DEMOLITION EITHER BELOW FINISH FLOOR LEVEL, ABOVE CEILING OR BEHIND FINISH WALL SURFACE. REROUTE PLUMBING THAT IS TO REMAIN IN SERVICE, AS REQUIRED, TO CLEAR NEW CONSTRUCTION.

HEATING & A/C, VENTILATION, ELECTRICAL, PLUMBING, AND FIRE PROTECTION CONTRACTORS: DISCONNECT AT SOURCE AND REMOVE EXISTING ELECTRICAL MATERIALS AND EQUIPMENT AND ALL OTHER MECHANICAL MATERIALS WHICH ARE RENDERED OBSOLETE BY THESE ALTERATIONS AND ADDITIONS. THESE ARE THE PROPERTY OF THE OWNER AND SHALL EITHER BE REMOVED FROM THE SITE OR RETURNED TO THE OWNER'S STOCK AT THE DISCRETION OF THE OWNER.

HEATING & A/C AND VENTILATION CONTRACTORS: DISCONNECT, REMOVE AND RELOCATE EXISTING MECHANICAL MATERIALS AND EQUIPMENT, AND ALL OTHER MECHANICAL ITEMS WHICH INTERFERE OR ARE INTERFERED WITH, OBSTRUCT OR ARE OBSTRUCTED BY THESE LOCATIONS AS DIRECTED. RECONNECT SUCH ITEMS IN PROPER OPERATING CONDITION AT NEW LOCATIONS.

GENERAL CONTRACTORS: ALL CUTTING AND PATCHING AS REQUIRED FOR WORK IS TO BE INCLUDED IN ASSOCIATED SCOPE OF WORK. FINISH WORK SHALL BE BY FINISHING CONTRACTOR BUT UNDER THE GENERAL CONTRACTORS CONTRACT.

GENERAL ALL CONTRACTORS

ALL CONTRACTORS ARE RESPONSIBLE TO VISIT THE SITE TO DETERMINE THE EXTENT OF DEMOLITION AND PATCHING AS REQUIRED TO INSTALL THEIR PORTION OF WORK.

REFER TO ALL DRAWINGS FOR FULL EXTENT OF DEMOLITION WORK. GENERAL TRADES CONTRACTOR TO INSURE ALL WALL OR FLOOR MOUNTED OBJECTS TO BE REMOVED AND EXISTING TO BE PREPARED FOR NEW FINISHES.

ALL CONTRACTORS SHALL VISIT AND INSPECT THE EXISTING BUILDING AND SHALL THOROUGHLY FAMILIARIZE THEMSELVES WITH ACTUAL JOB CONDITIONS BEFORE SIGNING CONTRACTS. NO EXTRAS WILL BE ALLOWED FOR WORK WHICH MIGHT HAVE BEEN REASONABLY FORESEEN BY AN INSPECTION OF THESE PREMISES.

WHILE THE SIZE AND LOCATION OF NEW WORK AND EQUIPMENT IN THE EXISTING BUILDING HAS BEEN INDICATED ON THE DRAWINGS AS ACCURATELY AS POSSIBLE, ALL PRIME CONTRACTORS SHALL ADJUST THEIR WORK AS REQUIRED TO AVOID EXISTING DUCTS, PIPES, CONDUITS AND BEAMS NOT SHOWN ON PLANS. ALL CONTRACTORS SHALL ADAPT THEIR WORK TO MEET ALL ACTUAL CONDITIONS ON THE EXISTING PREMISES.

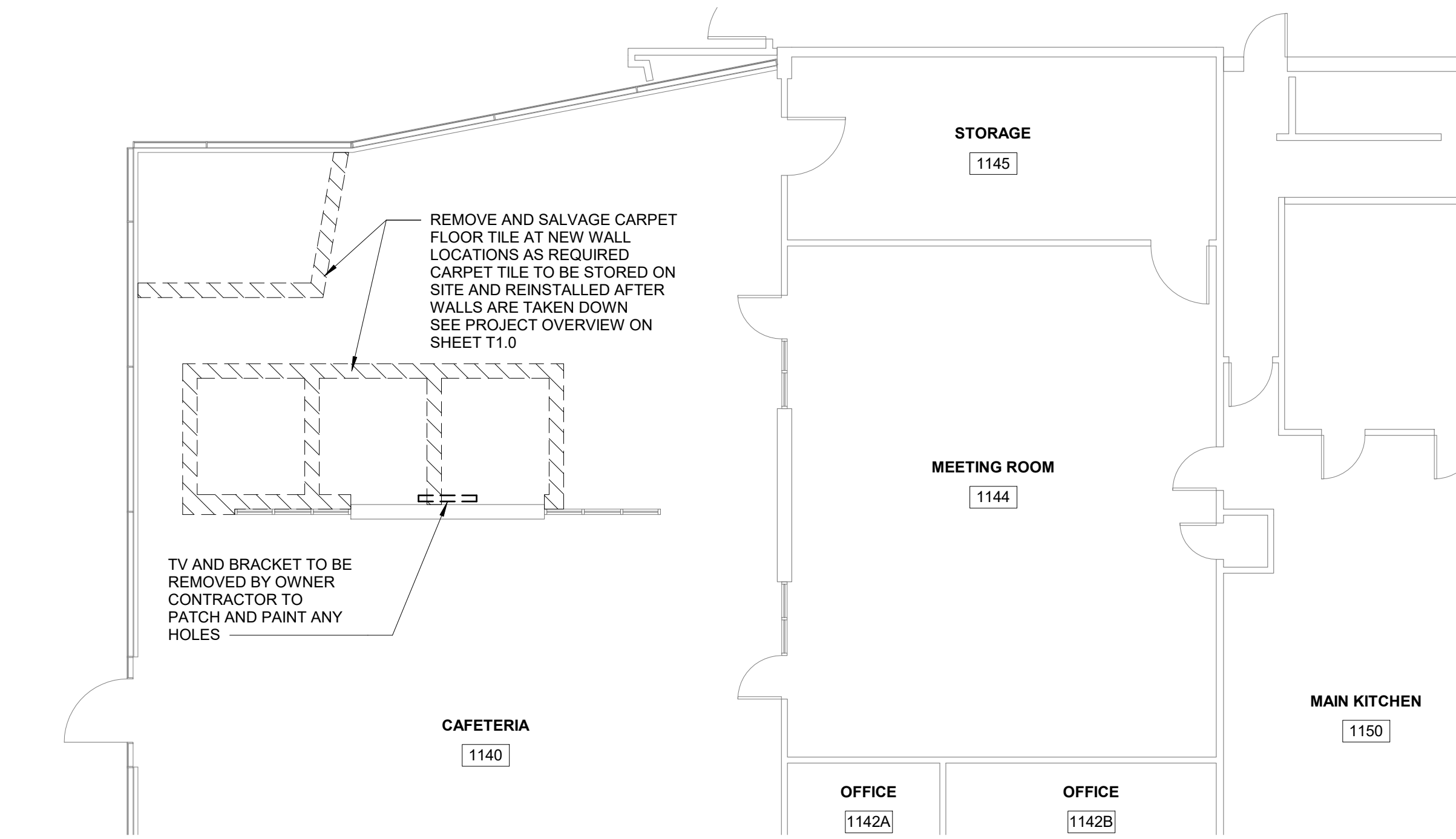
ALL CONTRACTORS SHALL INSPECT THE PREMISES AND MAKE A DETAILED EXAMINATION OF ALL LOCATIONS WHERE NEW WORK IS TO BE INSTALLED AND SHALL EXAMINE EXISTING PIPING, CONDUITS, STRUCTURAL SUPPORTING BEAMS, ETC.

ALL CONTRACTORS AFTER INSPECTING THE PREMISES AND THE DRAWINGS SHALL CALL TO THE ATTENTION OF THE ARCHITECT ANY LACK OF ANY NECESSARY SPACE OR CLEARANCE REQUIRED BY THE VARIOUS EQUIPMENT BEFORE CONTRACT IS SIGNED. ALL CONTRACTORS SHALL BE RESPONSIBLE FOR ALL CHANGES NECESSARY IF THEY NEGLECT TO DO SO.

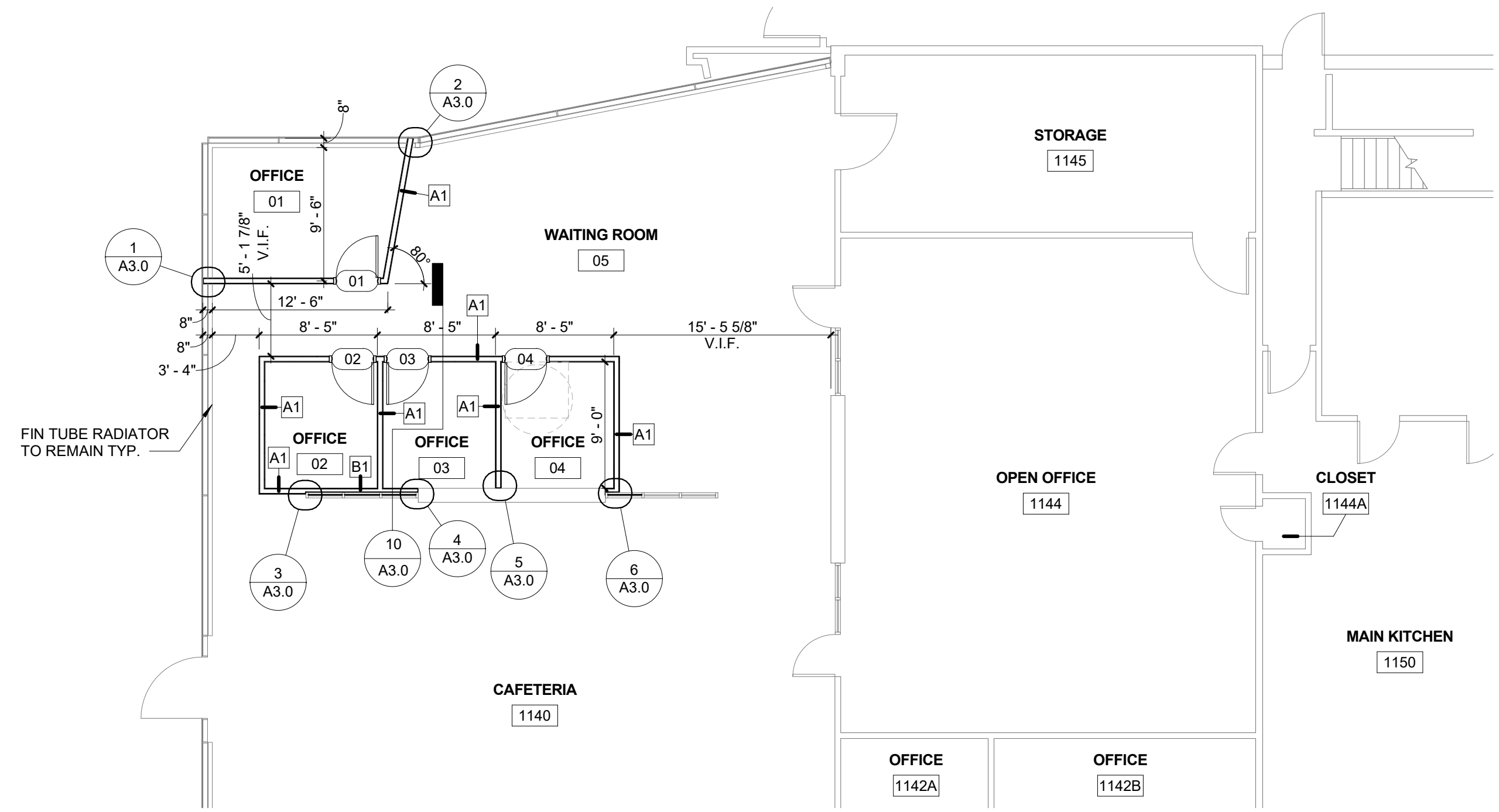
GENERAL CONTRACTORS TO PROVIDE TEMPORARY MEANS TO KEEP EXISTING BUILDING WEATHER TIGHT DURING DEMOLITION AND CONSTRUCTION.

IF ASBESTOS OR HAZARDOUS MATERIALS ARE FOUND AT THE SITE, CONTACT THE OWNER AND ARCHITECT IMMEDIATELY.

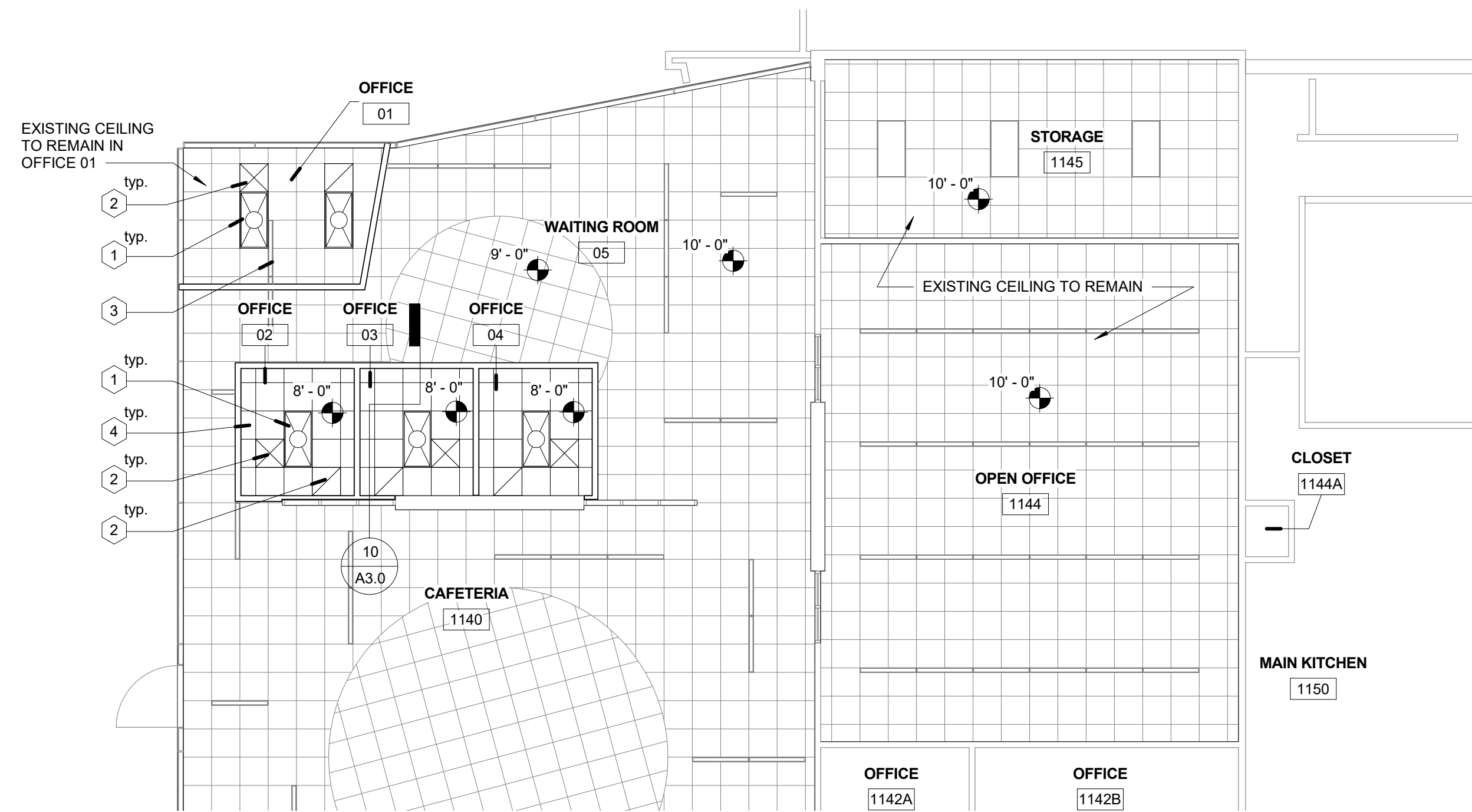




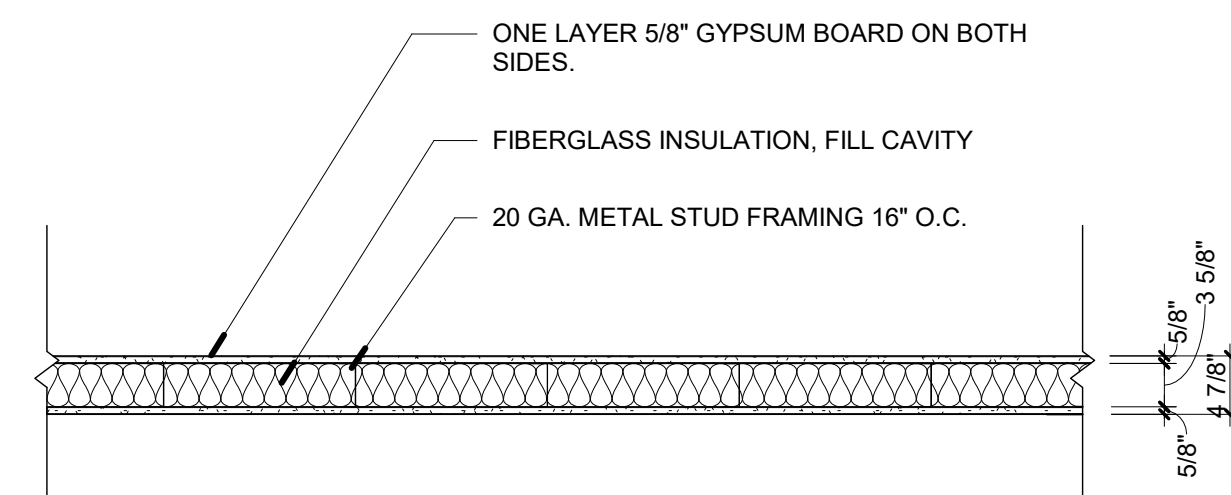
2 DEMOLITION PLAN
1/8" = 1'-0"



1 FLOOR PLAN
1/8" = 1'-0"

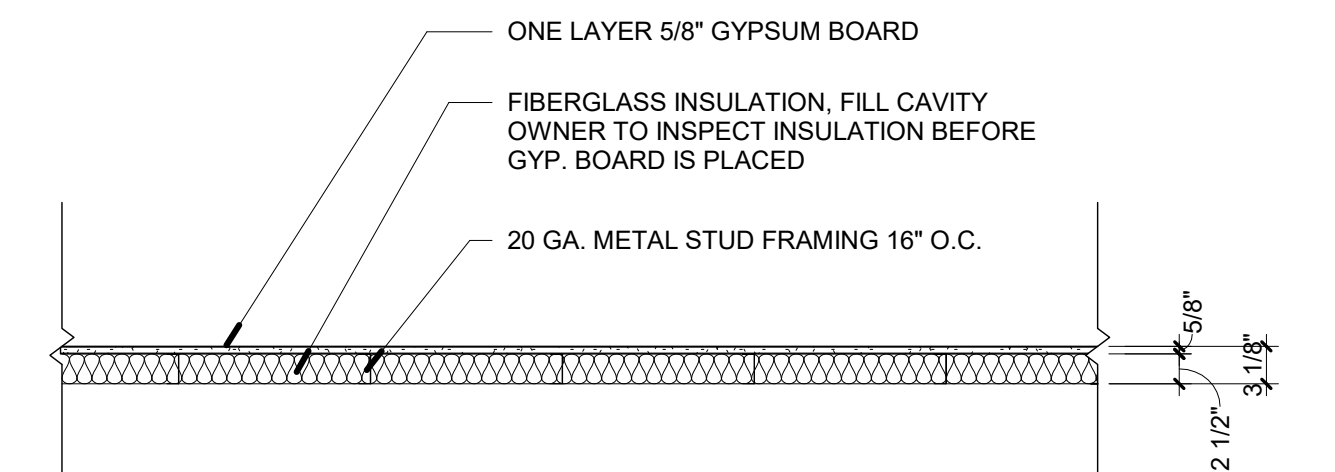


3 REFLECTED CEILING PLAN
1/8" = 1'-0"



WALL TYPE A1 - INTERIOR WALL

| DETAIL | STUD SIZE | STUD SPACING | NOMINAL WALL THICKNESS | MAX. HEIGHT | FIRE RATING | FIRE TEST NO. |
|--------|-----------|--------------|------------------------|-------------------------------|-------------|---------------|
| A1 | 3 5/8" | 16" O.C. | 4 7/8" | TO BOTTOM OF EXISTING CEILING | - | - |



WALL TYPE B1 - INTERIOR WALL

| DETAIL | STUD SIZE | STUD SPACING | NOMINAL WALL THICKNESS | MAX. HEIGHT | FIRE RATING | FIRE TEST NO. |
|--------|-----------|--------------|------------------------|-------------------------------|-------------|---------------|
| B1 | 2 1/2" | 16" O.C. | 3 1/8" | TO BOTTOM OF EXISTING CEILING | - | - |

GENERAL DEMOLITION NOTES

- REFER TO DRAWING T1.1 FOR FULL GENERAL DEMOLITION NOTES.
- IN AREAS WHERE EXISTING WALLS, PARTITIONS, ETC. ARE TO BE REMOVED, IT SHALL BE NECESSARY TO REPAIR EXISTING CEILINGS, ADJUST AND RELOCATE OR REWIRE LIGHTING FIXTURES, AND REMOVE OR RELOCATE ELECTRICAL AND MECHANICAL COMPONENTS AS REQUIRED OR DIRECTED.
- WASH AND CLEAN ALL EXISTING INTERIOR HVAC GRILLES AND DIFFUSERS WHICH ARE TO REMAIN (CEILING AND WALL-MOUNTED, AND FREESTANDING AT EXPOSED CONSTRUCTION).
- EXISTING WALLS, FLOORS, AND CEILINGS WHICH ARE DAMAGED AND ARE TO REMAIN SHALL BE PATCHED AND REBUILT AS REQUIRED TO MATCH SURROUNDING CONSTRUCTION, AT NO ADDITIONAL COST TO THE OWNER.
- ACTIVE PIPES, CONDUITS, AND OTHER UTILITIES OF ALL TYPES, WHETHER SHOWN IN THE CONSTRUCTION DOCUMENTS OR NOT, MUST BE PROTECTED BY CONTRACTOR AT ALL TIMES DURING THE CONSTRUCTION OF THE WORK. EXTREME CARE SHALL BE EXERCISED AT ALL TIMES NOT TO DAMAGE ANY SUCH PIPES AND CONDUITS. WHERE DAMAGE OCCURS, THE PRIME CONTRACTOR CAUSING THE DAMAGE SHALL REPAIR SUCH DAMAGE IN A MANNER APPROVED BY THE ARCHITECT AND OWNER, AND AT NO CHANGE IN THE CONTRACT PRICES OF CONTRACTOR.

GENERAL NOTES

- REFER TO ENLARGED PLANS FOR DIMENSIONAL INFORMATION AND PARTITION TYPES OF TAGGED AREAS.
- METAL FRAMING PERFORMANCE CRITERIA: CONTRACTOR IS RESPONSIBLE FOR PROVIDING NECESSARY FRAMING, GAUGES, FASTENERS, ETC. TO ACHIEVE L/360 DEFLECTION AT ALL METAL FRAMING INSTALLATIONS.
- ALL NEW WALLS ARE TO BE PREPARED AND ARE TO RECEIVE PRIMER AND TWO COATS OF PAINT AS SPECIFIED.

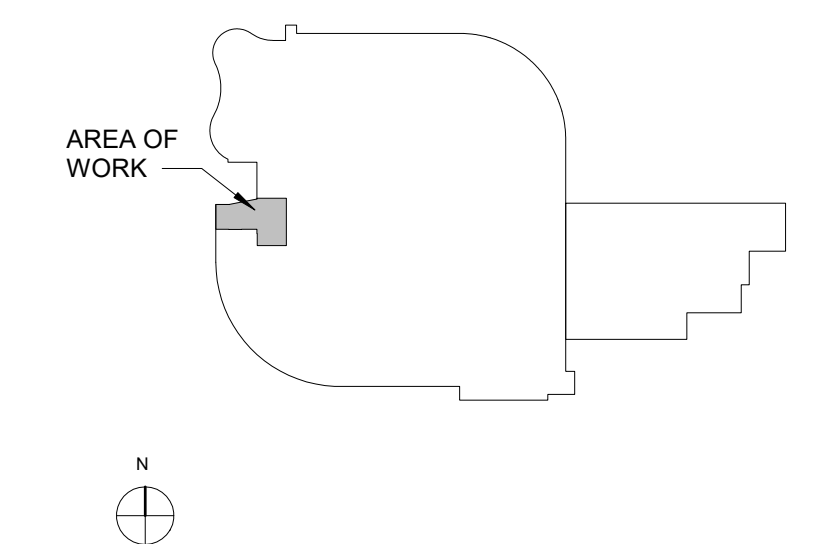
GENERAL CEILING NOTES

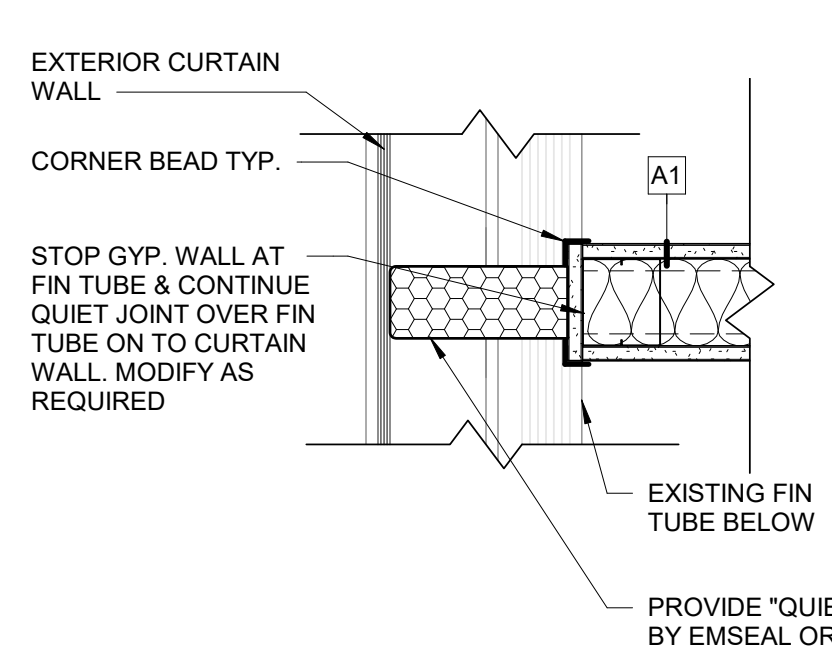
- IN AREAS OF 2'x2' ACT WHERE LESS THAN 4" OF TILE WOULD BE REQUIRED TO FILL SPACE TO THE WALL, PROVIDE MATCHING 2'x4' TILE CUT AS REQUIRED TO FILL SPACE. DO NOT PROVIDE INTERVENING TEE GRID.

KEYED CEILING NOTES

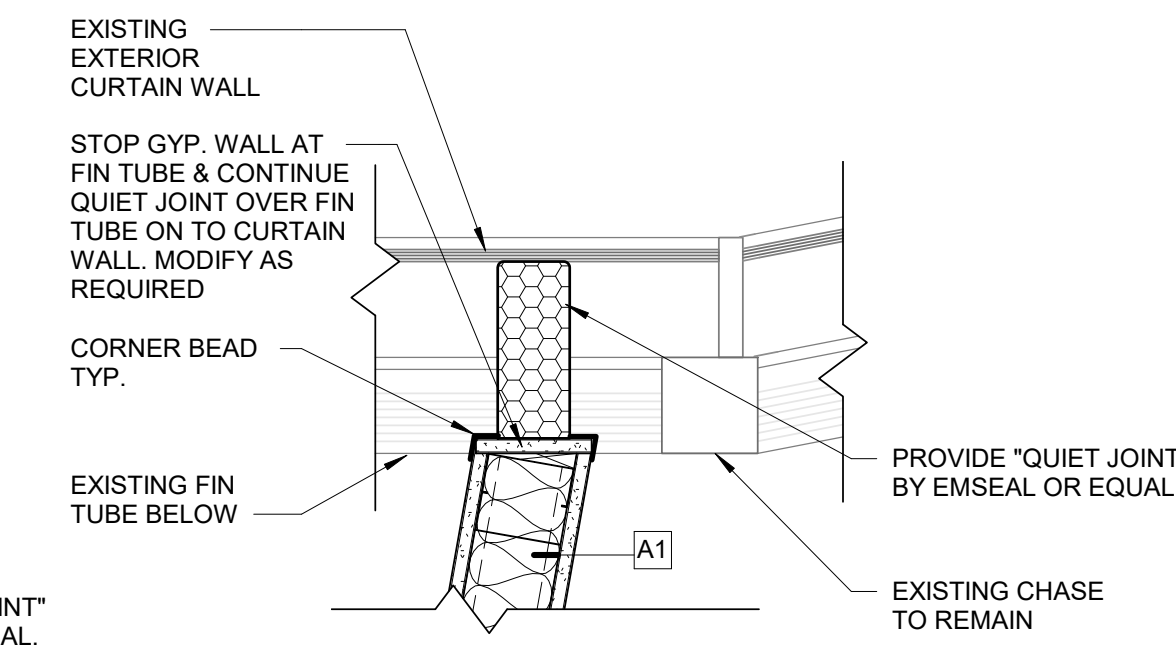
- INSTALL OWNER PROVIDED 2X4 LIGHT FIXTURE
- INSTALL OWNER PROVIDED DIFFUSERS AND GRILLES. REFER TO MECHANICAL DRAWINGS
- PARTIALLY REMOVE AND SALVAGE LINEAR LIGHT FIXTURE. LIGHT FIXTURES TO BE STORED FOR FUTURE REINSTALLATION. FILL IN CEILING TILES AS NECESSARY. REFER TO ELECTRICAL DRAWINGS
- INSTALL TEMPORARY CEILING BELOW EXISTING CEILING (OFFICES 02, 03, 04 ONLY)

KEY PLAN

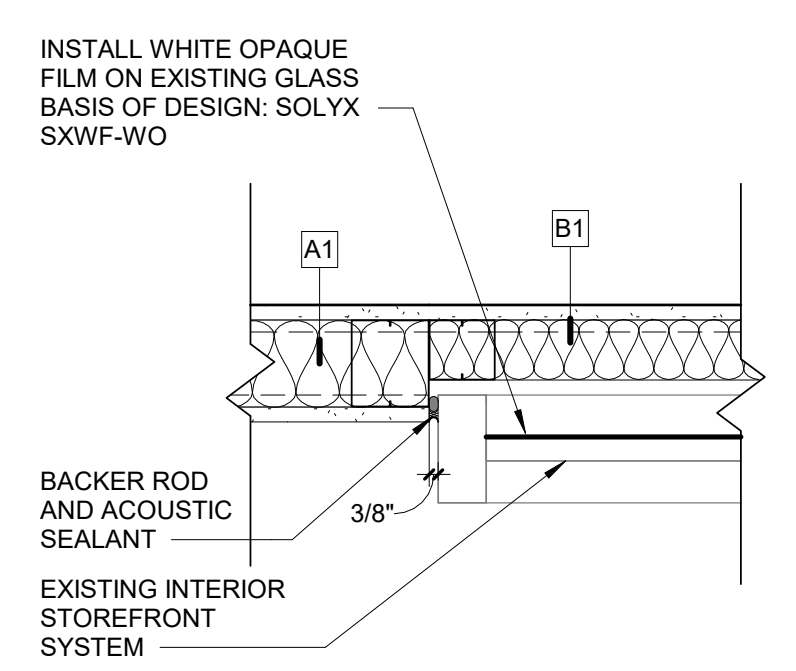




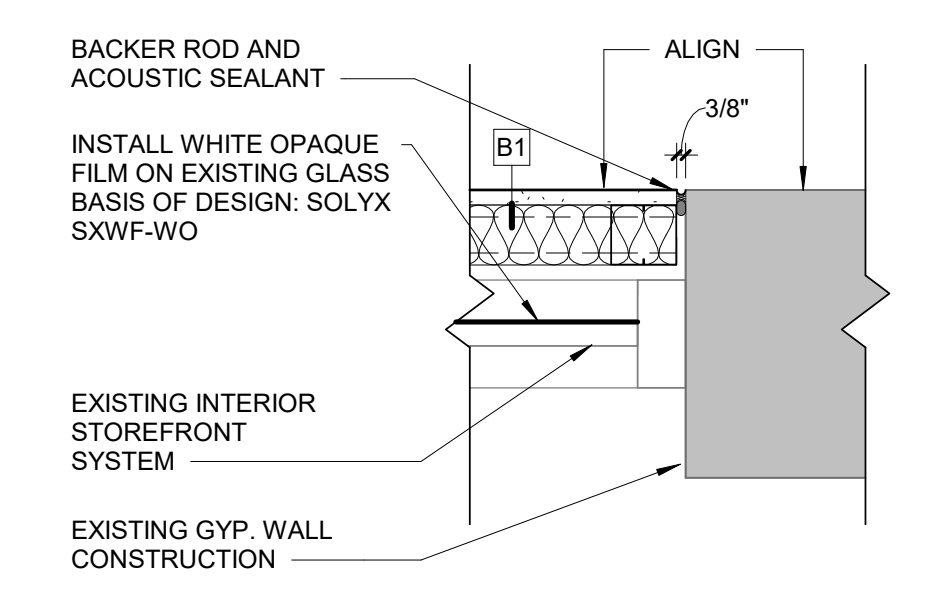
1 PLAN DETAIL
1 1/2" = 1'-0"



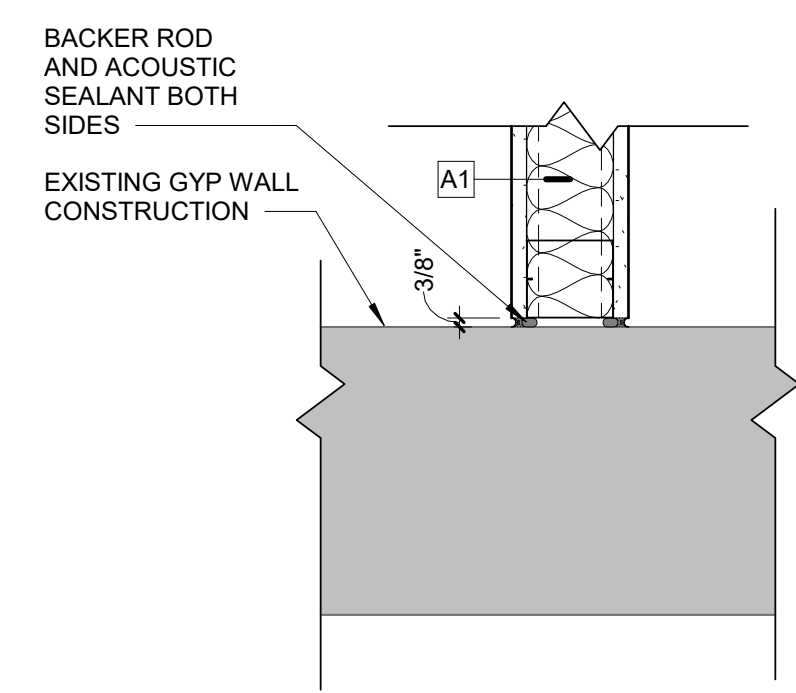
2 PLAN DETAIL
1 1/2" = 1'-0"



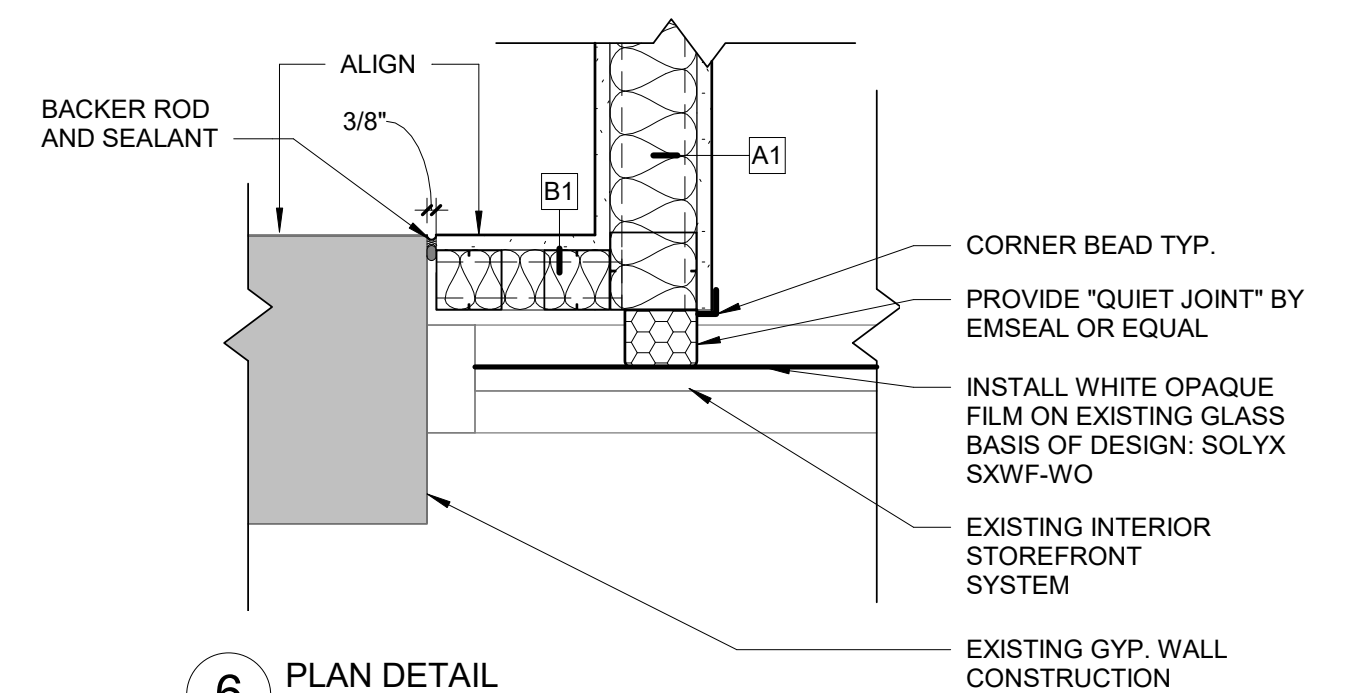
3 PLAN DETAIL
1 1/2" = 1'-0"



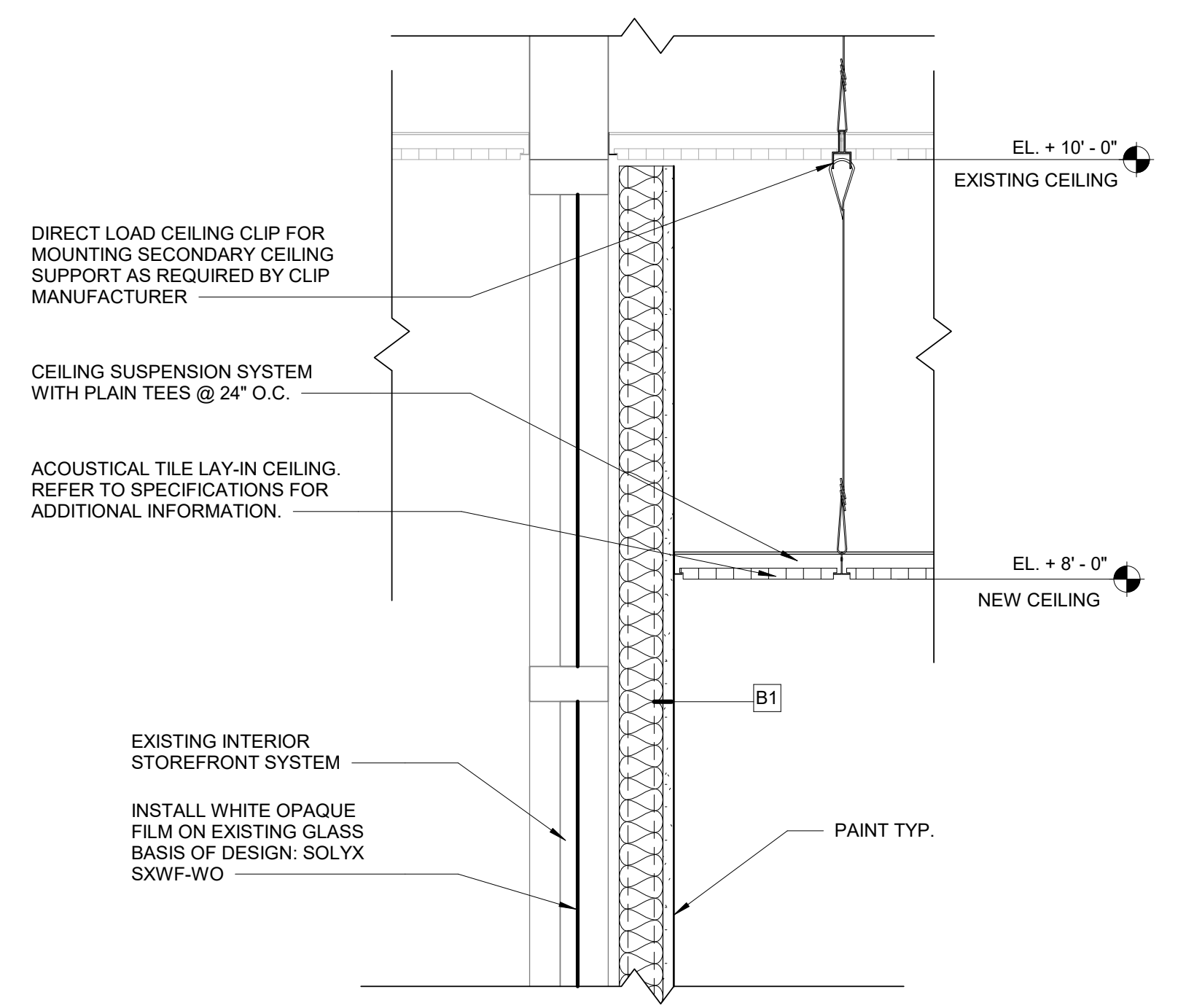
4 PLAN DETAIL
1 1/2" = 1'-0"



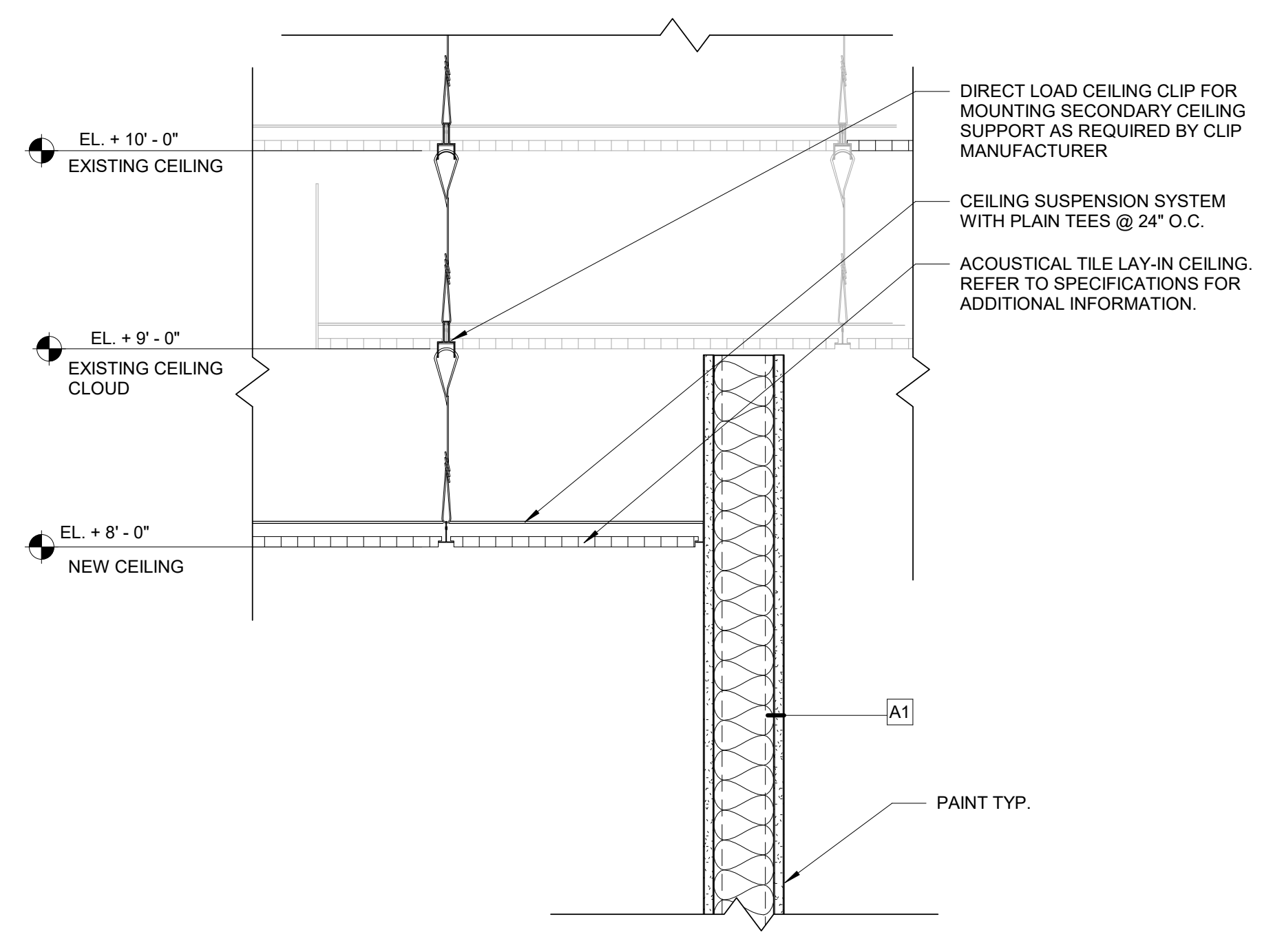
5 PLAN DETAIL
1 1/2" = 1'-0"



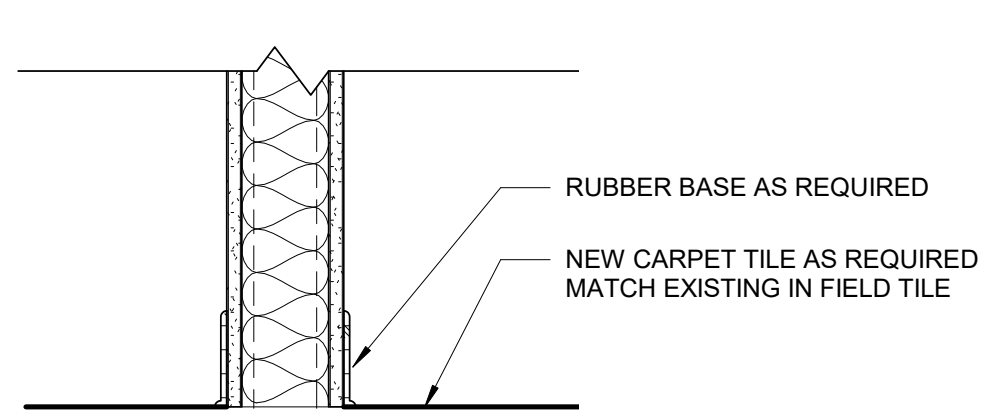
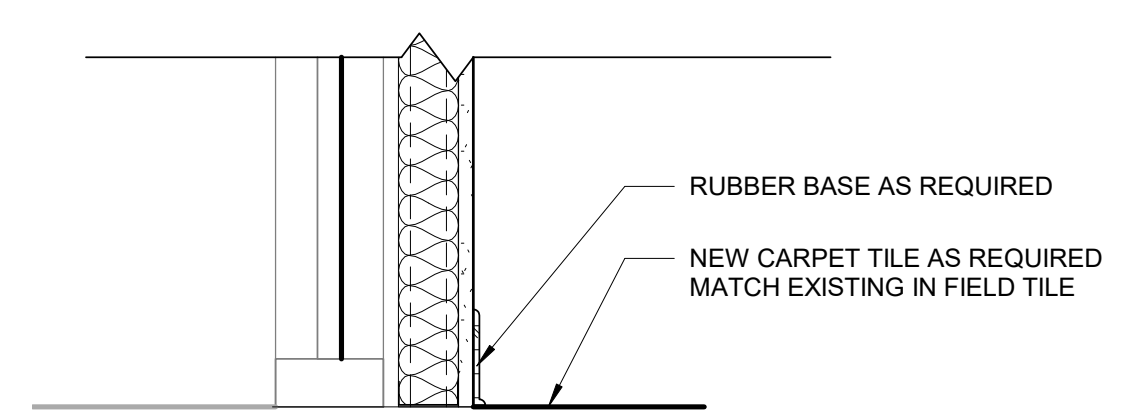
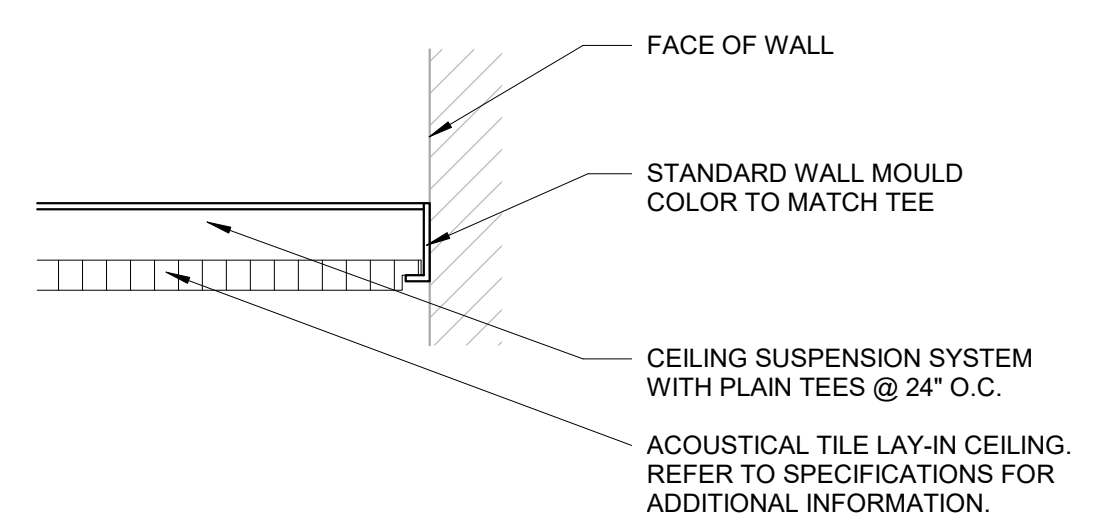
6 PLAN DETAIL
1 1/2" = 1'-0"



10 WALL SECTION
1 1/2" = 1'-0"



8 TYP. CEILING TO WALL CONNECTION
3" = 1'-0"



| DOOR SCHEDULE | | | | | | | | | | | | | | |
|---------------|-------|-------|--------|-------|-----|-----|---------|-----|-----|-------------------|-------------------|---------|------|--|
| DOOR NO. | DOOR | | | FRAME | | | DETAILS | | | FIRE RATING LABEL | DOOR HARDWARE SET | REMARKS | | |
| | W | H | T | TYPE | MAT | FIN | TYPE | MAT | FIN | | | | HEAD | JAMB |
| 01 | 3'-0" | 7'-0" | 1 3/4" | | | | | | | | | | | FRAME, DOOR AND HARDWARE TO BE PROVIDED BY OWNER |
| 02 | 3'-0" | 7'-0" | 1 3/4" | | | | | | | | | | | FRAME, DOOR AND HARDWARE TO BE PROVIDED BY OWNER |
| 03 | 3'-0" | 7'-0" | 1 3/4" | | | | | | | | | | | FRAME, DOOR AND HARDWARE TO BE PROVIDED BY OWNER |
| 04 | 3'-0" | 7'-0" | 1 3/4" | | | | | | | | | | | FRAME, DOOR AND HARDWARE TO BE PROVIDED BY OWNER |

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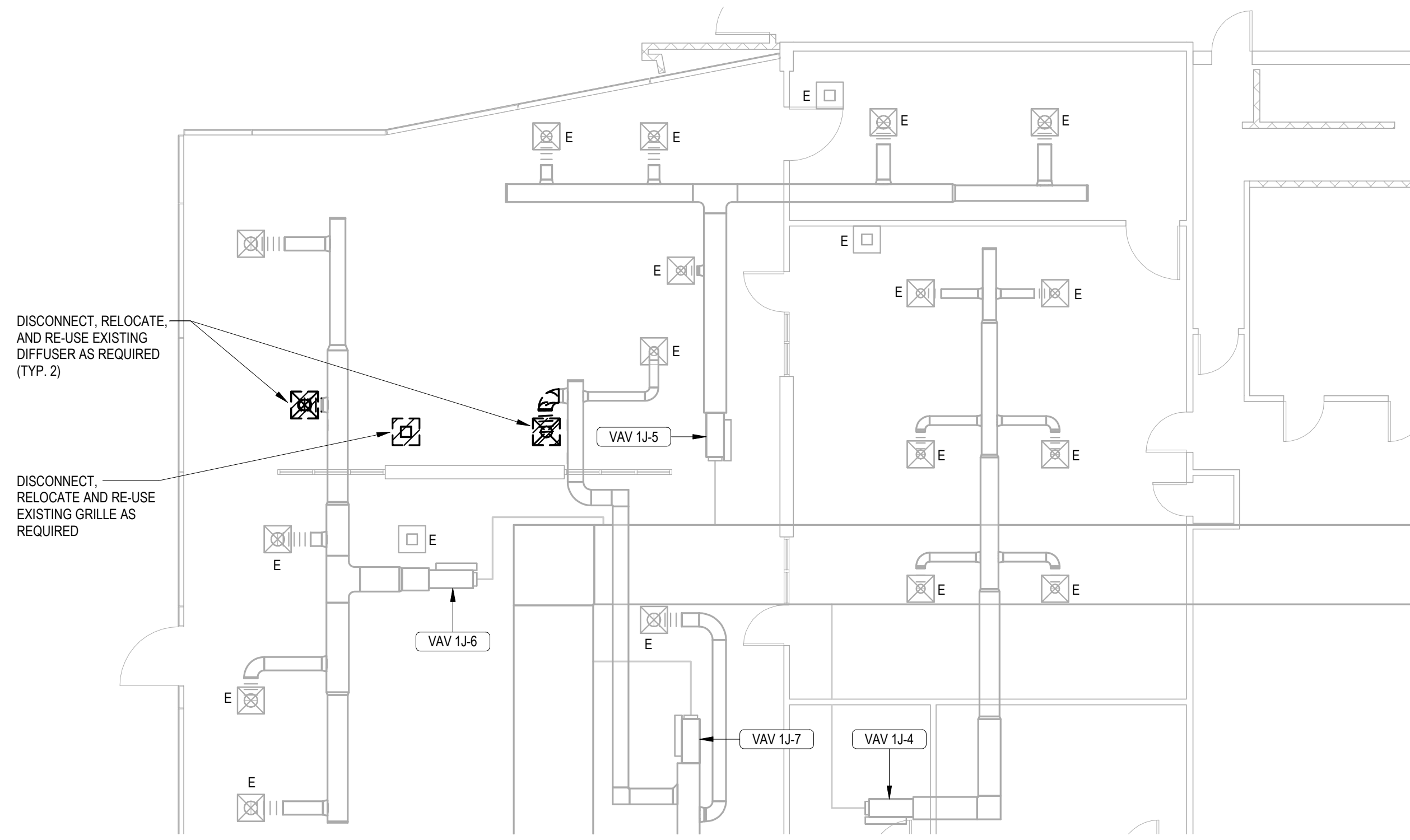
COD SRC PATHWAYS OFFICES
COLLEGE OF DUPAGE
425 Fawell Blvd.

DETAILS & DOOR SCHEDULE

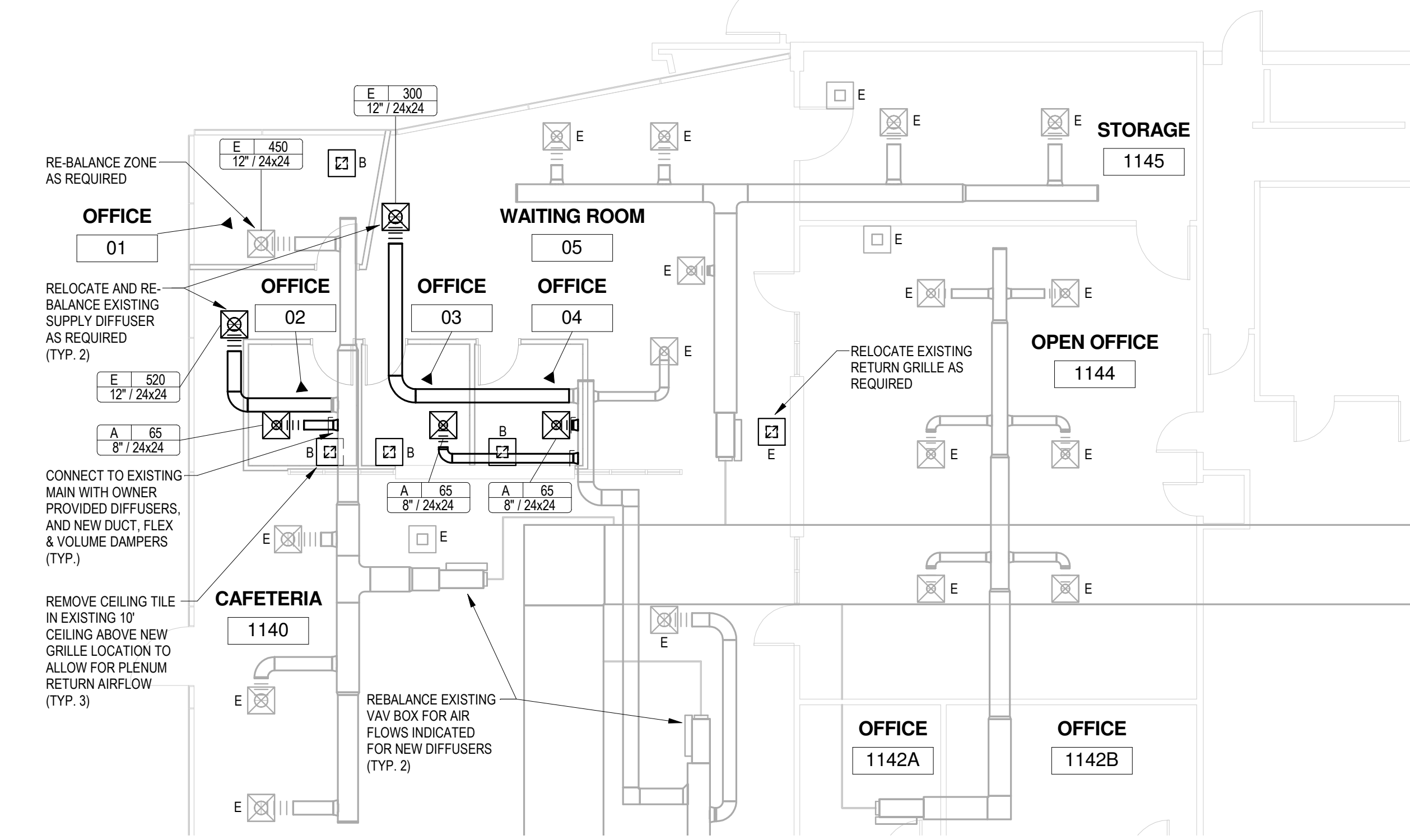
JOB NUMBER 19303
DATE 02.04.2019

REVISIONS:

A3.0



NORTH
1
PARTIAL MECHANICAL DEMOLITION
PLAN
1/8" = 1'-0"

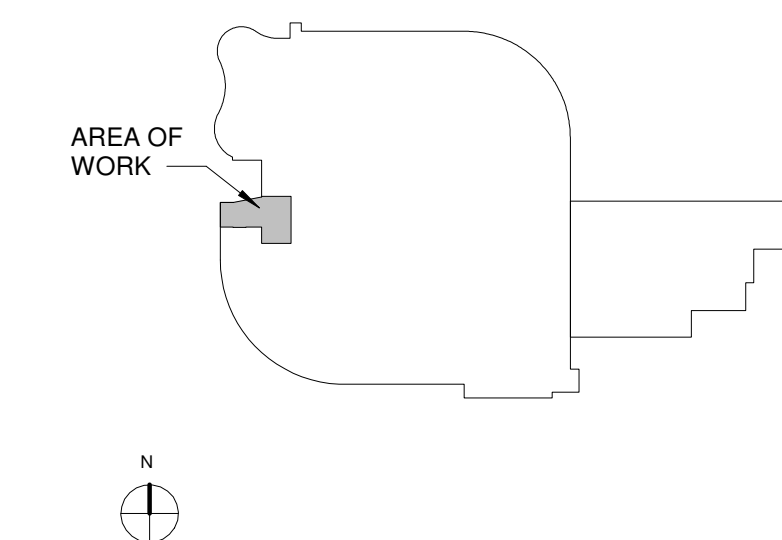


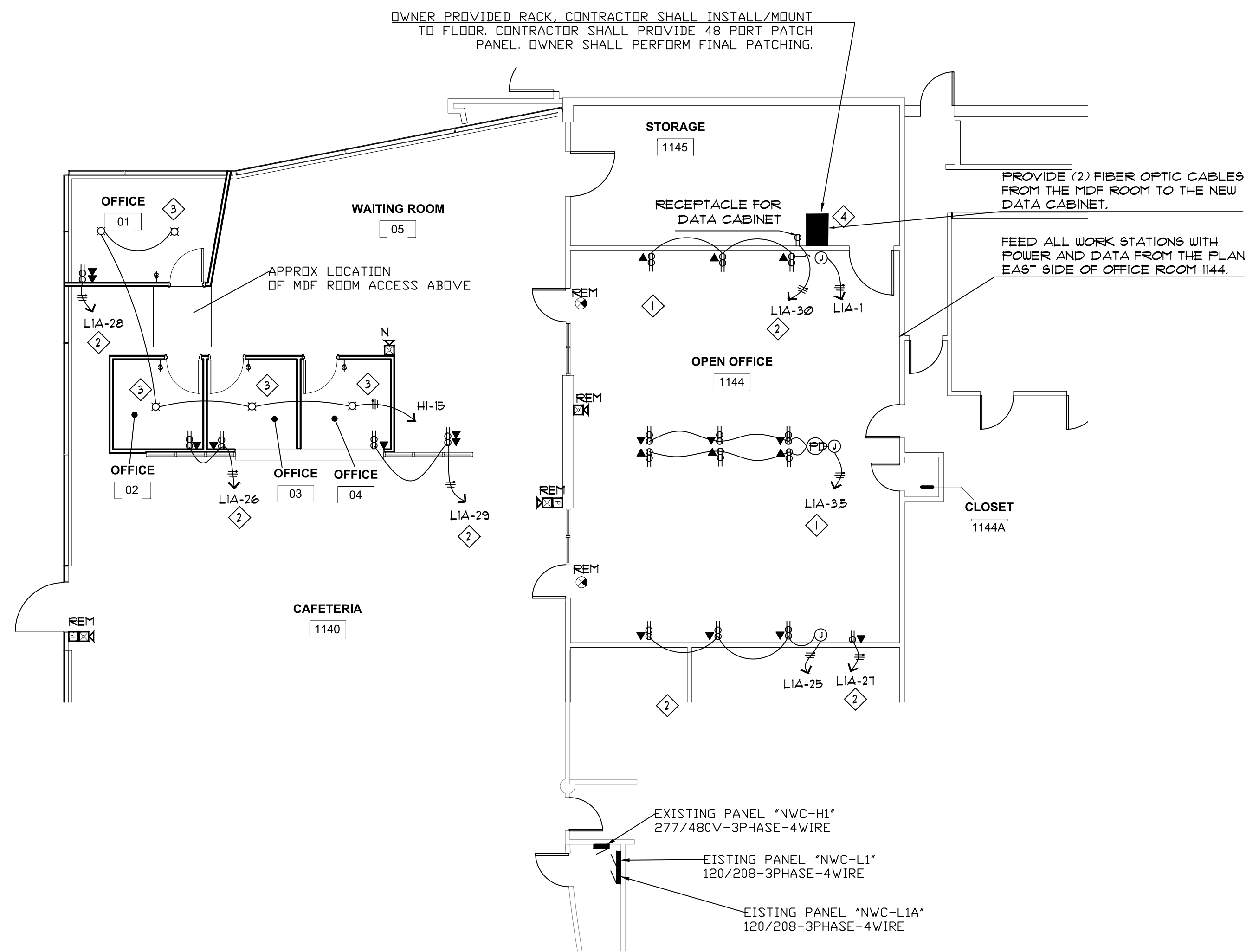
NORTH
2
PARTIAL MECHANICAL PLAN
1/8" = 1'-0"

GENERAL MECHANICAL NOTES

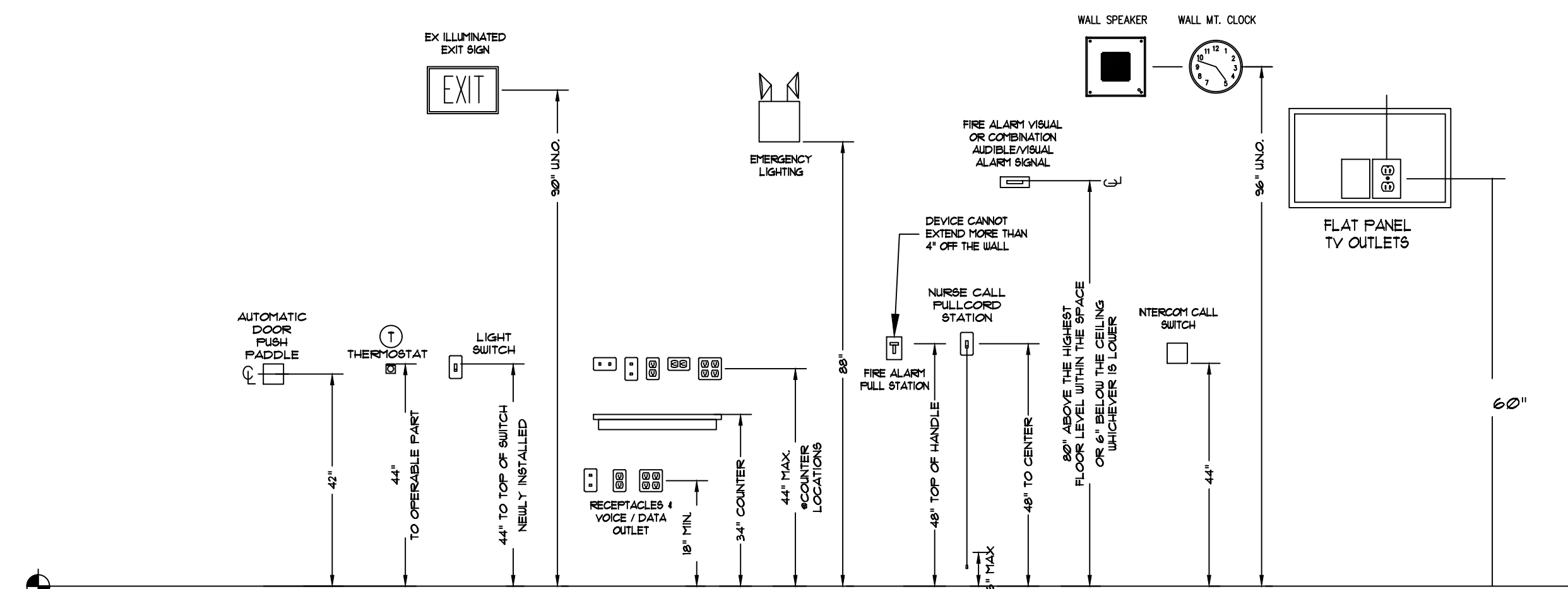
1. IT IS THE INTENT OF THESE DRAWINGS AND ATTACHED ARCHITECTURAL AND MECHANICAL SPECIFICATIONS THAT THE CONTRACTOR SHALL PROVIDE, DELIVER, AND INSTALL ALL HEATING, VENTILATING AND AIR-CONDITIONING SYSTEMS, DUCTWORK, DIFFUSERS, REGISTERS, GRILLES, LOUVERS, LINING, INSULATION, EXHAUST AIR SYSTEMS, ACCESSORIES, TEMPERATURE CONTROL SYSTEMS, SPECIALTIES, PIPING AND WIRING, WATER SYSTEMS AND DISTRIBUTION PIPING, TOOLS AND EQUIPMENT FOR COMPLETE INSTALLATION OF ALL H.V.A.C. SYSTEMS, GUARANTEE AND SERVICE. THIS CONTRACTOR SHALL BE RESPONSIBLE TO INSTALL ALL ITEMS SPECIFIED USING CONSTRUCTION METHODS THAT WILL PROTECT AT ALL TIMES PROPERTY AND PREVENT BODILY INJURY AND/OR DEATH. SPECIAL ATTENTION AND PRECAUTION SHALL BE PAID BY THE CONTRACTOR IN SELECTING THE SAFEST METHODS OR MEANS FOR THE INSTALLATION.
2. THIS ARCHITECT/ENGINEER HAS NO CONTRACTUAL DUTY TO CONTROL THE SAFEST METHODS OR MEANS OF THE WORK. JOB SITE RESPONSIBILITIES, SUPERVISION, OR TO SUPERVISE SAFETY AND DID NOT VOLUNTARILY ASSUME ANY SUCH DUTY OR RESPONSIBILITY.
3. ALL MECHANICAL WORK SHALL BE EXECUTED IN STRICT ACCORDANCE WITH FEDERAL, STATE, AND LOCAL CODES, ACCEPTED BY THE ARCHITECT AND LEFT IN PERFECT OPERATING CONDITION.
4. CONTRACTOR SHALL OBTAIN AND PAY ALL FEES AND PERMITS TO ALL PRIVATE AND PUBLIC AGENCIES HAVING JURISDICTION OVER THE PROJECT.
5. CONTRACTOR SHALL CONSULT AND CHECK AT ALL TIMES THE LATEST ARCHITECTURAL, ELECTRICAL, PLUMBING AND EQUIPMENT DRAWINGS FOR EXACT LOCATION OF EACH DIFFUSER, REGISTER, GRILLE, LOUVER, DUCT AND EQUIPMENT.
6. AFTER COMPLETION OF THE PROJECT, SUBMIT THREE SETS OF "AS BUILT" SHOP DRAWINGS AND ALL MANUFACTURER'S WARRANTIES, GUARANTIES AND INSTRUCTIONS OF ALL INSTALLED SYSTEMS AND EQUIPMENT PROPERLY BOUND AND LABELED FOR THIS PROJECT. PROVIDE SERVICE CONTACT INFORMATION AND WARRANTY LETTER FROM MECHANICAL INSTALLER ON THE COVER SHEET OF THE MANUALS.
7. CONTRACTOR SHALL NOT ROUTE DUCTWORK OVER ELECTRICAL PANELS.
8. CONTRACTOR SHALL ROUTE ALL DUCTWORK TIGHT TO STRUCTURE ABOVE IN EXPOSED CEILINGS.
9. CONTRACTOR SHALL PROVIDE CAULK AROUND ALL PIPES AND DUCTWORK AT ALL WALL PENETRATIONS.
10. CONTRACTOR SHALL PROVIDE ALL SUPPLY / RETURN / EXHAUST DIFFUSERS AND GRILLES WITH VOLUME DAMPERS AT BRANCH TAKE-OFF.
11. FOR CLARITY, THESE DOCUMENTS DO NOT NECESSARILY SHOW EVERY OFFSET, FITTING, VALVE, ETC.
12. UNLESS OTHERWISE NOTED ON THE ARCHITECTURAL DRAWINGS, CONTRACTOR SHALL CUT, PATCH, AND MATCH EXISTING BUILDING CONSTRUCTION TO REMOVE AND INSTALL WORK AS REQUIRED. ALL MATERIAL SHALL COMPLY WITH THE REQUIREMENTS OF SECTION IMC SECTION 602.
13. PROVIDE A 25 PSI AIR TEST AS REQUIRED ON GAS PIPING AT TIME OF ROUGH INSPECTION.
14. CONTRACTOR TO INSULATE NEW CONCEALED ROUND SUPPLY DUCT WITH 2" WRAP WITH A MINIMUM R-VALUE OF 4.2 WITH VAPOR BARRIER.
15. OWNER SHALL PROVIDE DIFFUSERS AND GRILLES TO CONTRACTOR FOR INSTALLATION.

KEY PLAN





1 PARTIAL ELECTRICAL PLAN
1/8"=1'-0"



3 TYPICAL DEVICE HEIGHTS
NTS

ELECTRICAL SYMBOLS LIST

| ELECTRICAL NOTES | |
|------------------|---|
| 1. | THIS PROJECT IS FOR TEMPORARY OFFICES AND WILL NOT COMPLY WITH VILLAGE OF GLEN ELLYN ENERGY CODES. THE PROJECT WILL BE DISASSEMBLED WITHIN 6 MONTHS. AFTER SIXTH MONTHS AREA OF WORK SHALL BE RETURNED TO ITS EXISTING CONDITION. |
| 2. | EXISTING DEVICES WILL BE UNTOUCHED AND LEFT TO BE REUSED AFTER THE 6 MONTH PERIOD. |
| 3. | EXISTING FIRE ALARMS AND PULL STATIONS WILL REMAIN EXISTING AND ACTIVE TO MAINTAIN LIFE SAFETY CODE AND EXISTING EMERGENCY LIGHTING TO REMAIN ACTIVE TO MAINTAIN EGRESS |
| 4. | COORDINATE WITH ARCHITECT REFLECTED CEILING PLAN FOR CHANGES OF EXISTING OF LIGHTING POSITIONS AND NEW LIGHTING PROVIDED BY OWNER. |
| 5. | MINIMUM NEW CIRCUIT WIRING SHALL CONSIST OF 2/10, 10/10G, 3/4"C WHERE HOME RUNS EXCEED 75' OR CONTINUOUS LOAD EXCEEDS 65% OF CIRCUIT RATING, MINIMUM CIRCUIT SIZE SHALL CONSIST OF 2/10, 10/10G, 1/2"C. |
| 6. | E.C. TO COORDINATE NEW CONDUIT RACEWAY FOR TEMPORARY NEW CIRCUITS. |
| 7. | ALL NEW RECEPTACLE OUTLETS IN OPEN OFFICE 1144 SHALL BE SURFACE MOUNTED 18" AFF GANG BOXES WIRED TOGETHER AS INDICATED CUTTING THROUGH BASE OF CUBICLE WALL TO CONNECT TO JUNCTION BOXES INDICATED. |
| 8. | NEW OWNER PROVIDED 2X4 TROFFERS SHALL BE TEMPORARILY CONNECTED TO NEAREST EXISTING BRANCH LIGHTING CIRCUITS WHERE APPLICABLE |
| 9. | NEW SWITCHES WILL BE SINGLE POLE AND CONNECTED TO NEW OWNER PROVIDED 2X4 TROFFERS ACCORDINGLY BASED ON ROOM IT IS ACCOMMODATING. |
| 10. | INDICATED NEW AUDIBLE STROBE FIRE ALARM SHOULD CONNECT TO EXISTING CIRCUITS. |
| 11. | REFER TO ARCHITECTURAL, MECHANICAL, PLUMBING, & FIRE PROTECTION PLANS FOR ADDITIONAL INFORMATION ON EXACT POWER WIRING, & ROUGH-IN REQUIREMENTS AND LOCATIONS OF DEVICES. |
| 12. | ALL NEW FIBER OPTIC CABLING SHALL BE PANDUIT 8-STRAND SINGLE MODE PLENUM RATED CABLE ROUTED IN INNERDUCT. PROVIDE LC CONNECTORS ON BOTH ENDS. |
| 13. | ALL DATA CABLING SHALL BE ROUTED BACK AND TERMINATED TO OWNER PROVIDED CABINET. |

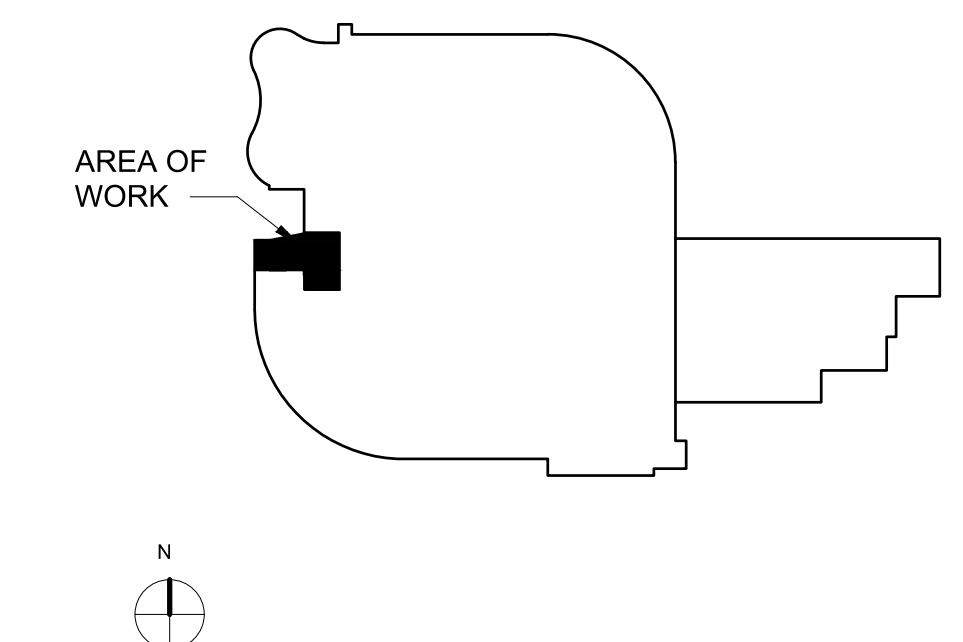
| PROJECT SPECIFIC ABBREVIATIONS: | |
|---------------------------------|--------------------|
| N | NEW DEVICE |
| REM | EXISTING TO REMAIN |

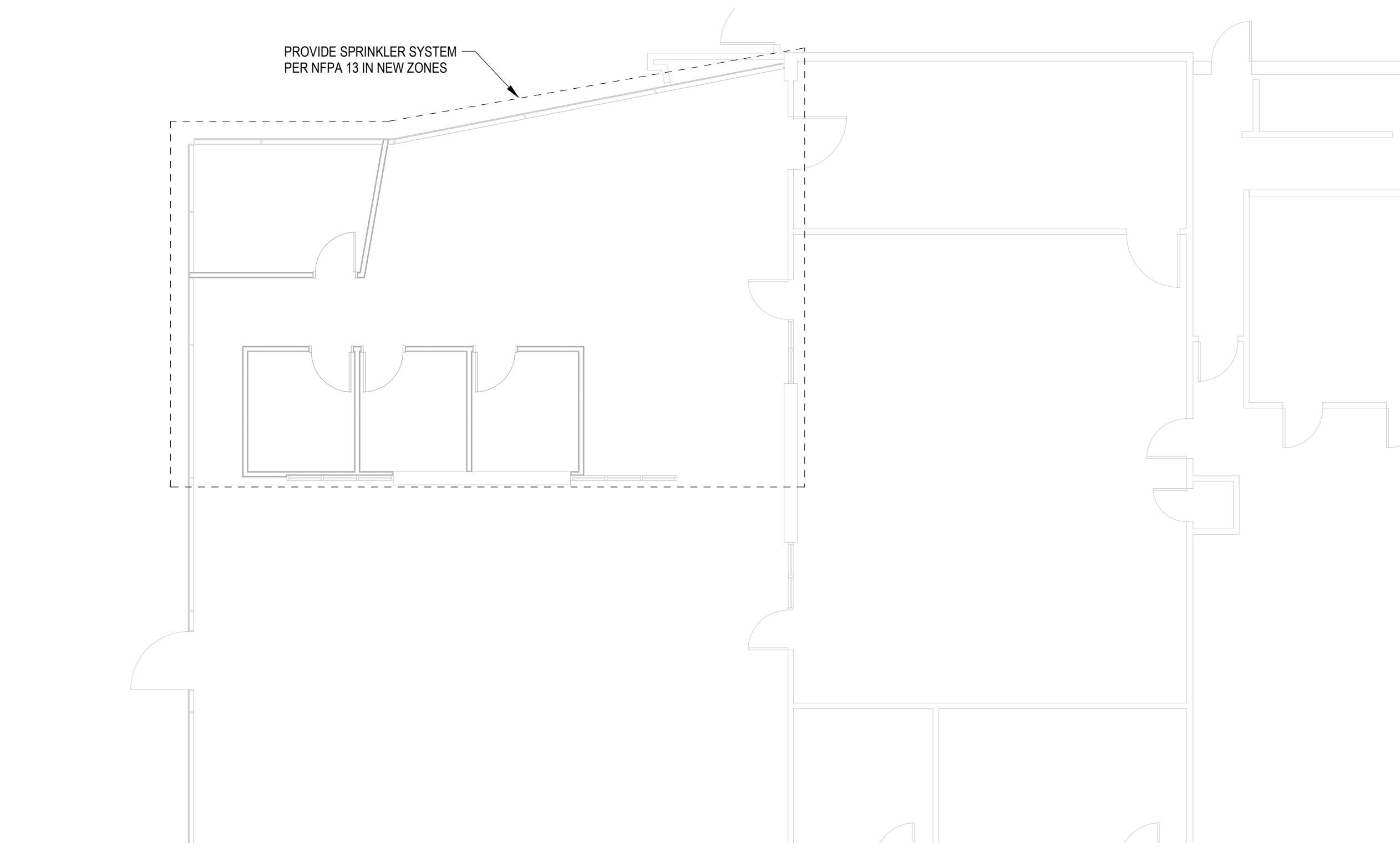
| KEYNOTES | |
|----------|--|
| ◇ | ADD TO EXISTING BRANCH CIRCUITS FOR NEW OUTLETS IF THEY INDICATED ON A EXISTING CIRCUIT |
| ◇ | ESTABLISH NEW CIRCUITS FOR RECEPTACLE OUTLETS AND ESTABLISH NEW 20A BREAKER POLE ON PANEL |
| ◇ | ESTABLISH A NEW CIRCUIT FOR OWNER PROVIDED 2X4 TROFFERS AND NEW 1 POLE BREAKER ON SPARE SPACE INDICATED (HI-15). |
| ◇ | APPROXIMATE LOCATION OF NEW DATA CABINET FURNISHED BY OWNER RECEIVED AND PLACED BY ELECTRICAL CONTRACTOR. ELECTRICAL CONTRACTOR TO FURNISH ONE 48-PORT BUILDING STANDARD PATCH PANEL (PER SPECIFICATION) AND ONE SEPARATE CIRCUIT 20-AMP 120 VOLT DUPLEX RECEPTACLE INSIDE THE UNIT (HEIGHT TO BE AS DIRECTED). NEW FIBER SHALL RUN TO SWITCH CABINET AND HOMERUN TO MDF ROOM. APPROX LOCATION OF MDF ACCESS ABOVE INDICATED ON ELECTRICAL PLAN. |

| | |
|-------|---|
| ⊕ | SWITCH TYPE (SINGLE POLE, 3-WAY, 4-WAY, DIMMING, TIMER, OCCUPANCY SENSOR, OVERRIDE, KEYED). 48" AFF. TO CENTER (UNO.). IN BLOCK WALLS, MEASUREMENT IS TO THE TOP. |
| ⊕ | DUPLEX CONVENIENCE OUTLET 18" AFF. (UNO.) TO THE CENTER. |
| ⊕ | LINE INDICATES AT COUNTER HEIGHT. MOUNT 48" AFF. (6" ABOVE COUNTERTOP TO CENTER). COORDINATE ACTUAL HEIGHT WITH BACKSPASHES |
| ⊕ | QUADPLEX CONVENIENCE OUTLET 18" AFF. (UNO.) TO THE CENTER. |
| ⊕ | LINE INDICATES AT COUNTER HEIGHT. MOUNT 48" AFF. (6" ABOVE COUNTERTOP TO CENTER). COORDINATE ACTUAL HEIGHT WITH BACKSPASHES |
| ⊕ | SINGLE POLE RECEPTACLE |
| ⊕ | DUPLEX AND QUADPLEX OUTLETS IN FLUSH FLOOR BOX |
| ⊕ WP | WP INDICATES RAIN-TITE |
| ⊕ GFI | GFI INDICATES GROUND FAULT INTERRUPT |
| ⊕ | DATA PORT |
| ⊕ | DOUBLE DATA PORT |
| ⊕ | SINGLE DATA PORT |
| ⊕ | EMPTY A/V STUB-UP. PROVIDE MINIMUM 1-1/2" RACEWAY TO ACCESSIBLE CEILING. |
| ⊕ | RECEPTACLE AND TELECOM DEVICES IN CONCEALED ACCESS FLOOR BOX. |
| ⊕ | JUNCTION BOX |
| ⊕ | HIGH VOLTAGE (277/480V) POWER AND/OR LIGHTING PANEL (UNO.) |
| ⊕ | LOW VOLTAGE (120/208V) POWER AND/OR LIGHTING PANEL (UNO.) |
| ⊕ | CT CABINET 4 METER |
| ⊕ | SELF-POWERED EXIT SIGNAGE PER LOCAL CODE |
| ⊕ | SELF-POWERED UNIT LIGHTING EQUIPMENT |
| ⊕ | FLUSH CLOCK/SPEAKER COMBO UNITS 96" AFF. |
| ⊕ | FLUSH CEILING SPEAKER PLAN AND RISER |
| ⊕ | SEMI-FLUSH SYSTEM WALL CLOCK PER RISER PLAN (96" AFF. UNO.) |
| ⊕ | LUMINARIES |
| ⊕ PD | POWER AND DATA POLE |

| NFPA SYMBOLS LIST | |
|-------------------|---------------------|
| ⊕ | MANUAL PULL STATION |
| ⊕ | AUDIO VISUAL DEVICE |

KEY PLAN





1 LEVEL 1 OVERALL FIRE PROTECTION PLAN
 FPI.0 1/8" = 1'-0"

FIRE PROTECTION NOTES

1. HAZARD CLASSIFICATION: SELECTED AREAS - LIGHT HAZARD.
2. FIELD-FIT SPRINKLER HEADS TO CENTER OF CEILING TILES AND PROVIDE CONCEALED STYLE HEAD WITH COVER PLATE TO MATCH CEILING.
3. ROUTE SPRINKLER MAINS IN CORRIDORS IN AN ORGANIZED FASHION. ROUTE ALL SPRINKLER PIPING TIGHT TO STRUCTURE.
4. LINE PIPING: BLACK STEEL SCHEDULE 40 PIPE, MANUFACTURED TO ASTM-A795, TYPE E, GRADE A, STANDARDS. FITTINGS SHALL BE VICTAULIC "FIT" FITTINGS, UL/LC/FM RATED TO 175 PSI FOR FIRE PROTECTION SERVICE. GASKETS SHALL BE GRADE E EPDM RUBBER COMPOUND, RATED AT -30F TO +150F. SCREWED FITTINGS SHALL BE CAST IRON THREADED, CLASS 125 (STANDARD), MANUFACTURED PER ANSI B16.4, U.L. LISTED FOR FIRE PROTECTION TO 175 PSI.
5. MAIN PIPING: BLACK STEEL SCHEDULE 10 PIPE, MANUFACTURED TO ASTM-A135 STANDARDS.
6. RISER NIPPLES & STARTER PIECES: BLACK STEEL SCHEDULE 40 PIPE, MANUFACTURED TO ASTM-A135 STANDARDS.
7. GROOVED COUPLINGS: VICTAULIC "FIRELOCK" RIGID COUPLINGS, UL/FM APPROVED TO 300 PSI FOR FIRE PROTECTION SERVICE. GASKETS SHALL BE GRADE E (TYPE A) EPDM RUBBER COMPOUND, RATED AT -30F TO +150F.
8. GROOVED FITTINGS: VICTAULIC "FIRELOCK" FITTINGS, UL/FM APPROVED TO 300 PSI FOR FIRE PROTECTION SERVICE.
9. FLANGED FITTINGS: CAST IRON, CLASS 125 (STANDARD), MANUFACTURED PER ANSI B16.1 AND MARKED 125. FLANGES ARE FACED AND DRILLED AMERICAN NATIONAL STANDARD. UL LISTED FOR FIRE PROTECTION TO 175 PSI.
10. HANGERS: 3/8" THREADED ROD, CLAMP TO STRUCTURE, UNISTRUT TRAPEZE AS REQUIRED.
11. PROVIDE SCHEDULE 40 SLEEVES AT WALL PENETRATIONS AND SEAL HYDROSTATICALLY. TEST COMPLETED SYSTEM AT 200 PSI FOR 2 HOURS. ALARM WIRING AND CENTRAL SUPERVISION FOR FLOW & TAMPER SWITCHES TO BE PROVIDED BY OTHERS. PROVIDE 115 VOLT FLOW & TAMPER SWITCH DEVICES.
12. CONTRACTOR SHALL DRAIN AND FILL SYSTEM AS NEEDED TO INSTALL NEW WORK.

SPRINKLER NOTES

1. DRAWING IS INTENDED TO PROVIDE SCOPE ONLY. DESIGN AND CALCULATION OF THE SYSTEM IS TO BE BY SPRINKLER CONTRACTOR IN ACCORDANCE WITH NFPA AND THE LOCAL FIRE PREVENTION DEPT. LOCATION AND NUMBER OF HEADS MUST BE VERIFIED BY THE SPRINKLER CONTRACTOR.
2. SPRINKLER CONTRACTOR SHALL PREPARE DESIGN DOCUMENTS AND LAYOUT DOCUMENTS AND SUBMIT THEM TO THE LOCAL FIRE PREVENTION DEPARTMENT FOR APPROVAL PRIOR TO ORDERING, PURCHASING, MANUFACTURING AND INSTALLING ANY PORTION OF THE SPRINKLER SYSTEM. PROVIDE PE STAMP FOR DESIGN DOCUMENTS AND NICET III/IV STAMP FOR LAYOUT DOCUMENTS.
3. ALL PIPING AND SPRINKLER HEADS SHALL BE INSTALLED AS PER NFPA-13, LOCAL CODES, AND ASTM-A120 STANDARDS, REGULATIONS, RECOMMENDATIONS AND RULES. PIPING SHALL BE SHOP WELDED IN ACCORDANCE WITH NFPA-13 STANDARDS. FITTINGS SHALL BE STANDARD WEIGHT BLACK CAST IRON WITH SCREWED JOINTS.
4. ALL MATERIALS, WHERE APPLICABLE, SHALL BE U.L. LISTED AND FACTORY MUTUAL APPROVED FOR USE IN AUTOMATIC SPRINKLER SYSTEMS.
5. ALL PIPES SHALL BE SUPPORTED FROM THE BUILDING STRUCTURE UTILIZING HANGERS, MATERIALS, AND METHODS PER NFPA 13. PIPING SUPPORT SHALL BE IN ACCORDANCE WITH NFPA 13.
6. REDUCERS, UNION, VALVES, HANGERS, SLEEVED THROUGH WALLS AND FLOORS, SPECIAL TIES AND OTHER MISCELLANEOUS ITEMS NOT SHOWN ON DRAWINGS SHALL BE FURNISHED BY SPRINKLER CONTRACTOR AS REQUIRED.
7. ELECTRIC ALARM DEVICES AND SUPERVISORY DEVICES FOR THE MONITORING OF THE SPRINKLER SYSTEM SHALL BE INSTALLED BY THE FIRE PROTECTION CONTRACTOR. ALL WIRING OF THE DEVICES IS THE RESPONSIBILITY OF OTHERS.
8. CHECK AND CONSULT ALL TIMES THE LATEST ARCHITECTURAL, MECHANICAL, ELECTRICAL AND EQUIPMENT DRAWINGS FOR EXACT LOCATION OF EQUIPMENT, LIGHTING FIXTURES, CEILING AIR DIFFUSERS, DUCTWORK, ETC. RE-ROUTE ANY PORTION OF SPRINKLER PIPING AS REQUIRED IN FIELD BY ARCHITECTURAL OR OTHER REVISIONS TO AVOID INTERFERENCES.
9. CONTRACTOR TO BE LICENSED AND PROVIDE PE STAMP.
10. ALL UNDERGROUND LINES MUST HAVE 10' HEAD TEST AND BE INSPECTED BY CITY

KEY PLAN

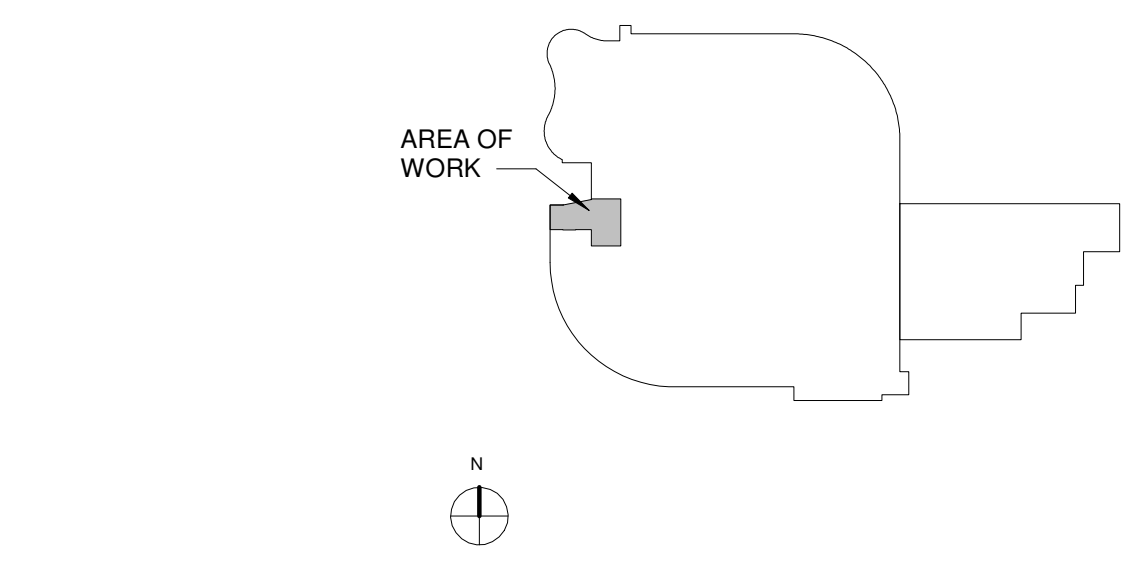


EXHIBIT C – PREVAILING WAGE



Prevailing Wage Form

In an effort to meet the Prevailing Wage Survey requirements of the State of Illinois, the College of DuPage has established the Prevailing Wage Form that will assist in reporting Prevailing Wage information. Please complete the information below and return to the College of DuPage Project Manager.

Project Name: _____

Project Bid/RFP#: _____

Contractor Information:

| | | | |
|--------------|-------|-------------|-------|
| Company Name | _____ | | |
| Address: | _____ | Suite/Floor | _____ |
| City: | _____ | ST | _____ |
| | | Zip Code | _____ |
| Phone: | _____ | Fax: | _____ |

Contractor Contact Information:

| | | | | | |
|----------------|-------|----|-------|-----------|-------|
| First Name | _____ | MI | _____ | Last Name | _____ |
| Title | _____ | | Email | _____ | |
| City | _____ | ST | _____ | Zip | _____ |
| Primary Phone: | _____ | | | | |

College of DuPage Project Manager: _____ **Date:** _____

EXHIBIT D – SAMPLE SMALL PROJECT AGREEMENT

See attached 5 page document “SMALL PROJECTS AGREEMENT FOR Sample Project”.

COLLEGE OF DUPAGE
SMALL PROJECTS AGREEMENT FOR SRC 1114 – Navigator Project
BETWEEN COMMUNITY COLLEGE DISTRICT 502 AND CONTRACTOR

THIS AGREEMENT (“**Agreement**”) is made as of March 2019 by and among Community College District 502 (COLLEGE OF DuPAGE), (“**COD**”) and General Trades (“**Contractor**”).

COD and Contractor desire to enter into this Agreement, pursuant to which Contractor shall perform certain work in connection with the Project, as hereinafter provided. In consideration of the performance of work by Contractor and the payment for such work by COD, the parties agree as follows:

1. Scope of Project. Contractor shall perform work for COD in connection with the Project, including specifically, the matters set forth on Exhibit 1. Contractor shall perform all work with the highest standards of workmanship and materials. Contractor shall maintain a sufficient staff to perform all work in the most expeditious manner consistent with the interests of COD. Contractor shall promptly notify COD immediately in writing: (i) of any information required from COD so Contractor can complete its work in a timely manner; and (ii) of any work requested by COD that is not included in the scope of work provided in Exhibit 1.

The Contractor understands that COD may engage other Contractors or COD personnel to work in areas near the Contractor’s work. Contractor shall cooperate with such others so that work is not disrupted or delayed.

The Contractor shall be solely responsible for means and methods selected in performing the Work. Contractor shall supervise all work so that it is performed in a safe and expeditious manner. Contractor shall be solely responsible for the safe work of its employees and its subcontractor’s employees.

Phase 1 of the work shall be completed Prior to Jun 1, 2019. Phase 2 is targeted Jan 2020.

2. Payment to Contractor. COD shall pay Contractor for Contractor’s work properly performed under this Agreement. Contractor’s work shall be billed as set forth in Exhibit 2 and in no event shall the total amount due to Contractor under this Agreement exceed the total contract sum following, without COD’s prior written approval:

Total Contract Sum: \$ TBD (numbers and words)

S

3. Defective Work and Guarantee. Contractor shall promptly correct any defective work. Payment by COD for any work otherwise determined to be defective shall not relieve Contractor of its obligation to correct. Contractor shall warrant and guarantee all work to be free from defect for one year following substantial completion of the work.

4. Indemnification and Insurance. Contractor hereby agrees to indemnify and hold COD, its trustees, officers, agents, employees and any other parties designated by COD (COD, its trustees, officers, agents, employees any other parties designated by COD hereinafter collectively called the “**Indemnitees**”) harmless from all losses, claims, liabilities, injuries, damages and expenses, including but not limited to, all attorneys’ fees, defense and court costs and expenses, that the Indemnitees may incur arising out of, or occurring in connection with, the acts, omissions, or breaches by Contractor of its duties and obligations under or pursuant to this Agreement. This indemnification obligation shall not be limited by a limitation on amount or type of damages, compensation or benefits payable by or for the Contractor or a Subcontractor under workers’ or workmen’s compensation acts, disability benefit acts or other employee benefit acts. Contractor shall procure, at no expense to COD, the insurance coverages set forth in Exhibit 3. Contractor shall adhere to all provisions of Exhibit 3.

5. Performance and Payment Bond. For every Small Project greater than Five Thousand Dollars (\$5,000), Contractor shall procure, a performance and payment bond with a surety with a Best Rating of A, VI. Prior to commencement of any work on the Project, Contractor shall submit insurance and bonds. Any provisions contained within the bonds abrogating COD’s rights or remedies, otherwise available in contract or law, are void.

6. Termination. COD may terminate this Agreement at any time, in whole or in part, with or without cause, upon written notice to Contractor. In the event this Agreement is terminated for convenience, Contractor shall be compensated for work properly rendered through the date of termination, as can be documented to the reasonable satisfaction of COD. COD shall have no liability to Contractor beyond the date of termination. In no event shall contractor be compensated for anticipated profit or lost opportunity.

7. Liens. Upon COD's request, contractor shall submit mechanics' lien waivers in form acceptable to COD with each statement for work rendered or request for payment. Should liens be placed on the project by any subcontractor, contractor shall indemnify COD for all costs, expenses and attorneys fees incurred in the defense of such lien.

8. Materials. All materials incorporated into the work shall be new and of high quality. Contractor shall adhere to all manufacturer's recommendations. If requested by COD or otherwise set out in the contract documents, Contractor shall, before purchase of such material, submit to COD for COD's review, and in a format acceptable to COD, all product data and literature. All manufacturer's warranties shall be forwarded to COD prior to substantial completion of the work.

9. Changes in Scope of Work. COD may, without invalidating this Agreement, request changes in the scope of the work, whether taking the form of additions, deletions, or other revisions. No such work shall be performed unless and until such change is agreed in writing by COD and Contractor. If the change in work will result in a change in contract price, the change in price shall be calculated by 1) lump sum, 2) agreed unit rates, or 3) time and material reimbursable plus mark-up. COD shall solely select the method of pricing.

10. Successors and Assigns. Contractor shall not assign any rights under or interest in this Agreement without the prior written consent of the COD. This Agreement shall be binding upon and inure to the benefit of the parties hereto and their respective successors and assigns.

11. Controlling Law. This Agreement is to be governed by the laws of the State of Illinois. Each party has reviewed and approved this Agreement and the rule of construction that resolves ambiguities against the drafting party shall not be employed in the interpretation of this Agreement.

12. Entire Agreement; Conflict. This Agreement incorporates COD's bid instruction and request documents and Contractor's bid. This Agreement represents the entire agreement between Contractor and COD and supersedes all prior negotiations or agreements, written or oral, which are not included herein. This Agreement may only be amended by written instrument executed by COD and Contractor. In the event of a conflict between this Agreement and a proposal from Contractor or any exhibits hereto, this Agreement shall control, followed by COD's bid instruction and request documents, and finally, by Contractor's bid.

13. Prevailing Wage Act. To the extent required by law, contractor shall not pay less than the prevailing wage as established pursuant to an Act Regulating The Wages of Laborers, Mechanics, and Other Workman employed under Contract for Public Workers 820 ILCS 130/1 *et seq.*

14. Human Rights Act. To the extent required by law, contractor shall abide by the Illinois Human Right Act, 775 ILCS 10/0.01 *et seq.*

15. Drug Free Workplace. To the extent required by law, contractor shall abide with the requirements of the Drug Free Workplace Act 30 ILCS 580.1 *er seq.*

16. Sexual Harassment Policy. Contractor represents by the signing of this Agreement that it has a written sexual harassment policy that is in accordance with 775 ILCS 5/2-105 (A)(4).

This Agreement has been executed the day and year provided above.

COLLEGE OF DUPAGE

Contractor:

By: _____

By: _____

Name: Dr. Brian Caputo

Name: _____

Title: VP Administration, CFO

Title: _____

SCOPE OF WORK

(List BID Package and any addendums)

EXHIBIT 2

Contractor shall submit monthly statements for work rendered. The statements will be based upon Contractor's work completed at the time of billing on the basis of actual work performed. COD shall make payments to Contractor sixty (60) days after receipt of Contractor's statements properly submitted. Monthly statements shall detail Amount Currently Due, Previous Amount Billed, and Balance of Contract Outstanding. In the event of termination for convenience by COD as herein provided, Contractor shall be paid for work properly rendered prior to termination, or as otherwise provided herein.

Requests for Payment shall be submitted no more than once per month in a format acceptable to COD.

Any terms or payment provisions, such as penalties or interest, contained on Contractor's invoices shall be of no effect.

COD may withhold payment from monies otherwise due to the Contractor to compensate the COD for the cost of repairing defective work or completing incomplete work in case of Contractor default.

If COD selects agreed unit rates as the method of payment for base scope work or change order work, the agreed unit rates are as set forth below:

UNIT RATE SCHEDULE

| Description | Unit | Rate (\$) |
|-------------|------|-----------|
| NA | | |
| | | |
| | | |
| | | |

Contractor shall be allowed 10% mark-up on change order work when time and material reimbursable method of pricing is selected.

CONTRACTOR' S LIABILITY INSURANCE

The Contractor shall not commence work under this contract until all insurance required herein is obtained and approved by the Owner. Nor shall the Contractor allow any subcontractor to commence work until all similar insurance required of the subcontractor has been so obtained.

The Contractor shall furnish the College of DuPage with a Certificate of Insurance, with Community College District 502, its trustees, officers, agents, employees, and any other parties designated by COD named as an additional insured for Commercial General and Automobile Liability, showing the minimum coverage indicated below. Insurance companies must have a Best Rating of at least A VI and otherwise be acceptable to the College. Workers' compensation insurance shall include a waiver of subrogation in favor of the College of DuPage. The College will also be shown as the certificate holder. Further, the Certificate of Insurance shall state that coverage provided is primary to any other coverage available to College of DuPage. An endorsement page showing coverage must accompany the certificate of insurance. The foregoing certificate shall contain a provision that coverage afforded under the policies will not be cancelled or non-renewed until at least sixty (60) days prior written notice has been given to College of DuPage.

TYPE OF INSURANCE

MINIMUM INSURANCE COVERAGE

Combined Single Limit Per Occurrence/Aggregate

Commercial General Liability including:

- | | |
|---|---------------------------|
| 1. Premises – Operations | \$1,000,000 / \$2,000,000 |
| 2. Explosion, Underground and Collapse Hazard | |
| 3. Products/Completed Operations | |
| 4. Contractual Insurance | |
| 5. Broad Form Property Damage | |
| 6. Independent Contractors | |
| 7. Bodily Injury | |

Automobile Liability

| | |
|-----------------------------|---------------------------|
| Owned, Non-owned, or Rented | \$1,000,000 / \$2,000,000 |
|-----------------------------|---------------------------|

| | |
|---|---------------------------------|
| Workers' Compensation and Employers' Liability | As Required by Applicable Laws. |
|---|---------------------------------|

| | |
|-------------------------------|--|
| Professional Liability | If Performance Specifications are Required by the Contract |
|-------------------------------|--|