LOCAL BUSINESS OPPORTUNITY COMMISSION
CERTIFICATION PACKAGE

DEPARTMENT OF HUMAN RIGHTS
AND
LOCAL BUSINESS DEVELOPMENT

Local, Small and Disadvantaged Business Enterprise Program

Government
of the
District of Columbia

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A MESSAGE FROM THE DIRECTOR

Dear Entrepreneur:

We are delighted that your company has expressed an interest in the District of Columbia's Equal Opportunity for Local, Small and Disadvantaged Business Enterprise Certification Program. The Department of Human Rights and Local Business Development is pleased to provide you with this certification application and instructional guide. We have incorporated in our revised package many of the recommendations made by the small business community.

A major change to our certification process is a condensed application and a "supporting documentation checklist" for each business (i.e. corporations, partnerships, sole proprietorships, etc.). This change will enable you to more easily determine which exhibits apply to your specific business type. If your principal place of business is outside the District of Columbia, but is located within the Washington Standard Metropolitan Statistical Area, please complete and submit the enclosed waiver form with your application.

This administration is optimistic that the revised certification application and information package will further encourage potential applicants to seek certification by the Local Business Opportunity Commission. Thank you in advance for your participation. We look forward to working with you.

Sincerely,

Jacquelyn A. Flowers
Director

District of Columbia
Department of Human Rights
and
Local Business Development

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District of Columbia
Department of Human Rights
and
Local Business Development

I. Introduction

LSDBE Application (Primary Application; must be completed by all applicants).

Waiver Application (Must be completed by all applicants with Principal Offices located outside the District of Columbia. Not eligible for Local Business Enterprise –LBE- Certification).

Please follow the 5 step user's guide as attached.

District of Columbia
Department of Human Rights
and
Local Business Development

II. Area of Certification or Eligibility Criteria:

Small Business Enterprise……(SBE – 50% Set Aside)

Local Business Enterprise……(LBE – 5% Preference)

Disadvantaged Business Enterprise…….……(DBE – 5% Preference)

Development Zone Enterprise…….(DZE – 2% Preference)

FACT SHEET
LOCAL, SMALL & DISADVANTAGED
BUSINESS CERTIFICATION PROGRAM

The LSDBE Program is a program established pursuant to legislation approved by the District of Columbia City Council and the Mayor on December 24, 1998. After review by the DC Financial Control Board and Congress, the permanent legislation became effective as DC LAW 12-268, the "Equal Opportunity for Local, Small and Disadvantaged Business Enterprises Act of 1998". The LSDBE Program establishes a 50% goal for District government contracts with local small business enterprises and provides a bid preference mechanism for local and disadvantaged business enterprises in all available areas of District government contracting. Under this program, applicants are eligible for certification in the following classifications:

Local Business Enterprises (LBE)

LBE is a business enterprise whose principal office is located physically in the District of Columbia, licensed by the District and subject to District of Columbia taxes.

Disadvantaged Business Enterprise (DBE)

A DBE is a LBE, or a business enterprise that has satisfied the requirements (waiver) established in Section 6(13) of the Act, which is operated, owned and controlled by an **economically disadvantaged** individual. For purpose of this program, an economically disadvantaged person is a socially disadvantaged person whose ability to compete in the free enterprise system has been impaired due to diminished capital and redia line of business and competitive market area who are not socially disadvantaged. **Socially disadvantaged** individuals are those who can clearly demonstrate that they have reason to believe they have been subjected to prejudice or bias because of their identity as members of a group without regard to their qualities. To qualify, you must submit a letter that demonstrates historic, economic and social discrimination, your letter must be signed and notarized in Washington, DC, along with your letter, you must submit your personal income tax return and your personal financial statement.

*****

Benefits:
LBEs and DBEs will be eligible to receive five (5) preference points on proposals and 5% reduction on all bids.

Small Business Enterprise (SBE)

A SBE is a local business or a business enterprise that has satisfied the requirements established in Section 6(13) of the Act, which has average annualized gross receipts (for three years preceding certification) and does not exceed the following limits:

Industry Type	Average Annual Gross Receipts
Construction (street, highway, bridges, etc.)	$23 million
Building Construction (general construction, etc.)	$21 million
Specialty Trade Contractors	$13 million
Manufacturing Services	$10 million
General Services	$19 million
Transportation & Hauling Services	$13 million
Goods & Equipment	$8 million
Personal Services (hotels, beauty, laundry, etc.)	$5 million
Business Services (general)	$10 million
Health & Legal Services	$10 million
Health Facilities Management	$19 million
Financial Institutions	$300 million

*****

Benefits:
SBEs are eligible to participate in a 50% Set-Aside (contracting & subcontracting) program.

Joint Ventures

A Joint Venture is an association of two or more businesses (including one *LBOC certified firm with at least 51% ownership, management and control), temporarily formed to carry out a single business activity or project for profit in which they combine their property, capital, efforts, skills and knowledge. The association is limited in scope and duration. Venture partners individually must remain within the above size standards in order to qualify for approval.

Enterprise Zone

LBEs that are located within an Enterprise Zone or an area for which an application for designation as an Enterprise Zone has been submitted will be eligible for a two (2) point preference in the case of proposals and a two percent (2%) reduction in the case of bids.

The following locations represent the economic development zones for the District of Columbia:

1. The Alabama Avenue economic development zone which is bordered on the north by the east side of Fort Staton park, SE and Suitland Parkway, SE and the northern Property line of St. Elizabeth Hospital and Alabama Avenue, SE on the south by Southern Avenue, SE, on the northeast along Fort Baker to 28th Street, SE, south on 28th Street, to Denver Street, SE, south on Denver Street, SE, to Naylor Road, SE, and southeast on Naylor Road, SE to Southern Avenue, SE, and on the west by South Capital Street, SE, as designated in Mayor's Order 86-193, dated October 27, 1986 (33 DCMR 7798);

2. The DC Village economic development zone, which is bordered by I-95 on the west and south, Martin Luther King, Jr. Avenue, SW, on the east, and Laboratory Road, SW, on the north, as designated in Mayor's order 86-193, dated October 27, 1986 (33 DCMR 7798);

3. The Anacostia economic development zone, from the west span of the 11th Street Bride, south to Martin Luther King, Jr. Avenue, SE and S Street, SE, east on S, Street, SE, to Naylor Road, SE, south to Altamont Place, SE, south to Good Hope Road, SE, south along the west boundary of Fort Stanton Park to Suitland Parkway, SE, crossing Suitland Parkway, SE, at Robinson Place, SE, northwest along the north property-line of Saint Elizabeth's Hospital that includes approximately 40 acres adjacent Barry Farms on the north property-line, including the are in and around the Point, and adjacent to the I-295 Expressway right of way on the south property line, to the west property-line of Saint Elizabeth's Hospital, south to the southern property-line of Saint Elizabeth's Hospital, east to Milwaukee Place, SE, southeast to Martin Luther

King, Jr. Avenue, SE, south to Portland Street, SE, west to South Capitol Street, SE, north to Anacostia Drive, SE, east to the west span of the 11th Street Bridge.

Waiver Provisions

Applications whose principal office are not physically located within the District of Columbia may qualify for certification as SBE and DBE if they meet certain waiver provisions. The waiver provisions are based on an applicant's ability to demonstrate strong economic ties to the District of Columbia. These applicants must first satisfy the waiver provisions in order to be eligible for certification consideration.

All information should be submitted to the Certification Division, DC Department of Human Rights and Local Business Development, One Judiciary Square, 441-4th Street, Suite 970N, Washington, DC 20001. For more information, please contact the Certification Division staff at (202)727-3900.

LSDBE

Certification Expiration

1. **Expiration:**

   All certifications expire two (2) years from the date of issuance.

   How to read your certification:

   Sample 98-01-1234 means

   Year 1998, Month 01, Certification No. 1234

2. **Recertification:**

   Applications should be submitted not less than ninety (90) days before the date of expiration.

   Anticipate recertification:

   Sample Expiration January 1999 means

   Submitted for renewal review in October 1998.

3. **Changes:**

   Any change in your certification status must be notified to the Local Business Opportunity Commission (LBOC) pursuant to the Equal Opportunity for Small, Local and Disadvantaged Business Enterprise, immediately. Section 821.1 of the DC Municipal Regulations on LSDBE Contracting.

   Notify LBOC of:

   Change of address and telephone numbers

   Change of ownership and/or control

   Other pertinent changes that affect the make-up of the company as presented in your LSDBE certification application

   Note: Failure to inform the LBOC of these changes can result in the revocation of certification.

4. **Bidding:**

   A copy of the LSDBE certification letter must be attached to the front of bid or proposal for the Small Business Enterprise (SBE) set-aside. Section 804.8 of the DC Municipal Regulations on LSDBE Contracting.

   Note: Bids or proposals may be challenged.

Revised: 16June99
web/fact sheet

USER'S GUIDE

District of Columbia
Local, Small and Disadvantaged
Business Enterprises Certification Program

Save time and energy…
Avoid costly errors and…
Improve your processing time…
By following these simple steps:

- Step 1 Print and Review All LSDBE Certification Program forms
- Step 2 Review Questions and Answers Most Frequently Addressed
- Step 3 Review Required Supporting Documents Checklist & Fact Sheet
- Step 4 Review Waiver Application (determine if applicable to you)
- Step 5 Complete LSDBE Certification Application and Attach Required Documents
- Step 6 Submit your LSDBE Certification Application to:

Department of Human Rights &
Local Business Development
Attention: LSDBE Certification Program
441-4th Street, NW, Suite 970N
Washington, DC 20001

Questions? Please call (202) 727-3900 and ask for Department of Local Business Development certification assistance.

Revised: 25May99
web/user guide

FREQUENTLY ASKED QUESTIONS

Q: What is the purpose of the LSDBE program?
The District of Columbia is focused on developing contracting and procurement "preference" and "set-aside" opportunities for District-based businesses. The District discretionary spending can be directed to District businesses that support and contribute directly to job creation and the tax base. These efforts in turn assist the District in developing a much stronger local economy.

Q: Exactly what benefits do I get as an LSDBE?
LSDBE Certification allows businesses to participate in the District's "Sheltered Markets" contracting program. Preference and set-aside vary from 35%-50% LSDBE participation. You may obtain preferences in the form of 2-12 points (maximum) on your response to Request for Proposals (RFPs) and/or 2-12% reduction (maximum) on your response to bids.

Q: Will all applicants be accepted into the LSDBE program?
No. Only bona-fide District businesses meeting the certification requirements will be accepted into the LSDBE program.

Q: If my company is not accepted into the LSDBE program, will I still be able to bid on District contracts and procurement opportunities?
Yes. All companies are welcomed to compete in the free enterprise system. Non-LSDBE companies may market themselves to the Office of Contracting and Procurement for bid and contracting solicitations. It should be noted, however, LSDBE program goals are established to provide increased opportunities to LSDBE certified firms through preference programs. If you company obtains an award from the District, it may be required to obtain 35-50% LSDBE participation for all sub contracting needs.

Q: I have already applied with other governmental agencies, can the LSDBE certification program accept my existing certifications? Why/Why not?
No. The District of Columbia LSDBE Certification Program is a legal regulation enforced through D.C. Law 12-268 entitled "Equal Opportunity for Local, Small and Disadvantaged Business, Act of 1998." The program is designed for District based businesses only. Other certification programs are not designed to meet legal compliance of the District. However, some <u>supportive</u> documentation can be copied and submitted to the District LSDBE certification program (i.e. business plan, financial statements, copy of business license, etc.).

Q: Who decides if my application is approved?
LSDBE Certification approvals are issued by the Local Business Opportunity Commission (LBOC). The Commission is appointed by the Mayor and serve as volunteers as specified in the District of Columbia Law 12-268. LBOC is composed of business leaders and one District government representative.

Q: If the LBOC decides on my approval, why do I need to submit my application with the Department of Human Rights and Local Business Development (DHR & LBD)?
DHR & LBD serves as the administrative support for the LBOC. It reviews, audits, and submits report summaries to LBOC for final review and approval.

Q: How soon will you begin <u>processing</u> my application?
The average time to process an application is approximately 10 working days. Once your application is received, it is placed with our "Intake" personnel for processing, where your application package is entered into the LSDBE application database and a receipt of delivery is given to you. Your application package is then assigned to a certification specialist for analysis. The specialist may contact you regarding the status of your application and for additional information. Once all required documents are received, the package

is submitted to the independent Local Business Opportunity Commission (LBOC) for certification approval/denial.

Q: How long does the overall certification approval take?
Because the certification program is in fact a two-fold system, certification approval requires a minimum of 30 to 90 days. This period reflects the time to process your application and the time to schedule/present your final summary and report at the next Local Business Opportunity Commission meeting.

LSDBE candidates may reduce the processing time by submitting complete and comprehensive application packages.

Q: If my application is not complete, will my processing time increase?
Yes. If your LSDBE package is not complete, you will be notfied in writing by a certification specialist indicating deficiencies. You will be asked for additional information pertaining to your application. If you do not respond in a timely manner to the request for additional information, your application may be deactivated and a new submission will be required.

Q: How can I ensure there are no additional delays in processing my application?
Take the time to prepare and submit a comprehensive application, complete with supporting documentation. Use the checklist provided to assist in developing a comprehensive package. Always ensure that all documents are included at the time of submission.

Q: Is my business subject to on-site inspections?
Yes. All LSDBE certification applications are subject to on-site inspections.

Q: What is the purpose for on-site inspections?
On-site inspections provide certification specialists an opportunity to confirm the applicants' business type (by NIGP codes), actual business site(s), principal office location, management control and capacity for doing business in the District.

Q: I am trying to get a contract now, can my LSDBE certification be postdated or retro-acted to my bid submission date?
No. All LSDBE certification packages are reviewed once per month by LBOC and effectively dated based on that meeting and determination.

Q: Where do I get an application?
Applications are currently available for pick-up at 441 4th Street, NW, Suite 970, Washington, DC 20001, or you may request to have it faxed to you by calling (202)727-3900. You can also print an application from our web site at www.ci.washington.dc.us/dhr_lbd.

Q: Can I speak to a representative before I submit my application?
Yes, the Department welcomes your inquiries. However, you may prefer to participate in an orientation meeting, please call (202)727-3900 for more information.

Q: Once certified, how will I get notice of contracting and procurement opportunities?
All LSDBE certified firms are placed into the DC Office of Contracting and Procurement (OCP) vendor file database and the LBOC LSDBE directory. Your company is matched to procurement and contracting opportunities based on NIGP codes. If a match is confirmed, you will be notified by OCP.

Q: Aside from NIGP matching, how else can I increase my opportunities with the District?

You must market your company to the DC Office of Contracting and Procurement (OCP), understand what new projects and/or bidding opportunities are to arise and submit responses as required. We encourage you to visit the District of Columbia. OCP supply schedule web site at www.ocp.dcgov.org.

Q: Who issues contracts for the District government?
Buyers for the District are centrally located in the Office of Contracts and Procurement located at 441 4th Street, NW, Suite 800 South, Washington, DC 20001, (202)727-0252. The District government has contracting offices that purchase for the agencies.

Q: I already search for federal contracts and procurement opportunities through the Commerce Business Daily, aren't the Districts' bidding opportunities listed there?
No. The District of Columbia is an independent government.

Q: I have just started a business, can I participate in the LSDBE program?
Yes. However, the LSDBE Certification Program requires detailed investigation of capacity to perform and proof of direct experience to compete. As a start-up, your application must include detailed information about: experience, management capability, staff, capital injection, equipment to perform, licenses, leases, financial operations, business plan, etc.

Q: What types of business structures does the LSDBE Program certify?
The LSDBE program certifies c-corporations, s-corporations, limited liability corporations, partnerships, sole-proprietorships, and joint ventures

Q: I'm thinking of joint venturing with another firm, do we both need LSDBE certification?
No. Although it is highly encouraged to have all firms LSDBE certified, a joint venture may have only one company certified IF the primary business owns (control) and operates over 51% of the business interest. Please call for further information. All joint ventures are subject to review and final approval by the LBOC.

Please Note:

This Questions and Answer packet is designed to assist the applicant by listing some of the most commonly addressed issues. This packet is not intended to, by accident or otherwise, supersede any viable and/or current legislation authorized by the District of Columbia City Council. All applicants are advised to attend the Department of Human Rights and Local Business Development Orientation Session for LSDBE program participation requirements and further application information.

REQUIRED SUPPORTING DOCUMENTS CHECKLIST - CORPORATION & LLC

For who: Companies registered as C-Corporations, S-Corporations and LLCs., with principle office(s) located **within** the District of Columbia

What to submit: **Existing corporations** please

1. Complete the enclosed application
2. Provide copies of the following supportive corporate documentation
   a) Articles of incorporation
   b) Executed stock certificates
   c) Executed office lease agreement (certificate of occupancy or home occupation permit may be substituted)
   d) Abbreviated business plan (e.g. executive summary, operations plan, organizational structure, marketing outline, etc.)
   e) Financial statements less than 120 days old (balance statement, cash flow summary, financial projections)
   f) Last two (2) years corporate District and Federal tax returns
   g) Resume of key personnel
3. Principle owner(s)' documentation of eligibility
   a) Proof of citizenship (e.g. copy of passport, birth certificate, voter registration card)
   b) Proof of residency (e.g. copy of driver's license or pictured ID and copy of current utility bill)

New corporations (less than 1 year old) must provide

1. All documentation as listed above, and
2. Proof of capital injection (e.g. current bank statement)
3. Comprehensive business plan

Note: **Companies with principal offices located <u>outside</u> the District of Columbia must also complete a Waiver Application and meet criteria. Please see attached.**

REQUIRED SUPPORTING DOCUMENTS CHECKLIST - SOLE PROPRIETORSHIP

For who: Companies registered as a sole-proprietorship with principal office(s) located **within** the District of Columbia

What to submit: **Sole-proprietorships** please

1. Complete the enclosed application
2. Provide copies of the following supportive sole-proprietorship documentation
   a) Executed office lease agreement (certificate of occupancy or home occupation permit may be substituted) or deed for principle business office
   b) Brief description of business or an abbreviated business plan (e.g. executive summary, operations plan, organizational structure, marketing outline, etc.)
   c) Financial statements less than 120 days old (balance statement, cash flow summary, financial projections)
   d) Last two (2) years District and Federal tax returns
   e) Resume
   f) Proof of citizenship (e.g. copy of passport, birth certificate, voter registration card)
   g) Proof of residency (e.g. copy of driver's license or pictured ID and copy of current utility bill, certificate of occupancy)

New sole-proprietorships (less than 1 year old) must provide

4. All documentation as listed above, and
5. Proof of capital injection (e.g. current bank statement)
6. Comprehensive business plan

Note: **Companies with principal offices located outside the District of Columbia must also complete a Waiver Application and meet criteria. Please see attached.**

REQUIRED SUPPORTING DOCUMENTS CHECKLIST - PARTNERSHIP

For who: Companies registered as a partnership with principal office(s) located **within** the District of Columbia

What to submit: **Partnerships** please

1. Complete the enclosed application
2. Provide copies of the following supportive sole-proprietorship documentation
   a) Executed office lease agreement (certificate of occupancy or home occupation permit may be substituted) or deed for principle business office
   b) Brief description of business or an abbreviated business plan (e.g. executive summary, operations plan, organizational structure, marketing outline, etc.)
   h) Financial statements less than 120 days old (balance statement, cash flow summary, financial projections)
   i) Last two (2) years District and Federal tax returns for each partner
   j) Resume for each partner
   k) Proof of citizenship (e.g. copy of passport, birth certificate, voter registration card) for each partner
   l) Proof of residency (e.g. copy of driver's license or pictured ID and copy of current utility bill, certificate of occupancy) for each partner
   m) Partnership agreement

New partnerships (less than 1 year old) must provide

7. All documentation as listed above, and
8. Proof of capital injection (e.g. current bank statement)
9. Comprehensive business plan

Note: **Companies with principal offices located outside the District of Columbia must also complete a Waiver Application and meet criteria. Please see attached.**

REQUIRED SUPPORTING DOCUMENTS CHECKLIST - DISADVANTAGED

For who: Companies applying for Disadvantaged Business Enterprise (DBE) status with principal office(s) located **within** the District of Columbia or the Washington Standard Metropolitan Statistical Area (WSMSA).

What to submit: **Notarized statements**:

1. Identification of the group (ethnic basis) for which you are claiming disadvantaged status
2. Summary of specific instances where the following was denied and/or affected your ability to enter the free enterprise system
   - Access to capital
   - Access to credit
   - Access to bonding
3. Principal owner's personal financials

Note: To obtain additional information about this program, please contact the Department of Human Rights and Local Business Development - Certification Division at (202) 727-3900. All documents submitted are kept confidential and on file.

Violations: Individuals found to have submitted fraudulent or substantially inaccurate information will be subject to civil criminal penalties (fines, imprisonment and/or debarment). Violators will also be liable for any additional expense the government incurs as a result of such violations.

WAIVER APPLICATION

GOVERNMENT OF THE DISTRICT OF COLUMBIA
LOCAL BUSINESS DEVELOPMENT OPPORTUNITY COMMISSION

The WAIVER APPLICATION is for companies whose principal office is NOT physically located in the District of Columbia.

Firms located outside the District of Columbia may obtain Small, Disadvantaged Business Enterprise Certification consideration IF the applicant meets 4 of the 5 following criteria. Please complete this addendum and submit with your certification application package.

Applicant's Name: _____

Business Name: _____

Principal Address: _____
(Street Address)

_____
(City), (State) (Zip)

Tel. _____ Fax _____

1. The applicant's principal office is located in the Washington Standard Metropolitan Statistical Area*: _____ Yes _____No

List City & State: _____ County: _____

Documentation Required: A copy of the lease or rental agreement, or deed for the principal business office.

2. More than fifty percent (50%) of the assets of the business enterprise are located in the District of Columbia. _____ Yes _____ No

Total Assets (100%): _____ % of Assets in DC: _____

Documentation Required: Bank statements for the last six months; Balance Sheet less than 90 days old from each jurisdiction. Utilization of local bank with principal office in DC is encouraged.

3. More than fifty percent (50%) of the employees of the business are residents

of the District of Columbia.

Total number of employees:

_____

Number of DC residents: _____

3. Continued…

Documentation Required: Employee W2 Forms or W3 Transmittal Forms for all employees who are DC residents; appropriate company contract forms for employees hired by contract; DC Unemployment Compensation Forms and/or certified payrolls not more than ninety (90) days old.

4. The owners of more than fifty percent (50%) of the business enterprise are residents of the District of Columbia.

Number of Owners: _____ Number of Owners in DC: _____

Percentage(%) Ownership in DC: _____

Documentation Required: Copy of personal income tax returns of principal owners reflecting their permanent home address; driver's license; homeowner's tax assessment, Articles of Incorporation, etc.

5. More than fifty percent (50%) of the total sales or other revenues derived from transactions in the District of Columbia. _____ Yes _____ No

Total Sales (FY ___): _____

Total DC Sales Revenues (FY ___): _____

Percentage (%) DC Sales Revenue (FY ___) _____

Documentation Required: Documentation of sales (e.g. photocopies of contracts, sales tax forms and/or invoices from each jurisdiction; tax returns or income statement).

<u>*Washington Standard Metropolitan Statistical Area (WSMSA)</u>

Maryland Counties: Calvert, Charles, Howard, Montgomery, Prince Georges

Virginia Counties: Arlington, Fairfax, Loudon, Prince William, Stafford

Virginia Cities: Alexandria, Fairfax, Falls Church, Manassas, Manassas Park

Official Use Only:
Tracking # _____
Received By: _____

LOCAL, SMALL AND DISADVANTAGE BUSINESS ENTERPRISE
CERTIFICATION APPLICATION

1. Business Name_____

   Email _____Tel. (_____)_____ Fax (_____)_____

2. Business Mailing Address _____

   City _____ State _____ Zip _____ Ward #_____

3. Principal Contact Person _____ Title_____ Tel (_____)_____

4. List Business Structure (choose one):
   ___ Corporation ___ LLC ___ Partnership ___ Sole Proprietorship

5. Date Business Established _____ If corporation, location of incorporation _____

   Primary business activity (if diversified, percent of each adding up to a total of 100%): %___ Professional Service (i.e. Legal, A&E, CPA, etc.)

   %___ Construction %___ Manufacturer %___ Distribution %___ Wholesaler %___Retailer %___ Service Provider

6. List the following business information (please contact listed reference phone numbers for personal assistance):

Dunn & Bradstreet No.:	800-333-0505	No.:
Local Unemployment Compensation No.:	202-724-7566	No.:
DC Franchise Tax ID:	202-727-7000	No.:
Federal Employer ID:	800-829-1040	No.:

7. Describe the business' product line, trade or services below (attach additional pages if necessary):

   _____

   7a. National Institute of Government Policies (NIGP) Commodity Codes (see attached):

   _____

8. Briefly describe any specialties: _____

9. List business and office equipment, vehicles and facilities located (attach additional page if necessary):

a. Equipment & Vehicles Owned &/or Leased	Storage Location of Equipment & Vehicles	b. List All Operating Facilities (please designate principal facility)	Address, City, State, Zip

10. Identify <u>all original and current</u> owners/stockholders of the business (attach additional page if necessary):

Original and Current Owners/Stockholders of Business							(a) List Total Corporate Shares Authorized _____		
(b) Name of Owners/ Stockholders	(c) US Citizen (check X if yes)	(d) LAPR	(e) Sex	(f) Total authorized shares/ holder	(g) % of Ownership	(h) Initial Capital Injection	(i) Class of Stock Issued (Common/ Preferred)	(j) Home Address and Phone Number	(k) Ward No.

Note: In column (c) indicate with an "x" whether the persons listed are United States Citizen or Lawfully Admitted Permanent Resident (LAPR). In columns (f) through (i) indicate investment capital, total number and type of shares issued to each owner.

11. Identify current members of Board of Directors/Owners (part a) and Officers of the Corporation (part b):

(a) Current Board of Directors/Owners							
Name	Title	Occupation	Sex	Date Appointed	Home Address	Phone	Ward No.

(b) Officers of Corporation/Key Personnel							
Name	Title	Operational Function(s)	Sex	Date Appointed	Home Address	Phone	Ward No.

12. List Bonding Information:
Name of Bonding Company _____

Address _____ City _____ State ____ Zip _____

Contact Person _____ Phone (_____)_____ Fax (_____) _____

List bonding specialties (if any) _____ Bonding Limit $ _____

_____ $ _____

13. List Insurance Information:
Name of Insurance Company _____

Address _____ City _____ State ____ Zip _____

Contact Person _____ Phone (_____)_____ Fax (_____) _____

List insurance type: _____ Property/Liability Limit $ _____

14. List Business Banking Information:
Primary Business Bank_____ _____

Address _____ City _____ State ____ Zip _____

Contact Person _____ Phone (_____)_____ Fax (_____) _____

15. List other Local Businesses (DC based) do you do business with:
Business Name _____Contact Person :_____ Tel (____)_____

Business Name _____Contact Person :_____ Tel (____)_____

Business Name _____Contact Person :_____ Tel (____)_____

16. List charitable and other contributions to the DC Community (please be specific):
Name _____ Tel (_____)_____

Type of contribution _____

Name _____ Tel (_____)_____

Type of contribution _____

17. List total amount of taxes paid to DC Government (specify type of taxes paid in the current and latest tax year):

a. Check all that apply:	b. Current, Year-to-Date:	c. Last Fiscal Year 19_____:
___ Arena …….……	$_____	$_____
___ Corporate….……	$_____	$_____
___ Unemployment…...……	$_____	$_____
___ Personal Property…….	$_____	$_____
___ Workers Compensation....	$_____	$_____
___ Sales……..	$_____	$_____
___ Real Estate……	$_____	$_____
___ Fuel……...	$_____	$_____
___ Business……	$_____	$_____
___ Use……	$_____	$_____
___ Income ……..	$_____	$_____

18. List the LSDBE status you are applying for (please choose all that are applicable and refer to "Supporting Documentation Checklist"):

___ Local ___ Small ___ Disadvantaged (additional notarized affidavit required)

a. List location of principal business site:

___ DC ___ WSMSA (please reference "Waiver Application")

b. Enterprise Zone - If you have listed "DC" as your principal business site, please indicate one:

___ DC Village Economic Development Zone
___ Anacostia Economic Development Zone
___ At large DC based business, Non-Economic Development Zone

c. List type and qualification for Small Business Enterprise:

Industry Type	Revenue Limit (last fiscal year)
___ Construction (street, highway, bridges, etc..)	$23 million or less
___ Building Construction (general construction, etc.)	$21 million or less
___ Specialty Trade Contractors	$13 million or less
___ Manufacturing Services	$10 million or less
___ General Services	$19 million or less
___ Transportation & Hauling Services	$13 million or less
___ Goods & Equipment	$8 million or less
___ Personal Services (hotels, beauty, laundry, etc.)	$5 million or less
___ Business Services (general)	$10 million or less
___ Health & Legal Services	$10 million or less
___ Health Facilities Management	$19 million or less
___ Financial Institutions	$300 million **in assets** or less

19. List Workforce Information:

Workforce Information							
Name	Title	Full Time/ Part Time	Sex	Date Hired	Home Address	Phone	Ward No.

20. List Professional and Current Licenses:

License Type	**License Number**	**License Expiration Date**	**Authorizing Entity** of License

21. List Gross Annual Revenues for Last Three (3) Years:

19_____/$_____ 19_____/$_____ 19_____/$_____

22. List Sources of Business Revenues

Source of Business Revenues Contracts/Sales	List Fiscal Year 19_____	Amount $	% of Total Revenues
DC Government Prime		$	%
DC Government Sub		$	%
Private Sector		$	%
Other		$	%
Total		$	100%
Description of "Other" sources			

23. Complete and notarize the attached Affidavit and submit to:

District of Columbia
Department of Human Rights and Local Business Development
441 4th Street, NW, Suite 970N
Washington, DC 20001
Tel: (202)727-3900

SWORN AFFIDAVIT

The undersigned swears that the foregoing statements made as part of this application and submitted (with/without a bid or proposal request) are true and correct and include all material information necessary.

1. to identify and explain the operations of (Name of Company) _____
2. to identify the ownership thereof; and
3. to establish their eligibility for certification as a Local Business Enterprise, and/or Small Business Enterprise, and/or Disadvantaged Business Enterprise, and/or located within an Enterprise Zone.

Further, the undersigned agrees that if he/she has not already done so, he/she will provide directly to the Local Business Opportunity Commission (LBOC) the LSDBE Application supporting documents as may be required. This includes complete Cooperation with the LBOC's certification process, and allows the examination of books, records and files of the names of the company at the business location or at any other place, including other companies with which the firm conducts its operations. The undersigned understand and agrees that failure to submit the required documentation could render a bid/proposal submitted under the rules of this statute null and void. The undersigned understands the District of Columbia Corporate Counsel may bring civil action in the Superior Court of the District of Columbia against a business enterprise and the directors, officers or principal thereof that is reasonably believed has certification by fraud or deceit or has furnished substantially inaccurate or incomplete information to the Commission which is punishable by a fine of $100,000. A business enterprise convicted of false swearing shall be subject to criminal penalties of not more than $1,000 and/or imprisoned for not more the one (1) year (Dec. 1, 1982, DC Law 4-164, §§404.29DCR 3976) and possible debarment. If a contract is terminated due to fraud or deceit by the applicant, requiring the government to readvertise or resolicit for products or services. The undersigned will be held liable for the additional expenses incurred by the government.

If, after filing this document there are any changes (during the term of the certification) in the information submitted herein, the undersigned will inform LSDBE Program immediately of the change.

NOTARIZATION: (Sign only in the presence of a D.C. Notary)

Signature: _____ Title: _____

Name (please print): _____ Date: _____

On this the _____day of _____, 19_____. Before me personally (name of D.C. Notary) _____,

who is properly authorized by (name of firm) _____ to execute thus Affidavit and did so at his/her free act and deed.

Notary Signature: _____ My commission expires: _____

Form LBD6292 rev.5/17/99

YOUR LETTERHEAD

EQUAL EMPLOYMENT OPPORTUNITY (EEO) POLICY STATEMENT

_____SHALL NOT DISCRIMINATE AGAINST ANY EMPLOYEE OR APPLICANT FOR EMPLOYMENT BECAUSE OF RACE, COLOR, RELIGION, NATIONAL ORIGIN, SEX, AGE, MARITIAL STATUS, PERSONAL APPEARANCE, SEXUAL ORIENTATION, FAMILY RESPONSIBILITIES, MATRICULATION, POLITICAL AFFILIATION, OR PHYSICAL HANDICAP.

_____AGREES TO AFIRMATIVE ACTION TO ENSURE THAT APPLICANTS ARE EMPLOYED, AND THAT EMPLOYEES ARE TREATED DURING EMPLOYMENT, WITHOUT REGARD TO THEIR RACE, COLOR, RELIGION, NATIONAL ORIGIN, SEX, AGE, MARITIAL STATUS, PERSONAL APPEARANCE, SEXUAL ORIENTATION, FAMILY RESPONSIBILITIES, MATRICULATION, POLITICAL AFFILIATION, OR PHYSICAL HANDICAP.THE AFFIRMATIVE ACTION SHALL INCLUDE, BUT NOT BE LIMITED TO THE FOLLOWING: (A) EMPLOYMENT, UPGRADING, OR TRANSFER; (B) RECRUITMENT OR RECRUITMENT ADVERTISING; (C) DEMOTION, LAYOFF, OR TERMINATION; (D) RATES OF PAY, OR OTHER FORMS OF COMPENSATION; AND (E) SELECTION FOR TRAINING AND APPRENTICESHIP.

_____AGREES TO POST IN CONSPICUOUS PLACES THE PROVISIONS CONCERNING NON-DISCRIMINATION AND AFFIRMATIVE ACTION.

_____SHALL STATE THAT ALL QUALIFIED APPLICANTS WILL RECEIVE CONSIDERATION FOR EMPLOYMENT PURSUANT TO SUBSECTION 1103.2 THROUGH 1103.10 OF MAYOR'S ORDER 85-85; "EQUAL EMPLOYMENT OPPORTUNITY REQUIREMENTS IN CONTRACTS."

_____AGREES TO PERMIT ACCESS TO ALL BOOKS PERTAINING TO ITS EMPLOYMENT PRACTICES, AND TO REQUIRE EACH SUBCONTRACTOR TO PERMIT ACCESS TO BOOKS AND RECORDS.

_____AGREES TO COMPLY WITH ALL GUIDELINES FOR EQUAL EMPLOYMENT OPPORTUNITY APPLICABLE IN THE DISTRICT OF COLUMBIA.

_____SHALL INCLUDE IN EVERY SUBCONTRACT THE EQUAL OPPORTUNITY CLAUSES, SUBSECTION 1103.2 THROUGH 1103.10 SO THAT SUCH PROVISIONS SHALL BE BINDING UPON EACH SUBCONTRACTOR OR VENDOR.

_____
AUTHORIZED OFFICIAL AND TITLE

_____
AUTHORIZED SIGNATURE

_____
FIRM/ORGA NIZATION NAME

_____
DATE

YOUR LETTERHEAD

ASSURANCE OF COMPLIANCE WITH EQUAL EMPLOYMENT OPPORTUNITY REQUIREMENTS

MAYOR'S ORDER 85-85, EFFECTIVE JUNE 10, 1985, AND THE RULES IMPLEMENTING MAYORS ORDER 85-85, 33 DCR 4952, (PUBLISHED AUGUST 15, 1986), "ON COMPLIANCE WITH EQUAL OPPORTUNITY REQUIREMENTS IN DISTRICT GOVERNMENT CONTRACTS," ARE HEREBY INCLUDED AS PART OF THIS BID/PROPOSAL. THEREFORE, EACH BIDDER/OFFEROR SHALL INDICATE BELOW THEIR WRITTEN COMMITMENT TO ASSURE COMPLIANCE WITH MAYOR'S ORDER 85-85 AND THE IMPLEMENTING RULES. FAILURE TO COMPLY WITH THE SUBJECT MAYOR'S ORDER AND THE IMPLEMENTING RULES SHALL RESULT IN REJECTION OF THE RESPECTIVE BID/PROPOSAL.

I, _____, THE AUTHORIZED REPRESENTATIVE OF _____, HEREINAFTER REFERRED TO AS "THE CONTRACTOR," CERTIFY THT THE CONTRATOR IS FULLY AWARE OF ALL OF THE PROVISIONS OF MAYOR'S ORDER 85-85, EFFECTIVE JUNE 10, 1985, AND OF THE RULES IMPLEMENTING MAYOR'S ORDER 85-85, 33 DCR 4952. I FURTHER CERTIFY AND ASSURE THAT THE CONTRACTOR WILL FULLY COMPLY WITH ALL APPLICABLE PROVISIONS OF THE MAYOR'S ORDER AND IMPLEMENTING RULES IF AWARDED THE D.C. GOVERNMENT REFERENCED BY THE CONTRACT NUMBER ENTERED BELOW. FURTHER, THE CONTRACTOR ACKNOWLEDGES AND UNDERSTANDS THAT THE AWARD OF SAID CONTRACT AND ITS CONTINUATION ARE SPECIFICALLY CONDITIONED UPON THE CONTRACTOR'S COMPLIANCE WITH THE ABOVE-CITED ORDER AND RULES.

_____
CONTRACTOR

_____
NAME

_____
SIGNATURE

_____
TITLE

_____
CONTRACT NUMBER

_____
DATE

EQUAL EMPLOYMENT OPPORTUNITY
EMPLOYER INFORMATION REPORT

GOVERNMENT OF THE DISTRICT OF COLUMBIA DC Office of Contracting and Procurement Employer Information Report (EEO)	Reply to: Office of Contracting and Procurement 441 4th Street, NW, Suite 700 South Washington, DC 20001

Instructions:
Two (2) copies of DAS 84-404 or Federal Form EEO-1 shall be submitted to the Office of Contracting and Procurement.
One copy shall be retained by the Contractor.

Section A – TYPE OF REPORT

1. Indicate by marking in the appropriate box the type of reporting unit for which this copy of the form is submitted (MARK ONLY ONE BOX)

Single Establishment Employer	Multi-establishment Employer:
(1) Single-establishment Employer Report	(2) ÿ Consolidated Report (3) ÿ Headquarters Report (4) ÿ Individual Establishment Report (submit one for each establishment with 25 or more employees) (5) ÿ Special Report

1. Total number of reports being filed by this Company. _____

Section B – COMPANY IDENTIFICATION (*To be answered by all employers)*

					OFFICIAL USE ONLY
1. Name of Company which owns or controls the establishment for which this report is filed					a.
Address (Number and street)	City or Town	Country	State	Zip Code	b.
b. Employer Identification No.					
2. Establishment for which this report is filed.					OFFICIAL USE ONLY
a. Name of establishment					c.
Address (Number and street)	City or Town	Country	State	Zip Code	d.
b. Employer Identification No.					
3. Parent of affiliated Company					
a. Name of parent or affiliated Company	b. Employer Identification No.				
Address (Number and Street)	City or Town	Country	State	Zip Code	

Section C - ESTABLISHMENT INFORMATION

1. Is the location of the establishment the same as that reported last year? Yes No Did not report last year Report on combined basis	2. Is the major business activity at this establishment the same as that reported last year? Yes No No report last year Reported on combined basis	OFFICIAL USE ONLY
2. What is the major activity of this establishment? (Be specific, i.e., manufacturing steel castings, retail grocer, wholesale plumbing supplies, title insurance, etc. Include the specific type of product or service provided, as well as the principal business or industrial activity.		e.

3. MINORITY GROUP MEMBERS: Indicate if you are a minority business enterprise (50% owned or 51% controlled by minority members).

Yes No

DAS 84-404 (Replaces D.C. Form 2640.9 Sept. 74 which is Obsolete) 84-2P891

SECTION D – EMPLOYMENT DATA

Employment at this establishment – Report all permanent, temporary, or part-time employees including apprentices and on-the-job trainees unless specifically excluded as set forth in the instructions. Enter the appropriate figures on all lines and in all columns. Blank spaces will be considered as zero. *In columns 1, 2, and 3, include ALL employees in the establishment including those in minority groups*

JOB CATEGORIES	TOTAL EMPLOYEES IN ESTABLISHMENT			MINORITY GROUP EMPLOYEES							
				MALE				FEMALE			
	Total Employees Including Minorities (1)	Total Male Including Minorities (2)	Total Female Including Minorities (3)	Black (4)	Oriental (5)	American Indian (6)	Spanish Surname American (7)	Black (8)	Oriental (9)	American Indian (10)	Spanish Surname American (11)
Officials and Managers											
Professionals											
Technicians											
Sales Workers											
Office and Clerical											
Craftsman (Skilled)											
Operative (Semi-Skilled)											
Laborers (Unskilled)											
Service Workers											
TOTAL											
Total employ reported in previous report											

(The trainee below should also be included in the figures for the appropriate occupation categories above)

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Formal On-The-Job Trainee	White collar											
	Production											

1. How was information as to race or ethnic group in Section D obtained?
   a. Visual Survey
   b. Employment Record
   c. Other Specify _____
   _____
2. Dates of payroll period used
3. Pay period of last report submitted for this establishment._____

Section E – REMARKS Use this Item to give any identification data appearing on last report which differs from that given above, explain major changes in composition or reporting units, and other pertinent information.

Section F - CERTIFICATION

Check One
1. All reports are accurate and were prepared in accordance with the instructions (check on consolidated only)
2. This report is accurate and was prepared in accordance with the instructions.

Name of Authorized Official | Title | Signature | Date

Name of person contact regarding This report (Type of print) | Address (Number and street)

Title | City and State | Zip Code | Telephone Number | Extension

INFORMATION CITED HEREIN SHALL BE HELD IN CONFIDENCE.

DEPARTMENT OF HUMAN RIGHTS AND LOCAL BUSINESS DEVELOPMENT
CONTRACT COMPLIANCE UNIT

SUBCONTRACT SUMMARY FORM

This SUMMARY form is to be completed by the PRIME contractor.

BID NO.: CCB NUMBER: _____ of _____ pages

*NOTE: The standard for **minority subcontracting** is 25% of the TOTAL contract dollar amount to be subcontracted.

AMOUNT OF PRIME CONTRACT: $_____
AMOUNT OF ALL SUBCONTRACTS: $_____ equals _____% OF THE PRIME CONTRACT.

NAME OF PRIME CONTRACTOR:

TELEPHONE NO.

ADDRESS:

PROJECT NAME:
ADDRESS:

WARD NO.:_____

PROJECT DESCRIPTIONS:

SECTION II **LIST ALL SUBCONTRACTORS THAT WILL BE UTILIZED ON THE ABOVE PROJECT**

1. NAME OF SUBCONTRACTOR 2. ADDRESS 3. CONTACT PERSON 4. MBOC CERT. NO. 5. PHONE NO.	1. IS THIS A *MINORITY SUB? _____ YES _____NO 2. TRADE OR BUSINESS PRODUCT THAT SUB WILL PROVIDE:	1. $ AMOUNT OF SUBCONTRACT equals(=) 2. _____% (percent) OF TOTAL PRIME CONTRACT.
1. 2. 3. 4. 5.	1. MINORITY SUBCONTRACTOR _____ YES _____NO 2.	1. $_____ equals(=) 2. _____%
1. 2. 3. 4. 5.	1. MINORITY SUBCONTRACTOR _____ YES _____NO 2.	1. $_____ equals(=) 2. _____%
1. 2. 3. 4. 5.	1. MINORITY SUBCONTRACTOR _____ YES _____NO 2.	1. $_____ equals(=) 2. _____%
1. 2. 3. 4. 5.	1. MINORITY SUBCONTRACTOR _____ YES _____NO 2.	1. $_____ equals(=) 2. _____%
1. 2. 3. 4. 5.	1. MINORITY SUBCONTRACTOR _____ YES _____NO 2.	1. $_____ equals(=) 2. _____%
1. 2. 3. 4. 5.	1. MINORITY SUBCONTRACTOR _____ YES _____NO 2.	1. $_____ equals(=) 2. _____%
1. 2. 3. 4. 5.	1. MINORITY SUBCONTRACTOR _____ YES _____NO 2.	1. $_____ equals(=) 2. _____%
1. 2. 3. 4. 5.	1. MINORITY SUBCONTRACTOR _____ YES _____NO 2.	1. $_____ equals(=) 2. _____%
1. 2. 3. 4. 5.	1. MINORITY SUBCONTRACTOR _____ YES _____NO 2.	1. $_____ equals(=) 2. _____%
1. 2. 3. 4. 5.	1. MINORITY SUBCONTRACTOR _____ YES _____NO 2.	1. $_____ equals(=) 2. _____%
1. 2. 3. 4. 5.	1. MINORITY SUBCONTRACTOR _____ YES _____NO 2.	1. $_____ equals(=) 2. _____%

TOTAL DOLLAR AMOUNT SUBCONTRACTED TO *MINORITY BUSINESS ENTERPRISES. $_____

PERCENT OF PRIME CONTRACT. _____%

*D.C. LAW 1-95, as amended, defines a MINORITY BUSINESS ENTERPRISE as a business of which more than 50% is owned by members of a minority, and of which more than 10%

SOLICITATION NO: _____

PROJECTED GOALS AND TIMETABLES FOR FUTURE HIRING

JOB CATEGORIES	MINORITY GROUP EMLOYES GOALS								TIMETABLES
	MALE				FEMALE				
	BLACK	ASIAN	AMERICAN INDIAN	HISPANIC	BLACK	ASIAN	AMERICAN INDIAN	HISPANIC	
OFFICIALS & MANAGERS									
PROFESSIONALS									
TECHNICIANS									
SALES WORKERS									
OFFICE AND CLERICAL									
CRAFTSMANS (SKILLELD)									
OPERATIVE (SEMI-SKILLED)									
LABORERS (UNSKILLED)									
SERVICE WORKERS									
TOTALS									

NAME OF AUTHORIZED OFFICIAL:	TITLE:	SIGNATURE:

FIRM NAME:	TELEHONE NO:	DATE:

INDICATE IF THE PRIME UTILIZES A "MINORITY FINANCIAL INSTITUTION"

_____ Yes _____ No

NAME:

ADDRESS:

TYPE OF ACCOUNT/S:

GOVERNMENT OF THE DISTRICT OF COLUMBIA

ADMINISTRATIVE ISSUANCE SYSTEM

SUBJECT: Compliance with Equal Opportunity Obligations in Contracts

ORIGINATING AGENCY: Office of the Mayor

By virtue of the authority vested in me as Mayor of the District of Columbia by Section 422 of the District of Columbia self-government and Government Reorganization Act of 1973 as amended, D.C. Code section 1-242 (1981-Ed.), it is hereby ORDERED that Commissioner's Order No. 73-51, dated February 28, 1973, is hereby rescinded and reissued in its entirety to read as follows:

1. Establishment of Policy: There is established a policy of the District of Columbia Government to:

   (a) provide equal opportunity in employment for all persons with respect to any contract by and with the Government of the District of Columbia.

   (b) prohibit discrimination in employment because of race, color, religion, national origin, sex, age, marital status, personal appearance, sexual orientation, family responsibilities, matriculation, political affiliation, or physical handicap;

   (c) provide equal opportunity to all persons for participation in all District of Columbia Government contracts, including but not limited to lease agreements, Industrial Revenue Bond financing, and Urban Development Action grants;

   (d) provide equal opportunity to minority business enterprises in the performance of District of Columbia Government contracts in accordance with Mayor's Orders, District of Columbia laws, and rules and regulations promulgated by the Minority Business Opportunity Commission; and

   (e) promote the full realization of equal employment through affirmative, continuing programs by contractors and subcontractors in the performance of contracts with the District of Columbia Government.

2. Delegation of Authority: The Director of the Office of Human Rights (hereinafter "Director") is delegated the authority vested in the Mayor to implement the provisions of this order as set forth herein, and any rules, regulations, guidelines, and procedures adopted pursuant thereto.

3. Responsibilities: The Director of the Office of Human Rights shall be responsible for establishing and ensuring agency compliance with the policy set forth in this Order, any rules, regulations, and procedures that may be adopted by the Office of Human Rights pursuant to this Order, and any other equal opportunity provisions as may be added as a part of any contract.

4. Powers and Duties: The Director of the Office of Human Rights shall have the following powers and duties:

   (a) to establish standards and procedures by which contractors and subcontractors who perform under District of Columbia Government contracts shall comply with the equal opportunity provisions of their contracts; to issue all orders, rules, regulations, guidelines, and procedures the Director may deem necessary and proper for carrying out and implementing the purposes of this Order;

   (b) to assume equal opportunity compliance jurisdiction over any matter pending before a contracting agency where the Director considers it necessary or appropriate for the achievement of the purposes of

this Order, keep the contracting agency informed of all actions taken, and act through the contracting agency to the extent appropriate and practicable;

(c) to examine the employment practices of any District of Columbia Government contractor or subcontractor, or initiate the examination by the appropriate contracting agency to determine whether or not the contractual provisions specified in any rules and regulations adopted pursuant to this Order have been violated, and notify the contracting agency of any action taken or recommended;

(d) to monitor and evaluate all District of Columbia Government agencies, including those independent agencies and commissions not required to submit the Affirmative Action Programs of their contractors to the Office of Human Rights for approval, to ensure compliance with the equal opportunity obligations in contracts;

(e) to use his or her best efforts to cause any labor union engaged in work under District of Columbia Government contracts, any referral, recruiting or training agency, or any other representative of workers who are or may be engaged in work under contracts and subcontracts to cooperate in and to comply with the implementation of the purposes of this Order;

(f) to notify, when appropriate, the concerned contracting agencies, the Office of Federal Contract Compliance Programs, the U.S. Department of Justice, or other appropriate Federal, State, and District agencies, whenever the Director has reason to believe that practices of any contractor, labor organization, lending institution, insurance firm, or agency violate provisions of Federal, State, or District, laws;

(g) to enter, where the determinations are made by Federal, State, or District agencies, into reciprocal agreements with those agencies to receive the appropriate information;

(h) to hold hearings, public or private, as necessary to obtain compliance with any rules, regulations, and procedures promulgated pursuant to this Order, and to issue orders relating thereto. No order to terminate or cancel a contract, or to withhold from any contractor further District of Columbia Government contractors shall be issued without affording the contractor an opportunity for a hearing. Any order to terminate or cancel a contract or to withhold from any contractor further District of Columbia Government contracts shall be issued in accordance with rules, and regulations pursuant to the Administrative Procedure Act, as amended and;

(i) to grant waivers from the minimum standards for the employment of minorities and women in Affirmative Action Programs in exceptional cases, as circumstances may warrant.

5. Duties of Contracting Agencies: Each contracting agency shall have the following duties:

(a) the initial responsibility for ensuring that contractors and subcontractors are in compliance with any rules, regulations, and procedures promulgated pursuant to this Order;

(b) to examine the employment practices of contractors and subcontractors in accordance with procedures established by the Office of Human Rights, and report any compliance action to the Director of the Office of Human Rights;

(c) to comply with the terms of this Order and of the orders, rules, regulations, guidelines, and procedures of the Office of Human Rights issued pursuant thereto in discharging their responsibility for securing contract compliance; and

(d) to secure compliance with any rules, regulations, and procedures promulgated pursuant to this Order before or after the execution of a contract by methods, of conference, conciliation and persuasion. No enforcement proceedings shall be initiated, nor shall a contract be cancelled or terminated in whole or in part, unless such methods have first been attempted.

6. Procedures: The procedures to be followed in implementing this Order shall be those set forth in

Orders, rules, regulations, and guidelines as may be promulgated by the Office of Human Rights.

7. Severability: If any section, subsection, sentence, clause, phrase, or portion of the provisions in this Order is for any reason declared by any court of competent jurisdiction to be invalid or unconstitutional, such section, subsection, sentence, clause, phrase, or portion shall be deemed a separate, distinct, and independent provision, and such holding shall not affect the validity of the remaining provisions of this order.

8. Effective Date: This Order shall become effective immediately.

Signed by Marion Barry, Jr.
Mayor

ATTEST: Signed by Clifton B. Smith
Secretary of the District of Columbia

OFFICE OF HUMAN RIGHTS

NOTICE OF FINAL RULEMAKING

The Director of the Office of Human Rights hereby gives notice of the adoption of the following final rules governing standards and procedures for equal employment opportunity applicable to contractors and subcontractors under District of Columbia Government Contracts. Notice of Proposed Rulemaking was published for public comment in the D.C. Register on April 11, 1986 at 33 DCR 2243. Based on some the comments received and upon further review by the Office of Human Rights, minor revisions were made in the rules at the following subsections: 1104.1, 1104.2, 1104.4, 1104.13, 1104.17(e) (5), 1104.28, 1107.1, 1199.1, and at page 15 the definition of minority was written out in addition to citing its D.C. Code. None of the revisions change the intent of the proposed final rules. Final action to adopt these final rules was taken on August 4, 1986, and will be effective upon publication of this notice in the Register.

CHAPTER 11 EQUAL EMPLOYMENT OPPORTUNITY REQUIREMENTS IN CONTRACTS

1100. PURPOSE

1100.1 These rules shall govern standards and procedures to be followed by contractors and subcontractors performing under District of Columbia Government contracts for goods and services, including construction contracts, for the purpose of assuring equal employment opportunity for minorities and women.

1100.2 These rules establish requirements for contractors and subcontractors regarding their commitment to observe specific standards for the employment of minorities and women and to achieve affirmative action obligations under District of Columbia contracts. These rules are not intended nor shall be used to discriminate against any qualified applicant for employment or employee.

1101 SCOPE

1101.1 Except as hereinafter exempted, the provisions of this chapter shall apply to all District of Columbia Government contracts subject to Mayor's Order No. 85-85, and any rules, regulations, and procedures promulgated pursuant to that Mayor's Order.

1102 COVERAGE

1102.1 The provisions of this chapter shall govern the processing of any matter before the Office Human Rights involving the following:

(a) Discrimination in employment on grounds of race, color, religion, national origin, sex, age, marital status, personal appearance, sexual orientation, family responsibilities, matriculation, political affiliation, or physical handicap by any District of Columbia Government contractor; and

(b) Achievement of affirmative action obligations under District of Columbia contracts.

1103 CONTRACT PROVISIONS

1103.1 Each contract for goods and services, including construction contracts, except construction subcontracts for standard commercial supplies or raw materials, shall include as express contractual provisions the language contained in subsections 1103.2 through 1103.10.

1103.2 The contractor shall not discriminate against any employee or applicant for employment because of race, color, religion, national origin, sex, age, marital status, personal appearance, sexual orientation, family responsibilities, matriculation, political affiliation, or physical handicap.

1103.3 The contractor agrees to take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, color, religion, national origin, sex, age, marital status, personal appearance, sexual orientation, family responsibilities, matriculation, political affiliation, or physical handicap. The affirmative action shall include, but not be limited to the following:

(a) Employment, upgrading, or transfer;
(b) Recruitment or recruitment advertising;
(c) Demotion, layoff, or termination;
(d) Rates of pay, or other forms of compensation; and
(e) Selection for training and apprenticeship.

1103.4 The contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided by the Contracting Agency, setting forth the provisions in subsections 1103.2 and 1103.3 concerning non-discrimination and affirmative action.

1103.5 The contractor shall, in all solicitations or advertisements for employees placed by or on behalf of the contractor, state that all qualified applicants will receive consideration for employment pursuant to the non-discrimination requirements set forth in subsection 1103.2

1103.6 The contractor agrees to send to each labor union or representative of workers with which it has a collective bargaining agreement, or other contract or understanding, a notice to be provided by the Contracting Agency, advising each labor union or workers' representative of the contractor's commitments under this chapter, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

1103.7 The contractor agrees to permit access to all books, records, and accounts, pertaining to its employment practices, by the Director and the Contracting Agency for purposes of investigation to ascertain compliance with this chapter, and to require under terms of any subcontractor agreement each subcontractor to permit access of such subcontractors, books, records, and accounts for such purposes.

1103.8 The contractor agrees to comply with the provisions of this chapter and with all guidelines for equal employment opportunity applicable in the District of Columbia adopted by the Director, or any authorized official.

1103.9 The prime contractor shall include in every subcontract the equal opportunity clauses, subsections 1103.2 through 1103.10 of this section, so that such provisions shall be binding upon each subcontractor or vendor.

1103.10 The prime contractor shall take such action with respect to any subcontractor as the Contracting Officer may direct as a means of enforcing these provisions, including sanctions for non-compliance; provided, however, that in the event the prime contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the contracting agency, the prime contractor may request the District to enter into such litigation to protect the interest of the District.

1104 AFFIRMATIVE ACTION PROGRAM

1104.1 Each apparent low bidder for a construction contract shall complete and submit to the Contracting Agency, prior to the execution of any contract in the amount of twenty-five thousand dollars ($25,000) or more, and each contractor covered under subsection 1105.1, an Affirmative Action Program to ensure equal opportunity which shall include specific standards for the utilization of minorities and women in the trades, crafts and skills to be used by the contractor in the performance of the contract.

1104.2 Each apparent low bidder or offeror for a non-construction contract shall complete and submit to the Contracting Agency, prior to the execution of any contract in the amount of ten thousand dollars ($10,000) or more, and each contractor covered under subsection 1105.2 , an Affirmative Action Program to ensure equal opportunity which shall include specific standards for the utilization of minorities in the job categories specified in subsection 1108.4.

1104.3 To ensure equal opportunity each Affirmative Action Program shall include the following commitments:

(a) With respect to construction contracts, each contractor shall certify that it will comply with the provisions of this chapter, and submit a personnel utilization schedule for all the trades the contractor is to utilize, indicating the actual numbers of minority and female workers that are expected to be a part of the workforce performing under the contract; and

(b) With respect to non-construction contracts, each contractor shall certify that it will comply with the provisions of this chapter, and shall submit a personnel utilization schedule indicating by craft and skill, the minority composition of the workforce related to the performance of the work under the contract. The schedule shall include all workers located in the facility from which the goods and services are produced and shall include the same information for other facilities which have a significant relationship to the performance of work under the contract.

1104.4 If the experience of the contractor with any local union from which it will secure employees indicates that the union will not refer sufficient minorities or women to meet minority or female employment commitments, the contractor shall, not less than ten (10) days prior to the employment of any person on the project subject to the jurisdiction of that local union, do the following:

(a) Notify the District of Columbia Department of Employment Services and at least two (2) minority and two (2) female referral organizations of the contractor's personnel needs, and request referral of minority and female workers; and

(b) Notify any minority and female workers who have been listed with the contractors as awaiting vacancies.

1104.5 If, within five (5) working days prior to commencement of work, the contractor determines that the Department of Employment Services or the minority or female referral organizations are unable to refer sufficient minorities or women to meet its commitments, the contractor may take steps to hire, by referral or otherwise, from the local union membership to fill the remaining job openings, provided that it notifies the local union of its personnel needs and of its employment commitments. Evidence of the notification shall be provided to the Contracting Agency.

1104.6 The contractor shall have standing requests for additional referrals of minority and female workers with the local union, the Department of Employment Services, and the other referral sources, until such time as the contractor has met its minority and female employment commitments.

1104.7 If the contractor desires to lay off some of its employees in a given trade on a construction site, it shall ensure that the required number of minority and female employees remain on the site to meet the minority and female commitments.

1104.8 No contractor shall refuse employment to any individual who has minimal facility to speak English except where the contractor can demonstrate that the facility to speak English is necessary for the performance of the job.

1104.9 No union with which the contractor has a collective bargaining agreement shall refuse to refer minority and female employees to such contractor.

1104.10 To the extent that contractors have delegated the responsibility for some of their employment practices to some other organization or agency which prevents them from meeting their equal opportunity obligations, those contractors shall not be considered to be in compliance with this chapter.

1104.11 The obligations of the contractor shall not be reduced, modified, or subject to any provision in any collective bargaining agreement with labor organization which provides that the labor organizations shall have the exclusive or primary opportunity to refer employees.

1104.12 When any contractor employs a minority person or woman in order to comply with this chapter, those persons shall be advised of their right to seek union membership, the contractor shall provide whatever assistance may be appropriate to enable that person to obtain membership, and the contractor shall notify the appropriate union of that person's employment.

1104.13 The contractor shall not discharge, refuse to employ, or otherwise adversely affect any minority person or woman because of any provision in any collective bargaining agreement, or any understanding, written or oral that the contractor may have with any labor organization.

1104.14 If at any time, because of lack of cooperation or overt conduct, a labor organization impedes or interferes with the contractor's Affirmative Action Program, the contractor shall notify the Contracting Agency and the Director immediately, setting forth the relevant circumstances.

1104.15 In any proceeding involving a disagreement between a labor organization and the contractor over the implementation of the contractor's Affirmative Action Program, the Contracting Agency and the Office of Human Rights may become a party to the proceeding.

1104.16 In determining whether or not a contractor is utilizing minorities and females pursuant to Section 1108, consideration shall be given to the following factors:

(a) The proportion of minorities and women employed in the trades and as laborers in the construction industry within the District of Columbia;

(b) The proportion of minorities and women employed in the crafts or as operatives in non-construction industries with in the District of Columbia;

(c) The number and ratio of unemployed minorities and women to total unemployment in the District of Columbia;

(d) The availability of qualified and qualifiable minorities and women for employment in any comparable line of work, including where they are now working and how they may be brought into the contractor's workforce;

(e) The effectiveness of existing training programs in the area, including the number who complete training, the length and extent of training, employer experience with trainees, and the need for additional or expanded training programs; and

(f) The number of additional workers that could be absorbed into each trade or line of work without displacing present employees, including consideration of present employee shortages, projected growth of the trade or line of work, and projected employee turnover.

1104.17 The contractor's commitment to specific standards for the utilization of minorities and females as required under this chapter shall include a commitment to make every good faith effort to meet

those standards. If the contractor has failed to meet the standards, a determination of "good faith" shall be based upon the contractor's documented equal opportunity efforts to broaden its equal employment program which shall include, but may not necessarily be limited to, the following requirements:

(a) The contractor shall notify the community organizations that the contractor has employment opportunities available and shall maintain records of the organizations' responses;

(b) The contractor shall maintain a file of the names and addresses of each minority and female worker referred to it and what action was taken with respect to each referred worker. If that worker was not sent to the union hiring hall for referral or if the worker was not employed by the contractor, the contractor's file shall be documented and the reasons therefore;

(c) The contractor shall notify the Contracting Agency and the Director when the union or unions with which the contractor has a collective bargaining agreement has not referred to the contractor a minority or female worker originally sent to the union by the contractor for union registration, or the contractor has other information that the union referral process has impeded the contractor's efforts to meet its goals;

(d) The contractor shall participate in training programs related to its personnel needs;

(e) The contractor shall disseminate its EEO policy internally by doing the following:

(1) Including it in any organizational manual;

(2) Publicizing it in company newspapers, annual report, etc.;

(3) Conducting staff, employee, and union representatives meetings to explain and discuss the policy;

(4) Posting; and

(5) Reviewing the policy with minority and female employees.

(f) The contractor shall disseminate its EEO policy externally by doing the following:

(1) Informing and discussing it with all recruitment sources;

(2) Advertising in news media, specifically including news media directed to minorities and women;

(3) Notifying and discussing it with all known minority and women's organizations; and

(4) Notifying and discussing it with all subcontractors and suppliers.

1104.18 The contractor shall make specific recruitment efforts, both written and oral, directed at all minority and women's training organizations within the contractor's recruitment area.

1104.19 The contractor shall encourage present employees to assist in the recruitment of minorities and women for employment.

1104.20 The contractor shall validate all qualifications, selection requirements, and tests in accordance with the guidelines of the Equal Employment Opportunity Commission.

1104.21 The contractor shall make good faith efforts to provide after school, summer and vacation employment to minority youths and young women.

1104.22 The contractor shall develop on-the-job training opportunities, and participate and assist in any association or employer group training programs relevant to the contractor's employee needs.

1104.23 The contractor shall continually inventory and evaluate all minority and female personnel for promotion opportunities.

1104.24 The contractor shall make sure that seniority practices, job classifications, qualifications, etc. do not have a discriminatory effect on minorities and women.

1104.25 The contractor shall make certain that all facilities and company activities are nonsegregated.

1104.26 The contractor shall continually monitor all personnel activities to ensure that its EEO policy is being carried out.

1104.27 The contractor may utilize minority banking facilities as depositories for funds which may be involved, directly or indirectly, in the performance of the contract.

1104.28 The contractor shall employ minority and female workers without respect to union membership in sufficient numbers to meet the minority and female employment standards, if the experience of the contractor with any labor union from which it will secure employees does not indicate that it will refer sufficient minorities and females to meet its minority and female employment standards.

1104.29 The contractor shall ensure that all of its employees as well as those of its subcontractors are made knowledgeable about the contractor's equal opportunity policy.

1104.30 [Reserved]

1104.31 Each contractor shall include in all bid invitations or other pre-bid communications, written or otherwise, with respect to prospective subcontractors, the standards, as applicable, which are required under this chapter.

1104.32 Whenever a contractor subcontracts a portion of the work in any trade, craft or skill it shall include in the subcontract, its commitment made under this chapter, as applicable, which shall be adopted by its subcontractors who shall be bound thereby and by the regulations of this chapter to the full extent as if it were the prime contractor.

1104.33 The prime contractor shall give notice to the Director and the Contracting Agency of any refusal or failure of any subcontractor to fulfill its obligations under this chapter.

1104.34 Failure of compliance by any subcontractor shall be treated in the same manner as a failure by the prime contractor.

1105 EXEMPTIONS

1105.1 Prospective construction contractors shall be exempt from submitting Affirmative Action Programs for contracts amounting to less than twenty-five thousand dollars ($25,000); provided, that when a construction contractor accumulates contracts amounting to twenty-five thousand dollars ($25,000) or more within a period of twelve (12) months that contractor shall be required to submit an Affirmative Action Program for each contract executed thereafter.

1105.2 Prospective non-construction contractors shall be exempt from submitting Affirmative Action Programs for contracts amounting to less than ten thousand dollars ($10,000); provided, that when

a non-construction contractor accumulates contracts amounting to ten thousand dollars ($10,00) or more during a period of twelve (12) months that contractor shall be required to submit an Affirmative Action Program for each contract executed thereafter.

1106 NONRESPONSIBLE CONTRACTORS

1106.1 If a bidder or offeror fails either to submit a complete and satisfactory Affirmative Action Program or to submit a revised Affirmative Action Program that meets the approval of the Director, as required pursuant to this chapter, the Director may direct the Contracting Officer to declare the bidder or offeror to be nonresponsible and ineligible for award of the contract.

1106.2 Any untimely submission of an Affirmative Action Program may, upon order of the Director, be rejected by the Contracting Officer.

1106.3 In no case shall there be any negotiation over the provision of specific utilization standards submitted by the bidder or offeror after the opening of bids or receipt of offer and prior to award.

1106.4 If any directive or order relating to nonresponsibility is issued under this section, the Director shall afford the bidder or offeror a reasonable opportunity to be heard in opposition to such action in accordance with subsection 1118.1, or in support of a request for waiver under section 1109.

1107 NOTICE OF COMPLIANCE

1107.1 Each Contracting Agency shall include, or require the contract bidder or offeror to include, in the invitation for bids or other solicitation used for a D.C. Government-involved contract, a notice stating that to be eligible for consideration, each bidder or offeror shall be required to comply with the provisions of this chapter for the trades, crafts and skills to be used during the term of the performance of the contract whether or not the work is subcontracted.

1108 MINIMUM STANDARDS FOR MINORITY AND FEMALE EMPLOYMENT

1108.1 The minimum standards for the utilization of minorities in the District of Columbia Government construction contracts shall be forty-two percent (42%) in each trade for each project, and an aggregate workforce standard of six and nine-tenths percent (6.9%) for females in each project. Any changes in Federal standards pertaining to minority group and female employment in Federally-involved construction contracts shall be taken into consideration in any review of these requirements.

1108.2 The construction contractor's standards established in accordance with subsection 1108.1 shall express the contractor's commitment of the forty-two percent (42%) of minority personnel who will be working in each specified trade on each of the contractor's District of Columbia Government projects, and the aggregate standard of six and nine-tenths percent (6.9%) for the employment of females in each District of Columbia Government contract.

1108.3 The hours for minority and female workers shall be substantially uniform throughout the entire length of the construction contract for each trade used, to the effect that the same percentage of minority workers in the trades used shall be working throughout the length of work in each trade on each project, and the aggregate percentage in each project for females.

1108.4 The minimum standard for the utilization of minorities in non-construction contracts shall be twenty-five percent (25%) in each of the following nine (9) job categories:

(a) Officials and managers;

(b) Professionals;

(c) Technicians;

(d) Sales workers;

(e) Office and clerical workers;

(f) Craftpersons (Skilled);

(g) Operative (Semi-skilled);

(h) Laborers (Unskilled); and

(i) Service workers.

1108.5 With respect to non-construction contracts the contractor's standards established in accordance with subsection 1108.4 shall express the contractor's commitment of the twenty-five percent (25%) of minority personnel who will be working in each specified craft or skill in each contract.

1109 WAIVERS

1109.1 The Director may grant a waiver to a prospective contractor from the requirement to submit a set of minimum standards for the employment of minorities and women in a particular contract, if before the execution of the contract and approval of the Affirmative Action Program, the contractor can document and otherwise prove it is unable to meet the standards in the performance of the contract.

1110 SOLICITATION OF CONTRACT

1110.1 Each solicitation for contract covered by section 1104 shall contain a statement that contractors shall comply with the minimum standards established pursuant to these rules for ensuring equal opportunity.

1110.2 The contract solicitation shall require that each bidder or offeror certify that it intends to meet the applicable minimum standards in section 1108 in order to be considered for the contract.

1111 PRIOR TO EXECUTION OF CONTRACT

1111.1 Upon being designated the apparent low bidder or offeror, that contractor shall submit a detailed Affirmative Action Program that sets forth the following:

(1) The composition of its current total workforce; and

(2) The composition of the workforce by race, color, national origin, and sex to be used in the performance of the contract and that of all known subcontractors that will be utilized to perform the contract.

1111.2 The apparent low bidder or offeror shall submit an Affirmative Action Program in accordance with section 1104 describing the actions it will take to ensure compliance with this chapter which shall be subject, prior to the execution of any contract, to the approval of the Director.

1111.3 If the Office of Human Rights does not act within ten (10) working days after the receipt of the Affirmative Action Program sent for approval, the Contracting Agency may proceed on its own determination to execute the contract.

1111.4 The apparent low bidder or offeror shall submit an Affirmative Action Program within a period of time to specified by each Contracting Agency, but which shall not exceed ten (10) working days after becoming the apparent contractor.

1111.5 The apparent low bidder or offeror shall furnish all information and reports to the Contracting Agency as required by this chapter, and shall permit access to all books or records pertaining to its employment practices or worksites.

1111.6 No contract subject to section 1104 shall be executed by the Contracting Agency, if the apparent low bidder or offeror does not submit an Affirmative Action Program, or if the Program has been disapproved in writing by the Director.

1111.7 If there is disagreement between the contractor and the Contracting Officer as to the adequacy of the Affirmative Action Program, the matter shall be referred to the Director for a decision.

1112 AFTER EXECUTION OF CONTRACT

1112.1 Each contractor shall maintain throughout the term of the contract the minimum standards for the employment of minorities and women, as set forth in the approved Affirmative Action Program.

1112.2 Each contractor shall require that each subcontractor, or vendor under the contract comply with the provision of the contract and the Affirmative Action Program.

1112.3 Each contractor shall furnish all information as required by this chapter, and permit access to all books and records pertaining to the contractor's employment practices and work sites by the Director and the Contracting Agency for purposes of investigation to ascertain compliance with this chapter.

1113 MONITORING AND EVALUATION

1113.1 The Director shall, from time to time, monitor and evaluate all District of Columbia Government agencies, including those independent agencies and commissions not required to submit the Affirmative Action Program of their contractors, to ensure compliance with the equal opportunity obligations in contracts, as provided for in this chapter.

1114 AFFIRMATIVE ACTION TRAINING PROGRAM

1114.1 Each contractor, in fulfilling its affirmative action responsibilities under a contract with the District of Columbia Government, shall be required to have, as part of its Affirmative Action Program, an existing training program for the purpose of training, upgrading, and promotion of minority and female employees or to utilize existing programs. Those programs shall include, but not be limited to, the following:

(a) To be consistent with its personnel requirements, the contractor shall make full use of the applicable training programs, including apprenticeship, on-the job training, and skill refinement training for journeymen. Recruitment for the program shall be designed to provide for appropriate participation by minority group members and women;

(b) The contractor may utilize a company-operated skill refinement training program. This program shall be formal and shall be responsive to the work to be performed under the contract;

(c) The contractor may utilize formal private training institutions that have as their objective training and skill refinement appropriate to the classification of the workers employed. When training is provided by a private organization the following information shall be supplied:

(1) The name of the organization;

(2) The name, address, social security number, and classification of the initial employees and any subsequent employees chosen during the course of the course of the contract; and

(3) The identity of the trades, and crafts or skills involved in the training.

1114.2 If the contractor relies, in whole or in part, upon unions as a source of its workforce, the contractor shall use its best efforts, in cooperation with unions, to develop joint training programs aimed toward qualifying more minorities and females for membership in the union, and increasing the skills of minority and female employees so that they may qualify for higher paying employment.

1114.3 Approval of training programs by the Contracting Agency shall be predicated, among other things, upon the quality of training, numbers of trainees and trades, crafts or skills involved, and whether the training is responsive to the policies of the District of Columbia and the needs of the minority and female community. Minority and female applicants for apprenticeship or training should be selected in sufficient numbers as to ensure an acceptable level of participation sufficient to overcome the effects of past discrimination.

1115 COMPLIANCE REVIEW

1115.1 The Director and the Contracting Agency shall review the contractor's employment practices during the performance of the Contract. Routine or special reviews of contractors shall be conducted by the Contracting Agency or the Director in order to ascertain the extent to which the policy of Mayor's Order No. 85-85, and the requirements in this chapter are being implemented and to furnish information that may be useful to the Director and the Contracting Agency in carrying out their functions under this chapter.

1115.2 A routine compliance review shall consist of a general review of the practices of the contractor to ascertain compliance with the requirements of this chapter, and shall be considered a normal part of contract administration.

1115.3 A special compliance review shall consist of a comprehensive review of the employment practices of the contractor with respect to the requirements of this chapter, and shall be conducted when warranted.

1116 ENFORCEMENT

1116.1 If the contractor does not comply with the equal opportunity clauses in a particular contract, including subsections 1103.2 through 1103.10 of this chapter, that contract may be cancelled in whole or in part, and the contractor may be declared by the Director or the Contracting Officer to be ineligible for further District of Columbia Government Contracts subject to applicable laws and regulations governing debarment.

1116.2 If the contractor meets its goals or if the contractor can demonstrate that it has made every good faith effort to meet those goals, the contractor will be presumed to be in compliance with this chapter, and no formal sanction shall be instituted unless the Director otherwise determines that the contractor is not providing equal employment opportunity.

1116.3 When the Director proceeds with a formal hearing she or he has the burden of proving that the contractor has not met the requirements of this chapter, but the contractor's failure to meet its goals shall shift to it the requirement to come forward with evidence to show that it has met the good faith requirements of this chapter.

1117 COMPLAINTS

1117.1 The Director may initiate investigations of individual instances and patterns of discriminatory conduct, initiate complaints thereupon and keep the Contracting Agency informed of those actions.

1117.2 If the investigation indicates the existence of an apparent violation of the non-discrimination provisions of the contract required under section 1103 of this chapter the matter may be resolved by the methods of conference, conciliation, mediation, or persuasion.

1117.3 If an apparent violation of the non-discrimination provisions of the contract required under section 1103 of this chapter is not resolved by methods of conference, conciliation, mediation, or persuasion, the Director of the Contracting Officer may issue a notice requiring the contractor in question to show cause, within thirty (30) days, why enforcement proceedings or other appropriate action should not be initiated.

1117.4 Any employee of any District of Columbia Government contractor or applicant for employment who believes himself or herself to be aggrieved may, in person or by an authorized representative, file in writing, a complaint of alleged discrimination with the Director.

1118 HEARINGS

1118.1 In the event that a dispute arises between a bidder, offeror or prospective contractor and the Director or the Contracting Officer as to whether the proposed program of affirmative action for providing equal employment opportunity submitting by such bidder, offeror or prospective contractor complies with the requirements of this chapter and cannot be resolved by the methods of conference, conciliation, mediation, or persuasion, the bidder, offeror or prospective contractor in question shall be afforded the opportunity for a hearing before the Director.

1118.2 If a case in which an investigation by the Director or the Contracting Agency has shown the existence of an apparent violation of the non-discrimination provisions of the contract required under section 1103 is not resolved by the methods specified in subsection 1117.2, the Director may issue a notice requiring the contractor in question to show cause, within thirty (30) days, why enforcement proceedings or other appropriate action should not be initiated. The contractor in question shall also be afforded the opportunity for a hearing before the Director.

1118.3 The Director may hold a hearing on any compliant or violation under this chapter, and make determinations based on the facts brought before the hearing.

1118.4 Whenever the Director holds a hearing it is to be held pursuant to the Human Rights Act of 1977, a notice of thirty (30) working days for the hearing shall be given by registered mail, return receipt requested, to the contractor in question. The notice shall include the following:

(a) A convenient time and place of hearing;

(b) A statement of the provisions in this chapter or any other laws or regulations pursuant to which the hearing is to be held; and

(c) A concise statement of the matters to be brought before the hearing.

1118.5 All hearings shall be open to the public and shall be conducted in accordance with rules, regulations, and procedures promulgated pursuant to the Human Rights Act of 1977.

1119 SANCTIONS

1119.1 The Director, upon finding that a contractor has failed to comply with the non-discrimination provisions of the contract required under section 1103, or has failed to make a good faith effort to achieve the utilization standards under an approved Affirmative Action Program, may impose sanctions contained in this section in addition to any sanction or remedies as may be imposed or invoked under the Human Rights Act of 1977.

1119.2 Sanctions imposed by the Director may include the following:

(a) Order that the contractor be declared ineligible from consideration for award of District of Columbia Government contracts or subcontracts until such time as the Director may be satisfied that the contractor has established and will maintain equal opportunity policies in compliance with this chapter; and

(b) Direct each Contracting Officer administering any existing contract to cancel, terminate, or suspend the contract or any portion thereof, and to deny any extension, modification, or change, unless the contractor provides a program of future compliance satisfactory to the Director.

1119.3 Any sanction imposed under this chapter may be rescinded or modified upon reconsideration by the Director.

1119.4 An appeal of any sanction imposed by order of the Director under this chapter may be taken pursuant to applicable clauses of the affected contract or provisions of law and regulations governing District of Columbia Government contracts.

1120 NOTIFICATIONS

1120.1 The Director shall forward in writing notice of his or her findings of any violations of this chapter to the Contracting Officer for appropriate action under the contract.

1120.2 Whenever it appears that the holder of or an applicant for a permit, license or franchise issued by any agency or authority of the Government of the District of Columbia is a person determined to be in violation of this chapter the Director may, at any time he or she deems that action the Director may take or may have taken under the authority of this chapter, refer to the proper licensing agency or authority the facts and identities of all persons involved in the violation for such action as the agency or authority, in its judgement, considers appropriate based upon the facts thus disclosed to it.

1120.3 The Director may publish, or cause to be published, the names of contractors or unions which have been determined to have complied or have failed to comply with the provisions of the rules in this chapter.

1121 DISTRICT ASSISTED PROGRAMS

1121.1 Each agency which administers a program involving leasing of District of Columbia Government owned or controlled real property, or the financing of construction under industrial revenue bonds or urban development action grants, shall require as a condition for the approval of any agreement for leasing, bond issuance, or development action grant, that the applicant undertake and agree to incorporate, or cause to be incorporated into all construction contracts relating to or assisted by such agreements, the contract provisions prescribed for District of Columbia Government contracts by section 1103, preserving in substance the contractor's obligation under those provision.

1199 DEFINITIONS

1199.1 The following words and phrases set forth in this section, when used in this chapter, shall have the following meanings ascribed:

Contract – any binding legal relationship between the District of Columbia and a contractor for supplies or services, including but not limited to any District of Columbia Government or District of Columbia Government assisted construction or project, lease agreements, Industrial Revenue Bond financing, and Urban Development Action grant, or for the lease of District of Columbia property in which the parties, respectively, do not stand in the relationship of employer and employee.

Contracting Agency – any department, agency, or establishment of the District of Columbia which is authorized to enter into contracts.

Contracting Officer – any official of a contracting agency who is vested with the authority to execute contracts on behalf of said agency.

Contractor – any prime contractor holding a contract with the District of Columbia Govemment. The term shall also refer to subcontractors when the context so indicates.

Director – the Director of the Office of Human Rights, or his or her designee.

Dispute – any protest received from a bidder or prospective contractor relating to the effectiveness of his or her proposed program of affirmative action for providing equal opportunity.

Minority – Black Americans, Native Americans, Asian Americans, Pacific Islander Americans, and Hispanic Americans. In accordance with D.C. Code, Section 1-1142(1) (Supp. 1985).

Subcontract – any agreement made or executed by a prime contractor or a subcontractor where a material part of the supplies or services, including construction, covered by an agreement is being obtained for us in the performance of a contract subject to Mayor's Order No. 85-85, and any rules, regulations, and procedures issued pursuant thereto.

Subcontractor – any contractor holding a contract with a District prime contractor calling for supplies or services, including construction, required for the performance of a contract subject to Mayor's Order No. 85-85, and any rules, regulations, and procedures promulgated pursuant thereto.

ATTACHMENT J.5 TAX CERTIFICATION

TAX CERTIFICATION AFFIDAVIT

Date _____ _____, 2004

Name of Organization/Entity: _____

Address: _____

Principal Officers: Name Soc. Sec. No. Title

_____
_____
_____

Business Telephone No.: _____

Finance and Revenue Registration No.: _____

Federal Identification No.: _____

DUNS No.: _____ Contract No.: _____

Unemployment Insurance Account No.: _____
I hereby certify that:

1. I have complied with the applicable tax filing and licensing requirements of the District of Columbia.
2. The following information is true and correct concerning tax compliance for the following taxes for the past five (5) years:

		Current	Not Current
District:	Sales and Use	( )	( )
	Employment Withholding	( )	( )
	Hotel Occupancy	( )	( )
	Corporation Franchise	( )	( )
	Unincorporated Franchise	( )	( )
	Personal Property	( )	( )
	Professional License	( )	( )
	Arena/Public Safety Fee	( )	( )
	Vendor Fee	( )	( )

3. If not current, as checked in item 2, I am in compliance with a payment agreement with the Department of Finance and Revenue.
___ Yes ____ No

Attach copy of the Agreement.
If outstanding liabilities exists and no agreement has been made, please attach a listing of all such liabilities.

The Department of Finance and Revenue also requires:
(A) Copies of FR-532 (Notice of Registration) or a copy of an FR-500 (Combined Registration Form)
(B) Copies of canceled checks for the last tax period(s) filed for each tax liability; i.e., sales and use, employer withholding, etc.

The District of Columbia Government is hereby authorized to verify the above information with appropriate Government authorities. Penalty for making false statements is a fine of not more than $1,000.00, imprisonment for not more than one year, or both, as prescribed in D.C. Code Sec. 22-2514. Penalty for false swearing is a fine of not more than $2,500.00, imprisonment for not more than three (3) years, or both, as prescribed in D.C. Code sec. 22-2513.

_____ _____
Signature of Person Authorized to Sign This Document Title

_____
Print Name

Notary: DISTRICT OF COLUMBIA, ss:

Subscribed and sworn before me this _____ day of _____Month and Year

_____
Notary Public

My Commission Expires _____

FIRST SOURCE EMPLOYMENT AGREEMENT

Contract Number: _____

Contract Amount: _____

Project Name: _____

Project Address: _____ Ward:_____

Nonprofit Organization: (Yes) _____ (No) _____

This First Source Employment Agreement, in accordance with D. C. Law 14-24, D.C. Law 5-93, and Mayor's Order 83-265 for recruitment, referral, and placement of District of Columbia residents, is between the District of Columbia Department of Employment Services, hereinafter referred to as DOES, and _____, hereinafter, referred to as EMPLOYER. Under this Employment Agreement, the EMPLOYER will use DOES as its first source for recruitment, referral, and placement of new hires or employees for the new jobs created by this project and will hire 51% District of Columbia residents for all new jobs created, as well, as 51% of apprentices employed in connection with the project shall be District residents registered in programs approved by the District of Columbia Apprenticeship Council.

I. GENERAL TERMS

A. The EMPLOYER will use DOES as its first source for the recruitment, referral and placement of employees.

B. The EMPLOYER shall require all contractors and subcontractors, with contracts totaling $100,000 or more, to enter into a First Source Employment Agreement with DOES.

C. DOES will provide recruitment, referral and placement services to the EMPLOYER subject to the limitations set out in this Agreement.

D. DOES participation in this Agreement will be carried out by the Office of the Director, with the Office of Employer Services, which is responsible for referral and placement of employees, or such other offices or divisions designated by DOES.

E. This Agreement shall take effect when signed by the parties below and shall be fully effective for the duration of the contract and any extensions or modifications to the contract.

F. This Agreement shall not be construed as an approval of the EMPLOYER'S bid package, bond application, lease agreement, zoning application, loan, or contract/subcontract.

G. DOES and the EMPLOYER agree that for purposes of this Agreement, new hires and jobs created (both union and nonunion) include all EMPLOYER'S job openings and vacancies in the Washington Standard Metropolitan Statistical Area created as a result of internal promotions, terminations, and expansions of the EMPLOYER'S workforce, as a result of this project, including loans, lease agreements, zoning applications, bonds, bids, and contracts.

H. For purposes of this Agreement, apprentices as defined in D.C. Law 2-156 are included.

I. The EMPLOYER shall register an apprenticeship program with the D.C. Apprenticeship Council for construction or renovation contracts or subcontracts totaling $500,000 or more. This includes any construction or renovation contract or subcontract signed as the result of, but is not limited to, a loan, bond, grant, Exclusive Right Agreement, street or alley closing, or a leasing agreement of real property for one (1) year or more.

J. All contractors who contract with the Government of the District of Columbia to perform information technology work with a single contract or cumulative contracts of at least $500,000, let within any twelve (12) month period shall be required to register an apprenticeship program with the District of Columbia Apprenticeship Council.

K. The term “information technology work” shall include, but is not limited to, the occupations of computer programmer, programmer analyst, desktop specialist, technical support specialist, database specialist, network support specialist, and any other related occupations as the District of Columbia Apprenticeship Council may designate by regulation.

II. RECRUITMENT

A. The EMPLOYER will complete the attached Employment Plan, which will indicate the number of new jobs projected, salary range, hiring dates, and union requirements. The EMPLOYER will notify DOES of its specific need for new employees as soon as that need is identified.

B. Notification of specific needs, as set forth in Section II.A. must be given to DOES at least five (5) business days (Monday - Friday) before using any other referral source, and shall include, at a minimum, the number of employees needed by job title, qualification, hiring date, rate of pay, hours of work, duration of employment, and work to be performed.

C. Job openings to be filled by internal promotion from the EMPLOYER'S current workforce need not be referred to DOES for placement and referral.

D. The EMPLOYER will submit to DOES, prior to starting work on the project, the names, and social security numbers of all current employees, including apprentices, trainees, and laid-off workers who will be employed on the project.

III. REFERRAL

DOES will screen and refer applicants according to the qualifications supplied by the EMPLOYER.

IV. PLACEMENT

A. DOES will notify the EMPLOYER, prior to the anticipated hiring dates, of the number of applicants DOES will refer. DOES will make every reasonable effort to refer at least two qualified applicants for each job opening.

B. The EMPLOYER will make all decisions on hiring new employees but will in good faith use reasonable efforts to select its new hires or employees from among the qualified persons referred by DOES.

C. In the event DOES is unable to refer the qualified personnel requested, within five (5) business days (Monday - Friday) from the date of notification, the EMPLOYER will be free to directly fill remaining positions for which no qualified applicants have been referred. Notwithstanding, the EMPLOYER will still be required to hire 51% District residents for the new jobs created by the project.

D. After the EMPLOYER has selected its employees, DOES will not be responsible for the employees' actions and the EMPLOYER hereby releases DOES, and the Government of the District of Columbia, the District of Columbia Municipal Corporation, and the officers and employees of the District of Columbia from any liability for employees' actions.

V. TRAINING

DOES and the EMPLOYER may agree to develop skills training and on-the-job training programs; the training specifications and cost for such training will be mutually agreed upon by the EMPLOYER and DOES and set forth in a separate Training Agreement.

VI. CONTROLLING REGULATIONS AND LAWS

A. To the extent this Agreement is in conflict with any labor laws or governmental regulations, the laws or regulations shall prevail.

B. DOES will make every effort to work within the terms of all collective bargaining agreements to which the EMPLOYER is a party.

C. The EMPLOYER will provide DOES with written documentation that the EMPLOYER has provided the representative of any involved collective bargaining unit with a copy of this Agreement and has requested comments or objections. If the representative has any comments or objections, the EMPLOYER will promptly provide them to DOES.

VII. EXEMPTIONS

A. Contracts, subcontracts or other forms of government-assistance less than $100,000.

B. Employment openings the contractor will fill with individuals already employed by the company.

C. Job openings to be filled by laid-off workers according to formally established recall procedures and rosters.

D. Suppliers located outside of the Washington Standard Metropolitan Statistical Area and who will perform no work in the Washington Standard Metropolitan Statistical Area.

VIII. AGREEMENT MODIFICATIONS, RENEWAL, MONITORING, AND PENALTIES

A. If, during the term of this Agreement, the EMPLOYER should transfer possession of all or a portion of its business concerns affected by this Agreement to any other party by lease, sale, assignment, merger, or otherwise, the EMPLOYER as a condition of transfer shall:

1. Notify the party taking possession of the existence of the EMPLOYER'S Agreement.

2. Notify the party taking possession that full compliance with this Agreement is required in order to avoid termination of the project.

3. EMPLOYER shall, additionally, advise DOES within seven (7) business/calendar days of the transfer. This advice will include the

name of the party taking possession and the name and telephone of that party's representative.

B. DOES shall monitor EMPLOYER'S performance under this Agreement. The EMPLOYER will cooperate in DOES' monitoring effort and will submit a Contract Compliance Form to DOES monthly.

C. To assist DOES in the conduct of the monitoring review, the EMPLOYER will make available payroll and employment records for the review period indicated.

D. If additional information is needed during the review, the EMPLOYER will provide the requested information to DOES.

E. With the submission of the final request for payment from the District, the EMPLOYER shall:

1. Document in a report to the Contracting Officer its compliance with the requirement that 51% of the new employees hired by the project be District residents; or

2. Submit a request to the Contracting Officer for a waiver of compliance with the requirement that 51% of the new employees hired by the project be District residents and include the following documentations:
   a. Material supporting a good faith effort to comply;
   b. Referrals provided by DOES and other referral sources; and
   c. Advertisement of job openings listed with DOES and other referral sources.

F. The Contracting Officer may waive the requirement that 51% of the new employees hired by the project be District residents, if the Contracting Officer finds that:

1. A good faith effort to comply is demonstrated by the contractor;

2. The EMPLOYER is located outside the Washington Standard Metropolitan Statistical Area and none of the contract work is performed inside the Washington Standard Metropolitan Statistical Area;

   The Washington Standard Metropolitan Statistical Area includes the District of Columbia, the Virginia Cities of Alexandria, Falls Church, Manasas, Manasas Park, Fairfax, and Fredericksburg; the Virginia Counties of Fairfax, Arlington, Prince William, Loundon, Stafford, Clarke, Warren, Fauquier, Culpeper, Spotsylvania, and King George; the Maryland Counties of Montgomery, Prince Georges, Charles, Frederick, and Calvert; and the West Virginia Counties of Berkeley and Jefferson.

3. The EMPLOYER enters into a special workforce development training or placement arrangement with DOES; or

4. DOES certifies that insufficient numbers of District residents in the labor market possess the skills required by the positions created as a result of the contract.

G. Willful breach of the First Source Employment Agreement by the EMPLOYER, or failure to submit the Contract Compliance Report, or deliberate submission of falsified data, may be enforced by the Contracting Officer through imposition of penalties, including monetary fines of 5% of the total amount of the direct and indirect labor costs of the contract.

H. Nonprofit organizations are exempted from the requirement that 51% of the new employees hired on the project be District residents.

I. The EMPLOYER and DOES, or such other agent as DOES may designate, may mutually agree to modify this Agreement.

J. The project may be terminated because of the EMPLOYER'S non-compliance with the provisions of this Agreement.

Dated this_____day of_____20_____

Signed:

_____ _____

Department of Employment Services Signature of Employer

_____

Name of Company

_____

Address

_____

Telephone

_____

E-mail

EMPLOYMENT PLAN

NAME OF FIRM_____

ADDRESS_____

TELEPHONE NUMBER_____FEDERAL IDENTIFICATION NO._____

CONTACT PERSON_____TITLE_____

E-mail:_____ TYPE OF BUSINESS: _____

ORIGINATING DISTRICT AGENCY_____

CONTRACTING OFFICER: _____ TELEPHONE NUMBER: _____

TYPE OF PROJECT_____FUNDING AMOUNT_____

PROJECTED START DATE_____PROJECT DURATION_____

NEW JOB CREATION PROJECTIONS (Attach additional sheets, as needed.) Please indicate the new position(s) your firm will create as a result of this project.

	JOB TITLE	# OF JOBS F/T P/T	SALARY RANGE	UNION MEMBERSHIP REQUIRED NAME LOCAL#	PROJECTED HIRE DATE
A					
B					
C					
D					
E					
F					
G					
H					
I					
J					
K					

CURRENT EMPLOYEES: Please list the names and social security numbers of all current employees including apprentices and trainees who will be employed on the project. Attach additional sheets as needed.

NAME OF EMPLOYEE	SOCIAL SECURITY

GOVERNMENT OF THE DISTRICT OF COLUMBIA
OFFICE OF CONTRACTING AND PROCUREMENT

TITLE PAGE – SPECIFICATIONS

SOLICITATION NO.: POAM-2004-B-0048-DR

ISSUING OFFICER:

OFFICE OF CONTRACTING AND PROCUREMENT
441 4th Street, N.W. Suite 700 South
Washington, D.C. 20001

Requests for clarification or interpretation of Bid Documents prior to date of Bid Opening:

ADDRESS TO: **Delorise P. Ragins**
Construction, Design & Building Renovation
441 4th Street, N.W. Suite 700 South
Washington, D.C. 20001
Tel: (202) 724-4904
Fax: (202) 272-5580

SECTION NO.	TITLE	NO. OF PAGES
DIVISION O1 – GENERAL REQUIREMENTS		
See the Section B of Bid Document and Drawings		
DIVISION 06 – WOOD & PLASTICEW		
06100	ROUGH CARPENTRY	4
DIVISION 07 – THERMAL & MOISTURE PROTECTION		
07920	JOINT SEALANTS	8
DIVISION 08 – DOORS & WINDOWS		
08110	STEEL FRAMES	3
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08711	DOOR HARDWARE	8
08800	GLAZING	11
08814	MIRRORED GLASS	5

SECTION 16721
FIRE ALARM SYSTEM

PART 1 - GENERAL

1.1 DESCRIPTION

A. This specification intends to describe an "on premises" integrated fire detection system to be intelligent device addressable, analog detecting, low voltage and modular with multiplex communication techniques in full compliance with all applicable codes and standards. The features described in this specification are a requirement for this project and shall be furnished by the successful contractor.

B. The system as described shall be installed, tested, and delivered to the owner in first class condition. The system shall include all required equipment, hardware, raceways, interconnecting wiring and software to accomplish the requirements of this specification and the contract drawings, whether itemized or not.

C. The equipment specified is that of the Pyrotronics Co. and was selected to meet the special requirements for design of this project.

D. Acceptable alternate manufacturers: Simplex, Edwards & Notifier or any other manufacturers items which are approved as equivalent by the Engineer.
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1.2 MATERIALS AND SERVICES

A. The system shall include all necessary equipment to provide a complete fully functional system as specified herein and as detailed on the contract drawings including, but not be limited to the following: Master system CPU including all fire detection; remote circuit interface panels including all modules; power supplies, batteries and battery chargers; equipment enclosures; intelligent addressable manual pull stations, heat detectors, analog smoke detectors, alarm monitoring modules, and supervised control modules; annunciators complete with all necessary multiplex drivers; audible and visual evacuation signals; software and firmware; wire, conduit and all electrical outlet boxes as required to provide a complete functioning system. Provide automatic telephone dialer (two-channel type) to transmit messages to pre-programmed destinations.

1.3 RELATED WORK SPECIFIED ELSEWHERE

A. Conduit, Raceways: Section 16110 Wire, Cables: Section 16120 Boxes and Cabinets: Section 16135

1.4 QUALITY ASSURANCE

A. The publications listed below form a part of this publication to the extent referenced. The publications are referenced in the text by the basic designation only. The latest version of each listed publication shall be used as a guide unless the authority having jurisdiction has adopted an earlier version.
1. Factory Mutual (FM)
a. FM AG Approval Guide
2. National Fire Protection Association (NFPA)
a. NFPA 13 Standard For The Installation of Sprinkler Systems.
b. NFPA 13A Recommended Practice For The Inspection, Testing And Maintenance of Sprinkler Systems.
c. NFPA 70 National Electrical Code.
d. NFPA 90A Standard For The Installation of Air Conditioning And Ventilating Systems.
e. NFPA 101 Life Safety Code.
f. NFPA 72.
3. Underwriters' Laboratories, Inc. (UL)

a. Appropriate UL standards.
4. State and Local Building Codes as adopted By The Authority Having Jurisdiction.
5. The Americans With Disabilities Act, public law 101-336 (ADA)
6. Basic Building Code (BOCA)
7. Uniform Building Code

1.5 QUALIFICATIONS OF THE INSTALLER

A. Before commencing work, submit data showing that the contractor has successfully installed fire alarm systems of the same type and design as specified.

B. Provide the services of a representative or technician from the manufacturer of the system, experienced in the installation and operation of the type of system provided. The representative shall be licensed in the State if required. The technician shall supervise installation, software documentation, adjustment, preliminary testing, final testing and certification of the system. The technician shall provide the required instruction to the owner's personnel in the system operation, maintenance and programming.

1.6 SUBMITTALS

A. The contractor shall include the following information in the equipment submittal:
1. Battery capacity calculations.
2. Supervisory power requirements for all equipment.
3. Alarm power requirements for all equipment.
4. Justification showing power requirements of the system power supplies.
5. Voltage drop calculations for wiring runs in worst case condition.

B. Complete manufacturer's catalog data including supervisory power usage, alarm power usage, physical dimensions, finish and mounting requirements for control modules, initiating and indicating devices, and annunciators. Submit panel configuration and interconnection of modules and all other data as required to make an informed judgment regarding product suitability. At a minimum, data shall be submitted on the following:
1. Master system CPU including all fire detection.
2. Circuit interface panels including all modules.
3. Power supplies, batteries and battery chargers.
4. Equipment enclosures.
5. Intelligent addressable manual pull stations, heat detectors, analog smoke detectors, alarm monitoring modules, and supervised control modules.
6. Annunciator panels, printers and video display terminals.
7. Audible and visual evacuation signals and devices.
8. Software and firmware as required to provide a complete functioning system.
9. Wiring and conduit systems.

C. Data describing more than one type of item shall be clearly marked to indicate the type the contractor intends to provide for a given application. All submittal material shall be complete. Partial submittal will not be accepted. The contractor shall submit copies of UL listing or FM approval data showing compatibility of the proposed device or appliance and the panel being provided.

D. Complete drawings covering the following shall be submitted by the contractor for the proposed system:

1. Floor plans showing all initiating, end of line, supervisory, indicating appliances, and output control devices; including circuit interface panels, annunciators, printers, video display terminals, color graphic displays and the main CPU locations. Raceways shall be shown, marked for size, conductor count with type and size, showing the percentage of allowable National Electric Code fill used. Drawings shall indicate ambient sound levels

used by the system layout designer for sound level calculations and mathematical justification for signal placement to meet the code required 15dBA above ambient for audible warning signals.

2. Wiring diagrams showing points of connection and terminals used for all electrical connections to the system devices and panels.

E. A complete proposed system database including a description of all logic strings, control by event programming and point identification labels in a formatted printed form shall be submitted for evaluation by the owner.

F. Statements shall be included, with copies of required licensing, verifying the qualifications of the installer as specified.

G. For use in system test, a complete operation and maintenance manual with two sets of proposed installation drawings shall be submitted. The manual shall be legible and easily read with large drawings folded and contained in pockets. Included in the manual shall be circuit drawings, wiring and control diagrams with data to explain detailed operation and control of each item of equipment and a control sequence describing start up instructions. Included shall be installation instructions, maintenance instructions, safety precautions, test procedures, performance data, and software documentation.

H. Upon completion of the installation, record drawings shall be submitted on each system before final acceptance of the work. The contractor shall furnish to the Engineer a set of record drawings including system diagrams for each system. The record drawing masters shall be on reproducible mylar film, uniformly sized as required for legibility and reproduction and on high density floppy disks in an AutoCAD 2000 format.

I. Prior to submission of shop drawings to the Architect, submit complete system shop drawings to the Owner and local officials for review comments and approval. Incorporate all review comments or changes required by the Fire Marshal's office.

J. Prior to final acceptance, furnish the owner three (3) bound copies of complete Operation and Maintenance Manuals for the specific system installed.

1.7 DESCRIPTION OF THE SYSTEM

A. The system shall be a complete, electrically supervised multiplex style fire detection system with intelligent analog alarm initiation, to be device addressable and annunciated as described and shown on the drawings.

B. The maximum number of devices on a single signaling circuit shall not exceed sixty with a capacity of sixty reporting system inputs and sixty system control outputs. Devices attached to the signaling circuit shall be individually identifiable at the control panel for alarm and trouble indication. Smoke detectors shall be interrogated for sensitivity settings from the control panel, logged for sensitivity changes indicating the requirement for cleaning, and tested by a single technician using the panel field test routine. Sensitivity settings of individual detectors shall be automatically or manually adjustable from the control panel to reduce the incidence of false alarms caused by environmental conditions. The analog signaling circuits shall be installed in the fire alarm control panel enclosure or in remote circuit interface panel enclosures.

C. The system shall support intelligent analog smoke detection, conventional smoke detection, manual station, water flow, supervisory, security, and status monitoring devices.

D. The panel shall be UL listed FM approved as a test instrument for the measurement of the sensitivity of connected intelligent analog ionization and photoelectric smoke detectors to comply with the testing requirements of NFPA 72. The measurements shall be discrete voltage readings, accurate to .01 VDC. The readings shall be dynamic, providing a constant display of voltage shifts when in the sensitivity voltage list

mode. The control panel shall provide a display and a printed list of these sensitivity measurements as a permanent record of the required sensitivity testing. When programmed, any system connected ionization or light refraction style smoke detector shall be capable of self adjustment to compensate for the accumulation of contaminates that would change the detector sensitivity in either a more or less sensitive direction. This adjustment shall keep the relationship between the sensing chamber voltage and the programmed alarm threshold voltage constant to prevent false indications or failure to alarm in the presence of smoke.

E. The system shall annunciate a trouble condition when any smoke detector approaches 80% of its alarm threshold due to gradual contamination, signaling the need for service and eliminating unwanted alarms. The trouble report shall annunciate the specific location of the smoke detector requiring service. All analog smoke detectors installed in the system shall include this feature.

F. Any intelligent analog smoke detector or conventional smoke detector zone shall include a selectable alarm verification capability. This feature shall provide automatic verification of smoke detector alarms as described by NFPA 72.

G. All external circuits shall be listed as power limited circuits per article 760 of the National Electric Code. Power limitation shall be provided using on board self restoring solid state thermal devices.

H. The system shall recognize initiating of an alarm and indicate the alarm condition in a degrade mode of operation, in the event of processor failure or the loss of system communications to the circuit interface panels. Each circuit interface panel shall be capable of operation in its own degrade mode. In this mode, the system shall receive an alarm from any intelligent analog or conventional initiating device. It shall activate local indicating appliances and remote or auxiliary connect circuits. The system shall indicate a trouble condition during degrade mode operation and shall give a visual indication of an alarm condition. Detector operation in the degrade mode shall continue at the alarm threshold previously programmed. Systems returning detectors to a common default value in degrade mode shall not be acceptable.

I. The system shall provide a one person field test of either the complete system or a specified area, maintaining full function of areas not under test. Field test shall be usable in a silent or audible mode. When in the audible mode, the signals shall audibly annunciate alarms, troubles and device types. All field test activity shall be logged to the system printer and historical memory.

J. The system shall be programmed in the field via a laptop computer. All programmed information shall be stored in nonvolatile memory after downloading into the control panel. No special programming terminal or prom burning shall be required and the system shall continue in service during reprogramming. Systems requiring on line programming or not capable of mass uploading of software for offsite documentation or editing will not be considered acceptable. During program upload or download the system shall retain the capability for alarm reporting. The system shall download to a PC for program editing. System program shall be stored on a floppy disk and all programming shall be multi-level password protected.

K. The system shall use a distributed multiplex architecture using a centrally located control unit with interconnection to remote circuit interface panels containing any combination of plug in intelligent analog signaling circuits, plug in conventional initiating device circuits and plug in relays. The remote circuit interface panels shall provide a power supply, microprocessor controlled battery charger and communication link to the main CPU through a high speed 19.2K baud RS-485 network.

L. The system as installed shall be expandable to its predetermined maximum capacity of 800 initiation devices and/or 1,000 combined zones of visual devices.

M. System shall be remotely monitored via telephone lines. Provide all necessary components and accessories for the interface.

N. Provide proper low voltage step down transformer for connecton to the main power supply.

1.8 SYSTEM OPERATION

A. Activation of any fire alarm initiating device shall cause the following actions and indications:

1. Display a custom message describing the device originating the alarm condition, at the fire alarm control panel LCD alpha numeric display. LED type annunciator displays, conventional and graphic style shall indicate alarm zoning as specified.

2. Activate the visual signals throughout the facility.

3. Close smoke dampers and shut down the air handling unit associated with the smoke detector of alarm origin.

4. Furnish an alarm system closure for connection to an off site reporting device as contracted for by the system user.

5. Close all smoke doors.

6. Start all smoke removal fans shown on the drawings, associated with the smoke detector of alarm origin, where applicable.

B. Activation of any supervisory circuit, supervised valve closure, air pressure abnormal, low temperature shall cause the following actions and indications:

1. Display the origin of the supervisory condition report at the alarm control panel alphanumeric LCD display.

2. Activate supervisory audible and visual signals as indicated on the drawings.

C. Receipt of a trouble report at the fire alarm control panel shall cause the following actions and indications:

1. Display at the alarm control panel alphanumeric LCD display, the origin of the trouble condition report.

2. Activate trouble audible and visual signals at the control panel and the remote annunciator as indicated on the drawings.

PART 2 - PRODUCTS

2.1 FIRE ALARM CONTROL PANEL

A. Fire alarm control panel shall be designed for mo unting as indicated on the drawings.

B. The control panel shall be Cerberus Pyrotronics model MXL, modular in construction and shall include, but not limited to; the hardware, software and firmware required to perform the following major system functions:

1. Surface mounted steel cabinet with indicator viewing window, hinged door and cylinder lock, dead front construction, and factory finished in baked enamel.

2. System power supplies, including necessary transformers rectifiers, regulators, filters and surge protection required for system operation, with the capacity to power the system in a worst case condition with all devices in alarm and all local indicating appliances active

without exceeding the listed ratings. The system devices shall display normal and alarm conditions consistently whether operating from normal power or reserve (standby) power.

3. System 16 bit core processor, with internal operating system processing incoming alarm signals and issuing output commands required as a result of the alarm reception by system programming or manual commands. Total system response time shall not exceed 2.5 seconds on a system configured to the maximum capacity. All system processors shall be supervised by individual watchdog circuitry furnishing automatic restart after loss of activity. Systems with a single watchdog circuits for all processors shall no be acceptable.
4. Selectable Style"4" or Style"7" system digital communication capabilities required for the control panel to communicate with remote circuit interface panels, annunciators, and displays. All communications shall be conducted in a digital format. Systems processing signals using pulse width or voltage level techniques are not considered acceptable.

5. Selectable Style"4", Style"6" or Style "7" with loop isolator analog signaling circuitry required to communicate with, and receive alarms from 120 points, consisting of a maximum of sixty intelligent analog alarm initiating and sixty intelligent controllable output devices. Provide Pyrotronics model ALD-2 analog loop driver.

6. For control of air handling units and elevator there shall be provided a Controllable Relay Module, Model CRM-4. The module shall be system interconnected by a card edge connector and shall be operable by the MXL control unit. It shall contain four independent relays, fitted with form "C" contacts, rated at 2 amps 28VDC/120 VAC resistive. All relays shall be supervised for coil open or shorted conditions.

7. Mother boards shall be used to plug in the following modules for system expansion; ALD-2 Analog Loop Driver, CRM-4 Relay Module, CZM-4 Conventional Zone Module, CSM-4 Indicating Module. Mother Board shall be Pyrotronics model MOM-4.

8. A manual control and annunciator model VSM-1 shall be provided in quantities required by the system. The module shall have multiple colored LED=s (Red, Green) flashing and steady for indicating status of switch activity. LED=s shall have positive feed back for actions selected. AccuLINK programming software shall be used to map switches to functions and any number of zones as required to perform system operation outlined in the specifications and drawings. Systems using multiple switches to activate groups of zones for functions shall not be acceptable.

9. A Terminal Block Module model TBM-1 shall be provided for interface between internal and field wiring. The module shall be capable of connecting audio risers either in "Style Y"(Class B) or "Style Z"(Class A), and telephone riser in Class B type wiring. This module shall have an RCA type jack for connection to an external audio sources such as back ground music. The module shall have an RCA type output jack for connection to an external audio recording unit. AccuLINK shall configure the operation of this output to become active when ever the microphone is pressed.

10. Provide as required Speaker/Strobe Zone Cards model ZC2-8B-25. Each card shall provide 8 zones "Style Y" (Class B) for dual channel 25 vrms speakers or 24 VDC strobe light or combination of the two indicating type signals. With speakers the circuit shall not exceed 45 watts. When using strobe lights the current shall not exceed 1.5 amps.

11. The enclosure for the system shall provide complete dead front construction. Operator control modules shall be on a frame hinge mounted to provide easy access to wiring and system plug in cards.

12. The system display shall consist of an 80 character back lighted alphanumeric super twist LCD display readable at any angle. Thirty two character customer defined custom

messages shall describe the location of the active device. Additionally, the display shall include LED indicators for "ALARM", "AUDIBLES SILENCED", "SUPERVISORY", "TROUBLE", "SECURITY", "POWER ON" and "PARTIAL SYSTEM DISABLED". There shall be dedicated touch activated tactile membrane switches with audible feedback for "ALARM ACKNOWLEDGE", "AUDIBLE SILENCE", "SUPERVISORY ACKNOWLEDGE", "TROUBLE ACKNOWLEDGE", "SECURITY ACKNOWLEDGE", "RESET", "DISPLAY HOLD" and "DISPLAY NEXT". The system display shall further include touch activated membrane switches, programmable to perform a minimum of twelve custom functions and a ten digit keypad for the passcode entry to perform programming and maintenance functions. The display shall be a Pyrotronics model MKB-2.

13. Custom message format shall be as follows: (Building Name)(Device Type) (Floor)(Location)(Location)(Location) etc. Example: RES HALL SMOKE 1ST COOR RM33.

14. Software defined logic module as required for each alarm initiation point, capable of controlling any combination of the system output functions using as logic factors; counting, verification, time, day, holiday, type of device, "and", "or", "not", "timer", "all", "any", flip-flop, D latch, and up to 32 levels of programming shall be possible.

15. Software logic modules and system database shall be programmed using a DOS compatible program on any IBM compatible computer. It shall be possible to program or edit the system database off site after downloading from the control panel.

16. Selective chronoLINK, up to 800 events, shall be stored in flash memory and displayed, printed or downloaded by classification for selective event reports. AccuLINK shall allow selection of events to be logged, including; inputs, as alarms, troubles, supervisories, securities, status changes and device verification; outputs, as audible control and output activation; actions, as reset, set sensitivity, arm/disarm, override, password, set time and acknowledge. Data format for downloading shall be compatible with the data base handling program, Paradox by Borland, allowing custom report generation to track alarms, troubles and maintenance. Audible and visual indications shall be generated when memory is 80% and 90% full to allow downloading of data. The system shall be programmable circular logging, assuring that at least the last 400 events will always be stored in non-volatile memory.

17. EnviroLINK software driven logic for adjusting the alarm threshold windows on detectors to compensate for accumulating contamination and keep detector response sensitivity constant. The software shall compensate for either over-sensitized or de-sensitized units, raising a system flag when a detector approaches the allowable limits of adjustment, indicating a requirement for cleaning.

a. EnviroLINK values shall be stored in non-volatile memory allowing activation of all tracking functions within 90 seconds of system initiation from a "cold boot". During the boot sequence, alarms from detectors programmed with the feature shall be suppressed. When the full data history is active all devices shall be checked and any active alarms displayed.

b. The control panel shall place each detector in the system in an alarm condition, transparent to the system user, every twenty four hours as a dynamic check of the accuracy of the alarm threshold setting. Upon reception of the alarm report, the system detector shall be restored to it's pretest state.

c. The system shall be capable of monitoring the state of detectors and displaying a message when a detector is approaching the limits of adjustment as a result of

contaminates. A second message shall be displayed when the detector reaches the limits of adjustment due to these contaminates.

d. The system shall be capable of recognizing that a detector has been cleaned, initiating a series of tests to determine if the cleaning was successful and display a detector cleaned message, readjusting that detectors normal sensitivity setting reference.

2.2 FIRE ALARM SYSTEM POWER SUPPLIES

A. System primary power

1. Primary power for the FACP and the secondary power battery chargers shall each be obtained from the power panel board. Circuit breakers shall be fitted with a suitable guard, requiring removal of a screw to open, and used only for fire alarm. Each circuit used for fire alarm purposes shall be permanently labeled for function.

2. MXL power supply and battery charging shall be provided by the MMB-1 main board and an MPS-6 power supply.

3. Power supply and battery charger shall be provided by the PSR-1 remote power supply and an MPS-6 or MPS-12 power supply.

4. Provide 300% extra capacity for future tenant space connections.

B. Secondary power supply

1. Provide sealed gelled electrolyte batteries as the secondary power supply for the fire alarm control panel and each system circuit interface panel. The battery supply shall be calculated to operate its load in a supervisory mode for twenty four hours with no primary power applied and, after that time, operate its alarm mode for five minutes, or for the time period duration required by local jurisdiction authority. Batteries shall be sized at no larger than 80% of the calculated size to compensate for deterioration and aging during the battery life cycle. Battery calculations shall be submitted to justify the battery size. Batteries shall be housed in the control cabinet or a separate cabinet with adequate cell separation to prevent accidental discharge.

2. Provide battery charging circuitry for each standby battery bank in the system low voltage power supply or as a separate circuit. The charger shall be automatic in design, adjusting the charge rate to the condition of the batteries. Battery charge rate and terminal voltage shall be read using the fire alarm control panel LCD display in the service mode, indicating directly in volts and amps. Charger shall be housed in the main fire alarm control panel or the battery cabinet.

3. Battery capacity shall include a 300% capacity ready for future tenant space connections.

2.3 REMOTE CIRCUIT INTERFACE PANELS

A. Remote circuit interface panels shall be Cerberus Pyrotronics type MXLR or MXLRV, and shall consist of an enclosure, a PSR-1 Remote Power Supply, NET-4 or NET-7 digital communications circuitry, mother boards either MOM-4 or OMM-1, batteries and hardware, modules and circuitry described for inclusion in the fire alarm control panel as required to function as specified.

1. Circuit interface panels shall, when required, include CZM-4 conventional zone module, ALD-2I analog loop drivers, CSM-4 indicating appliance circuits, CRM-4 output circuitry to perform actions, ZC1, ZC2, ZC3-8B series, ZC2, ZC3-4AB series speaker circuits,

EL-410C amplifiers and ZCT-8B firefighter telephone circuits. All fire detection, alarm and indicating devices supported by the circuit interface panel shall function as a self standing system in the default mode upon loss of the central fire alarm control panel processing, communications or the communications wiring between them.

2. Smoke detectors shall alarm at their programmed sensitivity settings and shall not revert to a common default setting when their operating system segment is in the default mode.

3. Circuit interface panels shall support remote system displays, annunciators and printers.

2.4 INTELLIGENT DEVICE PROGRAMMER/TESTER

A. Furnish as a part of the installed system, a Pyrotronics sensorLINK UL listed programmer and tester, complete with the following features:

1. The programmer shall be portable with internal rechargeable battery and charging supply sufficient for four hours of use before requiring recharging.

2. The programmer shall set and verify the device address and perform a device test to assure operation within the UL defined detection window. This programming and testing shall be done independent of the control panel and system wiring.

3. The programmer shall be menu driven with an integral keypad and LCD display.

4. The programmer shall contain an integral detector base and non-polar leads to program and test intelligent modules with screw terminals.

5. The tester/programmer shall be housed in a carrying case with cover, latch and handle, type FPI-CC.

6. The tester shall be equipped with battery conservation circuitry to shut off power to the device should no keyboard activity take place for five minutes.

7. The programmer tester shall dynamically display in real time, the detector chamber analog voltage.

2.5 SMOKE DETECTORS, INTELLIGENT PHOTOELECTRIC

A. Furnish and install where indicated on the drawings, Pyrotronics type ID-60P, intelligent photoelectric smoke detectors with features and characteristics as follows:

1. The detector shall be self compensating for ambient temperature and humidity.

2. The detector shall be addressed, tested and programmed prior to installation using a UL listed programmer/tester. The detector readout shall yield a discreet electrical value for status tracking and logging for determining maintenance and cleaning requirements.

a. The control panel shall provide a sensitivity readout from the detector without removal from the pluggable base.

3. The detector shall be suitable for two wire operation and two way communications on the intelligent analog signaling circuit.

4. Detectors shall incorporate triple technology microprocessor chips including analog, digital and EEROM technologies on the single device.

a. Address and sensitivity assignments shall be set electronically and devices requiring dip switches, rotary switches, staples or jumpers are not acceptable. The detectors shall be assigned a sensitivity level based on environment, time of day or any programmable function as required by the system user, and shall respond at that level whether in the "on line" or "default" mode.

b. Detectors shall be supplied with the enviroLINK feature enabling the detector to maintain a constant programmed sensitivity within the environment installed, regardless of contaminant accumulation. This feature shall compensate by increasing or decreasing the alarm threshold, dependent on the ambient detector chamber voltage, eliminating both failure to detect at the desired level and unwanted alarms at lower levels.

c. Detectors shall incorporate internal automatic temperature compensation to overcome the effects of either high or low ambient temperatures in the installed environment on the detector sensitivity.

5. The detectors furnished shall be listed for use in environments as covered by Factory Mutual, UL (UROX) and shall be installed according to the requirements of NFPA 72 for open area coverage.

a. Duct smoke detectors shall be listed for in duct use in air velocities between 0 and 4000 FPM in addition to open area coverage.

b. Duct smoke detectors shall be wired to respective air handling unit for fan shut-down. Wiring shall be supervised and shall be installed per NFPA 101 Section 7-6.5.5.

6. Detectors shall be furnished and installed with integral, self restoring 135 degree heat detectors where shown on the drawings, type ID-60P.

7. The intelligent detectors shall be suitable for remote reset.

8. Duct smoke detectors, or any concealed detector, shall be provided with remote LED for finished ceiling mount.

2.6 HEAT DETECTORS, INTELLIGENT RATE COMPENSATED

A. Furnish and install where indicated in the drawings, Pyrotronics type ID-60T-135 heat detectors with features and characteristics as follows:

1. Detectors shall be of the intelligent, rate compensated type rated at 135 degrees. Detectors shall be constructed to compensate for the thermal inertia inherent in conventional type detectors due to the thermal mass, and alarm at the set point of 135 degrees Fahrenheit.

2. The detector shall be addressed, tested and programmed prior to installation using a UL listed programmer/tester.

3. The detector shall be suitable for two wire operation and two way communications on the intelligent analog signaling circuit.

4. Detectors shall incorporate triple technology microprocessor chips including analog, digital and EEROM technologies on the single device.

a. Address assignments shall be set electronically and devices requiring dip switches, rotary switches, staples or jumpers are not acceptable.

5. The detectors furnished shall have a listed spacing for coverage up to 2,500 square feet for use in environments as covered by Factory Mutual and UL (UQGS) and shall be installed according to the requirements of NFPA 72 for open area coverage.

2.7 FIRE DETECTOR BASES, UNIVERSAL

A. Detector bases shall be Pyrotronics type DB-3S, low profile twist lock type with screw clamp terminals and self wiping contacts. Bases shall be installed on an industry standard, 4" square or octagonal electrical outlet box.

1. Where selective localized control of electrical devices is required for system operation, furnish and install type DBI-60R detector base with software programmed addressable relay integral to the base. The relay shall switch electrical loads, as indicated on the drawings.

2. The detector bases shall be compatible with, and allow the installation of, detectors operating on the flame, ionization, photoelectric or rate compensated heat principles of detection.

2.8 MANUAL STATIONS, INTELLIGENT

A. Provide Cerberus Pyrotronics type MSI-10, single action intelligent manual stations where shown on the drawings, to be flush mounted at 44" to centerline.

1. Station shall be equipped with terminal strip and pressure style screw terminals for the connection of field wiring.

2. The manual stations shall be addressable and identifiable by the master fire alarm control panel.

a. Address assignments shall be set electronically and reside within the station in non volatile memory. Devices using rotary switches, pins, jumpers or staples are not acceptable.

3. Surface mounted stations where indicated on the drawings shall be mounted using a manufacturer's prescribed matching baked red enamel outlet box. Provide at each manual station a visual evacuation signal (shown or not shown on the drawings). Visual signal shall be as specified in paragraph 2.10 A4.

2.9 INTELLIGENT SYSTEM INTERFACE MODULE

A. Furnish and install, for the monitoring of contact type initiation devices and for the control of electrical devices where required, Cerberus Pyrotronics Type TRI-2 intelligent analog signaling circuit interface module. Modules shall be supplied to meet the project requirements as follows:

1. A single circuit intelligent signaling circuit interface module for monitoring alarm, trouble, supervisory security or status contact type devices, type TRI-2.

2. Unit as above with form C software programmable control contacts for the management of specified electrical loads as required by this specification, type TRI-2R.

3. Dual circuit units as described in paragraph A.01 above, type TRI-2D.

B. The module shall be addressed, tested and programmed prior to installation using a UL listed programmer/tester.

C. The module shall be suitable for two wire, two way communications on the intelligent analog signaling circuit.

D. Modules shall incorporate triple technology microprocessor chips including analog, digital and EEROM technologies on the single device.

1. Address assignments shall be set electronically and devices requiring dip switches, rotary switches, staples or jumpers are not acceptable.

2.10 EVACUATION SIGNALS

A. Furnish and install where shown on the drawings, audible/visual signals, Cerberus Pyrotronics type SPKM7025W with the following characteristics and capacities:

1. Field selectable power taps at 3db increments between .25 And 2 watts and driven at 25vrms.

2. Sound output rating of 90db at full power tap.

3. Pressure type screw terminals with capacity to use up to 12AWG wire for speaker connection.

4. Visual alarm signals shall be furnished with light intensity complying with the ADA act and the following requirements:

a. Xenon strobe with a minimum repetition rate of 1 HZ, not exceeding 3 HZ and a maximum duty cycle of 40% with a pulse duration of .2 seconds.

b. Unfiltered or clear filtered white light.

c. Visual signals shall be mounted at a height of 80 inches above the highest level of the finish floor or six inches below the ceiling, whichever is lower.

B. The evacuation signals shall be available in flush, semi-flush, or surface versions as required for signal locations shown on the contract documents. Signals shall be mounted using a listed outlet box, and as required, tile bridges. When used within the pool area the speakers and ADA visual signals shall be fabricated with materials suitable for use in a corrosive environment.

1. Signals shall be available in audible only, visual only and combination to satisfy all required project applications.

2.11 REMOTE GRAPHIC ANNUNCIATOR

A. Provide a remote Graphic Annunciator Panel which shall have a plan view of the typical floor shown in the proper perspective as shown on the drawings. Floor, device type and LED's shall be provided for each fire alarm and supervisory zone as listed in the specifications and as shown on the drawings. A lamp test push button shall be mounted on the face plate. Operation of the lamp test push button shall light all LED's and sound a Sonalert. A fire alarm control panel trouble actuated LED with Sonalert and a supervisory actuated LED with Sonalert, and, momentary key operated silencing switches shall be provided. Provide a "Power On" LED for the fire alarm control panel on the face of this annunciator panel. The face plate frame shall be welded for rigidity and shall be mounted flush to the wall. Provide stainless steel, satin finish panel.

B. Annunciator shall incorporate Pyrotronics model MOI-1 Output Interface and Pyrotronics model MOD-16 Output Drivers, as required.

C. Provide system display similar to 2.1, B, 12 and 2.1, B, 13 of this specification at the annunciator panel.

PART 3 - EXECUTION
3.1 DESIGN AND INSTALLATION

A. Provide design and installation drawings which show a general layout of the complete system including equipment arrangement. It shall be the responsibility of the fire alarm contractor to verify dimensions and assure compatibility all other systems interfacing with the fire alarm system.

1. Identify on the drawings, conduit and conductor sizes and types with number of conductors in each conduit. Provide each conduit and device with a unique identification. For addressable alarm initiation devices, the system identifier shall be the system address for that device. Signals shall be sequentially numbered as the address of the controlling module.

2. Indicate on the point to point wiring diagrams, interconnecting wiring within the panel between modules, and connecting wiring to the field device terminals.

3. Provide mounting details of FACP and other boxes to building structure, showing fastener type, sizes, material and embedded depth where applicable.

4. Provide smoke detector at room or space where fire alarm panel or cabinet is installed.

3.2 INSTALLATION

A. Perform work in accordance with the requirements of NEC, NFPA 70, NFPA 72, and NFPA 101.

B. Fasten equipment to structural members of building or metal supports attached to structure, or to concrete surfaces.

1. Use clamping devices for attaching to structural steel, or when clamping is impractical, obtain written authority to weld or to drill.

2. Fasten equipment to concrete or masonry with expansion anchors.

3. Fasten equipment to drywall by screws into studs, and to metal wall panels by weld studs, bolts or self taping metal screws.

4. Do not install conduit raceways and boxes in positions that interfere with the work of other trades.

5. Attach nameplates on panels or other components as specified.

6. Locations for all ceiling-mounted equipment shall be coordinated with lights, air outlets, and other ceiling fixtures, and shall be acceptable to the Architect.

C. Remote annunciator panel shall be installed in the Vestibule. See Fire Alarm System Floor Plan.

3.3 RACEWAYS

A. Use rigid steel or intermediate metal where subject to mechanical damage, installed in concrete floors or walls, installed exposed to the weather or installed 4 feet or less above the floor. Electrical metallic tubing may be used elsewhere.

B. Install #16 gauge galvanized pull wire or 1/8 inch polyethylene rope in conduit installed for future use, and seal the ends.

C. Install concealed conduits as directly as possible and with bend radii as long as possible. Install exposed conduit parallel with or at right angles to building lines. Where conditions permit, maintain continuous exposed horizontal runs along walls at minimum height of 9 feet above floor level or grade. All conduits shall be concealed unless otherwise required by field conditions and approved by the Architect.

D. Permanently label or mark at both ends with conduit number of each wire as shown on the drawings. Conduit and junction box labels shall be permanent and conform to the requirements of the National Electric Code, Art. 760.

E. Make elbows, offsets and bends uniform and symmetrical. Bend conduit with approved bending devices.

F. Cut conduit ends square, ream and remove burrs. Conduit shall be clean, dry, and free of debris. Immediately after installation, plug or cap exposed ends with standard accessories until wires are pulled.

G. Use galvanized steel lock nuts for attachments to enclosures except threaded hubs may be used where permitted by the NEC. Threadless fittings will not be permitted for rigid conduit. Use Erikson type couplings with running threads.

H. Use one hole clamps equipped with clamp backs to secure conduits.

I. Install without moisture traps wherever possible. Where practicable, provide drain holes in pull boxes or fittings at low points in systems and remove burrs from drilled holes.

J. Use flexible conduit to make connections to equipment subject to vibrations. Use liquid tight flexible metal conduit where conduit and fittings are installed outdoors or exposed to moisture or chemical fumes indoors. Flexible conduit may be used in lengths not exceeding four feet for other equipment, with the approval of the acceptance inspector.

K. Set up joints in conduit installed in concrete, underground, or exposed to weather, with high temperature, anti-seize, conductive thread lubricant and sealant.

L. Seal openings around conduit at exterior wall penetrations and penetrations of walls forming boundaries between adjoining smoke partitions or ventilation zones, using specified sealant. Make all seals waterproof and finish flush with surrounding wall surfaces.

M. Use hangars with 3/8 inch rods for 2 inch conduit or smaller. If conduit is suspended on rods more than 2 feet long, conduit shall be rigidly braced to prevent horizontal motion or swaying.

N. Apply sealing compound in conduit at box or enclosure nearest exterior wall penetration on both sides of wall.

O. Where routing is parallel with hot water or steam pipes, conduits shall not be installed within six inches of the pipe covering. When routing is not parallel with pipes, it is acceptable to install within six inches providing the conduit does not touch the pipes.

3.4 BOXES, ENCLOSURES AND WIRING DEVICES

A. Boxes shall be installed plumb and firmly in position.

1. Extension rings with blank covers shall be installed on junction boxes where required.
2. Junction boxes served by concealed conduit shall be flush mounted.
3. Upon initial installation, all wiring outlets, junction, pull and outlet boxes shall have dust

covers installed. Dust covers shall not be removed until wiring installation when permanent dust covers or devices are installed.
4. "Fire alarm system" decal shall be applied to all junction box covers.

3.5 CONDUCTORS

A. Each conductor shall be identified with wire markers at every splice and terminal point. Attach permanent wire markers within 2 inches of the wire termination. Marker legends shall be visible.
1. All wiring shall be supplied and installed in compliance with the requirements of the National Electric Code, NFPA 70, Article 760, and that of the manufacturer.
2. Wiring for strobe circuits shall be a minimum 16 AWG.
3. All splices shall be made using solderless connectors. All connectors shall be installed in conformance with the manufacturers recommendations.
4. Crimp-on type spade lugs shall be used for terminations of stranded conductors to binder screw or stud type terminals. Spade lugs shall have upset legs and insulation sleeves sized for the conductors.

B. Permanently label or mark each conductor at both ends with permanent alpha-numeric wire markers.

C. A consistent color code for fire alarm system conductors shall be maintained throughout the installation.

D. Wiring within sub panels shall be arranged and routed to allow accessibility to equipment for adjustment and maintenance.

3.6 DEVICES
A. Relays and other devices to be mounted in auxiliary panels are to be securely fastened to avoid false indications and failures due to shock or vibration.

B. Wiring within subpanels shall be arranged and routed to allow accessibility to equipment for adjustment and maintenance.

3.7 SPLICES AND CABLE TERMINATIONS

A. All splices shall be made using solderless connectors or compression type terminal strips. All connectors shall be installed in conformance with the manufacturers recommendations.

B. Crimp-on type spade lugs shall be used for terminations of stranded conductors to binder screw or stud type terminals. Spade lugs shall have upset legs and insulation sleeves sized for the conductors.

3.8 CERTIFICATE OF COMPLIANCE

A. Complete and submit to the Project Engineer in accordance with NFPA 72.

3.9 FIELD QUALITY CONTROL

A. Testing, general
1. All intelligent analog devices shall be tested for correct address and sensitivity using test equipment specifically designed for that purpose. These devices and their bases shall be tagged with adhesive tags located in an area not visible when installed, showing the system address, initials of the installing technician and date.
2. Wiring runs shall be tested for continuity, short circuits and grounds before system is energized. Resistance, current and voltage readings shall be made as work progresses.
a. A systematic record shall be maintained of all readings using schedules or charts of tests and measurements. Areas shall be provided on the logging form for readings, dates and witnesses.

b. The acceptance inspector shall be notified before the start of the required tests. All items found at variance with the drawings or this specification during testing or inspection by the acceptance inspector, shall be corrected.
c. Test reports shall be delivered to the acceptance inspector as completed.
3. All test equipment, instruments, tools and labor required to conduct the system tests shall be made available by the installing contractor. The following equipment shall be a minimum for conducting the tests:
a. Ladders and scaffolds as required to access all installed equipment.
b. Multimeter for reading voltage. current and resistance.
c. Intelligent device programmer/tester.
d. Laptop computer with programming software for any required program revisions.
e. Two way radios, flashlights, smoke generation devices and supplies.
f. Spare printer paper.
g. A manufacturer recommended device for measuring air flow through air duct smoke detector sampling assemblies.
h. Decibel meter.
4. In addition to the testing specified to be performed by the installing contractor, the installation shall be subject to test by the acceptance inspector.
5. System wiring: fire alarm circuits shall be tested for continuity, grounds, and short circuits.

B. Acceptance testing
1. A written acceptance test procedure (ATP)for testing the fire alarm system components and installation will be *prepared and performed in accordance with NFPA 72, and this specification. The contractor shall be responsible for the performance of the ATP, demonstrating the function of the system and verifying the correct operation of all system components, circuits, and programming.
2. A program matrix shall be prepared by the installing contractor referencing each alarm input to every output function affected as a result of an alarm condition on that input. In the case of outputs programmed using more complex logic functions involving "any", "or", "not", "count", "time", and "timer" statements; the complete output equation shall be referenced in the matrix.
3. A complete listing of all device labels for alpha-numeric annunciator displays and logging printers shall be prepared by the installing contractor prior to the ATP.
4. The acceptance inspector shall use the system record drawings in combination with the documents specified under paragraph 3.01 During the testing procedure to verify operation as programmed. In conducting the ATP, the acceptance inspector shall request demonstration of any or all input and output functions. The items tested shall include but not be limited to the following:
a. System wiring shall be tested to demonstrate correct system response and correct subsequent system operation in the event of:
(1) Open, shorted and grounded intelligent analog signaling circuit.
(2) Open, shorted and grounded network signaling circuit.
(3) Open, shorted and grounded conventional zone circuits.
(4) Open, shorted and grounded speaker, telephone circuits.
(5) Intelligent device removal.
(6) Primary power or battery disconnected.
(7) Incorrect device at address.
(8) Printer trouble, off line or out of paper.
b. System evacuation alarm indicating appliances shall be demonstrated as follows:
(1) All alarm notification appliances actuate as programmed
(2) Audibility and visibility at required levels.
c. System indications shall be demonstrated as follows:
(1) Correct message display for each alarm input at the control panel, each remote alpha-numeric display and each CRT terminal.
(2) Correct annunciator light for each alarm input at each annunciator and color graphic terminal as shown on the drawings.

(3) Correct printer logging for all system activity.
d. System off-site reporting functions shall be demonstrated as follows:
(1) Correct zone transmitted for each alarm input.
(2) Trouble signals received.
e. Secondary power capabilities shall be demonstrated as follows:
(1) System primary power shall be disconnected for a period of time as specified herein. At the end of that period, an alarm condition shall be created and the system shall perform as specified for a period as specified.
(2) System primary power shall be restored for forty eight hours and system charging current shall be normal trickle charge for a fully charged battery bank.
(3) System battery voltages and charging currents shall be checked at the fire alarm control panel using the test codes and displayed on the LCD display.

3.10 SERVICES

A. The contractor shall warrant the entire system against mechanical and electrical defects for a period described in the contract general conditions. This period shall begin upon completed certification and test of the system or upon first beneficial use of the system, whichever is earlier.

B. The fire alarm system subcontractor or manufacturer shall offer for the owners consideration at the time of system submittal a priced inspection, maintenance, testing and repair contract in full compliance with the requirements of NFPA 72.
1. The services offered under this contract shall be performed at no charge during the first year after system acceptance and the owner shall have the option of renewing for single or multiple years up to five years at the price quoted upon completion of the warranty period.
2. The contractor performing the contract services shall be qualified and listed to maintain ongoing certification of the completed system to the UL for specific installed system listing.

C. The installation contractor shall furnish training as follows for a minimum of two employees of the system user:
1. Training in the receipt, handling and acknowledgment of alarms.
2. Training in the system operation including manual control of output functions from the system control panel.
3. Training in the testing of the system including logging of detector sensitivity, field test of devices and response to common troubles.
4. The total training requirement shall be a maximum of 8 hours, conducted on two successive days, but shall be sufficient to cover all items specified.

"END OF SECTION"

SECTION 16143
WIRING DEVICES

PART 1 - GENERAL
1.1 GENERAL PROVISIONS

A. The drawings and the general provisions of the contract, including the General Conditions, Supplementary General Conditions, and General Requirements, apply to the work of this section.

1.2 SUMMARY

A. Provide all labor, materials, equipment, and services necessary for and reasonable incidental to the furnishing and installation of the work and the equipment of this section.

1.3 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specifications sections, apply to work of this section.

B. This section is a Division-16 Basic Materials and Methods section and is part of each Division-16 section making reference to wiring devices specified herein.

1.4 DESCRIPTION OF WORK

A. Types of electrical wiring devices in this section include the following:
Receptacles.
Switches.
Wallplates.

1.5 QUALITY ASSURANCE

A. NEC Compliance: Comply with NEC as applicable to construction and installation of electrical wiring devices.

B. UL Compliance and Labeling: Provide electrical wiring devices which have been UL-listed and labeled.

C. NEMA Compliance: Comply with NEMA standards for general and specific purpose wiring devices.

1.6 SUBMITTALS

A. Product Data: Submit manufacturer's data on electrical wiring devices.

PART 2 - PRODUCTS
2.1 ACCEPTABLE MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturer's offering products which may be incorporated in the work include, but not limited to the following:
Arrow-Hart Div., Crouse-Hinds Co.
Leviton Mfg. Co.
Hubbell, Inc.
or any other manufacturers items which are approved as equivalent by the Engineer.

B. All wiring devices shall be the product of the same manufacturer unless specifically noted otherwise.

2.2 FABRICATED WIRING DEVICES

A. General: Provide factory-fabricated wiring devices, in types, colors, and electrical ratings for applications indicated and complying with NEMA standards Pub. No. WD 1. Where types and grades are not indicated, provide proper selection as determined by Installer to fulfill wiring requirements and complying with NEC and NEMA standards for wiring devices. Provide ivory color devices and stainless steel appliances. Final color to be determined by the owner and architect

B. Receptacles
Heavy-Duty Duplex: Provide duplex, heavy-duty type specification grade receptacles, 2 Pole, 3 wire grounding with green hexagonal equipment ground screw, ground terminals and poles internally connected to mounting yoke, 20 amperes, 125 volts, with metal plaster ears, side wiring, NEMA configuration 5-20R unless otherwise indicated on the drawing.
Ground fault type receptacles shall be provided where shown on the drawings and shall be the same as herein before specified except they shall be circuit interrupter type.
Single Receptacles: Provide heavy-duty type specification grade single receptacles where shown on the drawings, and of the NEMA configuration designated on the drawing.

C. Switches
Snap: Provide heavy-duty specification grade flush single pole, toggle switches, 20 ampere, 120/277 volts AC, with mounting yoke insulated from mechanism, equip with plaster ears, switch handle, and side wired screw terminals.
Duplex Snap: Provide heavy-duty specification grade duplex flush, 3-way AC quiet switches, 20 a mperes, 120/277 volts, with mounting yoke insulated from mechanism,, equip with plaster ears, sw itch handles and side wired screw terminals.
Horsepower Rated: Where a switch is serving motor load, the switch shall be rated for use with motor.
All devices shall be ivory in color.

D. Wiring Device Accessories
Device plates shall be provided for all outlets where devices are installed. Where gang combinations are required, the combinations shall be provided as a single plate. Construct with metal screws for securing plates to devices; screw heads colored to match finish of plates. Provide wall plates possessing the following additional construction features. Final plate types an styles to be determined by the owner and architect.
Material and Finish:
(1) 0.04 thick, type 302, satin finished stainless steel.
Where receptacles are called for to be weatherproof, they shall be provided with cast non-corrosive metal plates with hinged covers; and gasket covers shall have provisions for locking.
Where switches are called for to be weatherproof, they shall be equal to AH & H #2890 series switch with AH & H 32881-G plate or AH & H #2882-G plate with red pilot light.

PART 3 - EXECUTION
3.1 INSTALLATION OF WIRING DEVICES

A. Install wiring devices as indicated in compliance with manufacturer's written instructions, applicable requirements of NEC and NECA's "Standard of Installation", and in accordance with recognized industry practices to fulfill project requirements.

B. Coordinate with other work, including painting, electrical box and wiring work, a necessary to interface installation of wiring devices with other work.

C. Install wiring devices in electrical boxes which are free from excess building materials, dirt, and debris.

D. Install galvanized steel, steel wallplates in unfinished spaces.

E. Delay installation of wiring devices until work is completed.

F. Delay installation of wallplates until after painting work is completed. Any device or wallplate painted over or splashed with paint shall be replaced at the Contractor's expense.

G. Where switches are installed out of sight of the item controlled, they shall be provided with device plates with engraved designations indicating the item controlled.

H. All electrical outlets shall be located on clear wall spaces, clear of all shelving, chalkboards, tackboards, cabinet work, etc. Contractor shall check all door swings and he shall be responsible for installing all room light switches associated with doors on the strike side of all doors regardless of the indication on the electrical drawings. Outlets not complying with the above shall be relocated at the Contractor's expense.

I. All receptacles shall be installed with "U" shaped grounding connection at the bottom.

J. All devices installed in location where exposed to the elements shall be weatherproof. (Shown or not shown on the drawings.)

3.2 PROTECTION OF WALLPLATES AND RECEPTACLES

A. Upon installation of wallplates and receptacles, advise Contractor regarding proper and cautious use of convenience outlets. At time of substantial completion, replace those items which have been damaged, including those painted over, burned or scorched by faulty plugs.

3.3 GROUNDING

A. Provide electrically continuous, tight grounding connections for wiring, devices, unless otherwise indicated.

3.4 TESTING

A. Prior to energizing circuitry, test wiring devices for electrical continuity and proper polarity connections. After energizing circuitry, test wiring devices to demonstrate with requirements.

"END OF SECTION"

SECTION 16142
ELECTRICAL CONNECTIONS FOR EQUIPMENT

PART 1 - GENERAL
1.1 RELATED DOCUMENTS

A Drawings and general provisions of Contract, including General and Supplementary Conditions apply to work of this section.

B. This section is Division-16 Basic Electric Materials and Methods section, and is part of each Division 15-and-16 section making reference to electrical connections for equipment specified herein.

1.2 DESCRIPTION OF WORK

A. Extent of electrical connections for equipment is indicated by drawings and schedules. Electrical connections are hereby defined to include connections used for providing electrical power to equipment.

1.3 Application of electrical power connections specified in this section include but are limited to the following:

A. This Contractor shall extend wire to all equipment requiring electrical connections and make final and complete connections to same.

B. Provide a complete branch circuit and control wiring system between panels and various equipment. Phase loading shall be suitably balanced on all panels.

C. All motors will be provided and set in place under other sections of the Specifications but connected under this section.

D. Provide disconnect switches at all motors or loads where required by National Electrical Code, shown or not shown on the drawings.

E. The furnishing and setting of certain equipment, including food service, plumbing, heating, ventilating, and air conditioning equipment, is to be done under other sections of the Specifications. However, this contractor shall wire and connect to all equipment requiring electric power, except where otherwise specifically excluded.

F. Grounds including earthing connections.

G. Shown or not shown, this Contractor shall coordinate with the Control Contractor and shall provide a dedicated 20 amp, 120 volt circuit from the nearest panelboard for control and interlock wiring at each mechanical equipment room or specific location as directed by the Control Contractor.

H. All 120 Volt power for smoke dampers, combination smoke/fire dampers. Provide all indication/ annunciation requirements for connecting the above dampers and associated duct smoke detectors at the existing fire alarm control and annunciator panel.

I. Power for HVAC control.

1.4 Electrical connections for equipment, not furnished as integral part of equipment, are specified in Division-15, and other Division-16 sections and are work of this section.

1.5 Motor starters and controllers, not furnished as integral part of equipment, are specified in applicable

Division-15 sections, and are not work of this section.

1.6 Refer to Division-15 sections for, motor starters and controllers furnished integrally with equipment, not work of this section.

1.7 Junction boxes and disconnect switches, required for connecting motors and other electrical units of equipment, are specified in applicable food service and Division-16 sections and are work of this section.

1.8 Raceways and wires/cable, required for connecting motors and other electrical units of equipment, are specified in applicable Division-16 section and are work of this section.

1.9 Refer to Division-15 sections for control system wiring; not work of this section.

1.10 QUALITY ASSURANCE

A. Manufacturers: Firms regularly engaged in manufacturer of electrical connectors and terminals of types and ratings required.

B. Comply with applicable practices, standards, and requirements as to products used, installation connections for equipment: NEC, ANSI, ETS, IEEE, UL, ANSI/EIA

PART 2 - PRODUCTS
2.1 ACCEPTABLE MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products of one of the following (for each type of product):
Appleton Electric Co.
Arrow-Hart Div., Crouse-Hinds Co.
Burndy Corporation.
Ideal Industries, Inc.
Thomas and Betts Corp.
or any other manufacturers items which are approved as equivalent by the Engineer.

2.2 MATERIALS AND COMPONENTS

A. General: For each electrical connection indicated, provide complete assembly of materials, including but not necessarily limited to, pressure connectors, terminals (lugs), electrical insulating tape, electrical soldering flux, heat-shrinkable insulating tubing, cable ties, solderless wire-nuts, and other items and accessories as needed to complete splices and terminations of types indicated.

2.3 METAL CONDUIT, TUBING, AND FITTINGS

A. General: Provide metal conduit, tubing and fittings of types, grades, sizes and weights (wall thickness) indicated for each type service. Where types and grades are not indicated, provide proper selection as determined by installer to fulfill wiring requirements and comply with NEC requirements for raceways. Provide products complying with Division-16 basic electrical materials and methods section "raceways", and in accordance with the following listing of metal conduit, tubing, and fittings.
Rigid steel conduit.
Rigid metal conduit fittings.
EMT fittings.
Flexible metal conduit.
Flexible metal conduit fittings.
Liquid-tight, flexible metal conduit.
Liquid-tight flexible metal conduit fittings.

2.4 WIRE, CABLES AND CONNECTORS

A. General: Provide wires, cables, and connectors complying with Division-16 basic electrical materials and methods section "Wires and Cables".

B. Wires/Cables: Unless otherwise indicated, provide wire/cables (conductors) for electrical connections which match, including sizes and ratings, of wires/cables which are supplying electrical power. Provide copper conductors with conductivity of not less than 98% at 20 degrees C (68 degrees F).

C. Connectors and Terminals: Provide electrical connectors and terminals which mate and match, including sizes and ratings, with equipment terminals and are recommended by equipment manufacturer for intended application.

PART 3 - EXECUTION
3.1 INSPECTION

A. Inspect area and conditions under which electrical connections for equipment are to be installed and notify Mechanical Contractor in writing of conditions detrimental to proper completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to Installer.

3.2 INSTALLATION OF ELECTRICAL CONNECTIONS

A. Install electrical connections, as indicated, in accordance with equipment manufacturer's written instructions and with recognized industry practices and complying with applicable requirements of UL, NEC, and NECA's "Standard of Installation" to ensure that products fulfill requirements.

B. Coordinate with other work, including wires/cables, raceway, and equipment installation, as necessary to properly interface installation of electrical connections of equipment with other work.

C. Connect electrical power supply conductors to comply with equipment, manufacturer's written instructions, and wiring diagrams. Mate and match conductors of electrical connections for proper interface between electrical power supplies and installed equipment.

D. Cover splices with electrical insulating material equivalent to, or of greater insulation resistivity rating, than the electrical insulation rating of those conductors being spliced.

E. Prepare cables and wires, by cutting and stripping covering armor, jacket, and insulation properly to ensure uniform and neat appearance where cables and wires are terminated. Exercise care to avoid "ringing" copper conductors while skinning wire.

F. Trim cables and wires as short as practicable and arrange routing to facilitate inspection, testing, and maintenance.

G. Tighten connectors and terminals, including screws and bolts in accordance with equipment manufacturers published torque tightening values for equipment connectors. Accomplish tightening by utilizing proper torquing tools, including torque screwdriver bean-type torque wrench, and ratchet wrench with adjustable torque settings. Where manufacturer's torquing requirements are not available, tighten connectors and terminals to comply with torquing values contained in UL's 486A.

H. Provide PVC-coated, coated conduit and fittings as indicated for highly-corrosive atmosphere.

I. Provide flexible conduit for motor connections, and other electrical equipment connections, where

subject to movement and vibration.

J. Provide liquid-tight flexible conduit for connection of motors and other electrical equipment where subject to movement and vibration, and also where connections are subjected to one or more of the following conditions:
Exterior location.
Moist or humid atmosphere where condensate can be expected to accumulate.
Corrosive atmosphere.
Water spray.
Dripping oil, grease, or water.

3.3 FIELD QUALITY CONTROL

A. Upon completion of installation of electrical connections, and after circuitry has been energized with rated power source, test connections to demonstrate capability and compliance with requirements. Ensure that direction of rotation of each motor fulfills requirement. Correct malfunctioning units at site, then retest to demonstrate compliance.

"END OF SECTION"

SECTION 16135
ELECTRICAL BOXES AND FITTINGS

PART 1 - GENERAL
1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and supplementary Conditions apply to work of this section.

B. This section is a Division-16 Basic Materials and Methods section, and is part of each Division-16 section making reference to electrical wiring boxes and fittings specified herein.

1.2 DESCRIPTION OF WORK

A. Extent of electrical box and electrical fitting work is indicated on drawings.

B. All boxes and fittings shall be code-gauge steel, plastic not permitted.

C. Types of electrical boxes and fittings in this section include the following:
Outlet boxes.
Junction boxes.
Pull boxes.
Conduit bodies.
Bushings.
Locknuts.
Knockout closures.

1.3 QUALITY ASSURANCE

A. NEC Compliance: Comply with NEC as applicable to construction and installation of electrical wiring boxes and fittings.

B. UL Compliance: Provide electrical boxes and fittings which have been UL-listed and labeled.

C. ANSI/NEMA Standards Compliance: Comply with ANSI C 134.1 (NEMA Standards Pub. No. OS 1) as applicable to sheet-steel outlet boxes, device boxes, covers, and box supports.

PART 2 PRODUCTS
2.1 FABRICATED MATERIALS

A. Interior Outlet Box Accessories: Provide junction box and pullboxes as required for each installation, including mounting brackets.

B. Available Manufacturers: Subject to compliance with requirements, manufacturers offering interior outlet boxes which may be incorporated in the work include, but are not limited to the following:
Appleton Electric Co.
RACO, Inc.
Steel City/Midland-Ross Corp.
or any other manufacturers items which are approved as equivalent by the Engineer.

C. Weatherproof Outlet Boxes: Provide corrosion-resistant cast-metal weatherproof outlet wiring boxes, of types, shapes and sizes, including depth of boxes, with threaded conduit ends, cast-metal face plates with spring-hinged waterproof caps suitable configured for each application, including face plate gaskets and corrosion-resistant fasteners.

D. Available Manufacturers: Subject to compliance with requirements, manufacturers offering weatherproof outlet boxes which may be incorporated in the work include, but are not limited to the following:
Arrow-Hart Div., Crouse-Hinds Co.
Eagle Electric Mfg. Co., Inc.
O-Z/Gedney Co.

E. Junction and Pull Boxes: Provide galvanized code-gage sheet steel junction and pull boxes, with screw-on covers; of types and shapes and sizes, to suit each respective location and installation; with welded seams and equipped with stainless steel nuts, bolts, screws, and washers.

F. Available Manufacturers: Subject to Compliance with requirements, manufacturers offering junction and pull boxes which may be incorporated in the work include, but are not limited to the following:
Appleton Electric Co.
Arrow-Hart Div., Crouse-Hinds Co.
O-Z/Gedney Co.

G. Conduit Bodies: Provide Galvanized cast-metal conduit bodies, of types, shapes and sizes to suit respective locations and installation, construct with threaded-conduit-entrance ends, removable covers, and corrosion-resistant screws.

H. Available Manufacturers: Subject to compliance with requirements, manufacturers offering conduit bodies which may be incorporated in the work include, but are not limited to the following:
Appleton Electric Co.
Killark Electric Mfg. Co.
O-Z/Gedney Co.

I. Bushings, Knockout Closures and Locknuts: Provide corrosion-resistant punched-steel box knockout closures, conduit locknuts, and malleable iron conduit bushings, offset connectors, or types and sized to suit respective uses and installation.

J. Available Manufacturers: Subject to compliance with requirements, manufacturers offering bushings, knockout closures, locknuts, and connectors which may be incorporated in the work include, but are not limited to the following:
Burndy Corp.
O-Z/Gedney Co.
Thomas and Betts Co., Inc.

PART 3 EXECUTION
3.1 INSTALLATION OF ELECTRICAL BOXES AND FITTINGS

A. General: Install electrical boxes and fittings where indicated complying with manufacturer's written instructions, applicable requirements of NEC and NECA's "Standard of Installation," and in compliance with recognized industry practices to ensure that products fulfill requirements.

B. Coordinate installation of electrical boxes and fittings with wire/cable and raceway installation work.

C. Provide weatherproof pullboxes for interior and exterior locations exposed to weather or moisture, shown or not shown, on the drawings.

D. Provide knockout closures to cap unused knockout holes where blanks have been removed.

E. Install boxes and conduit bodies in those locations to ensure ready accessibility of electrical wiring.

F. Avoid using round boxes where conduit must enter box through side of box, which would result in difficult and insecure connections when fastened with locknut or bushing on rounded surface.

G. Fasten boxes rigidly to substrates or structural surfaces to which attached, or solidly embedded electrical boxes in concrete or masonry.

H. All junction box on exposed conduit work shall be cast ferrous alloy conduit fittings of proper type.

I. All outlet boxes shall be galvanized, except those installed outside or in damp locations, where they shall be fabricated from non-corrosive metal.

J. Boxes in concrete slabs shall generally be 4" octagonal, 2 1/8" deep with concrete rings and plates, depth as required.

K. Boxes in ceiling construction shall generally be 4 inches square, 2 1/8" deep or 4 inches octagonal, 2 1/8" deep.

L. Wherever required to facilitate the pulling of wire, junction or pull boxes shall be installed. Where pull box or junction box is required in finished area, the exact location shall be as determined by the Engineer.Regardless of system application, all junction and/or pull boxes minimum size shall be in accordance with the National Electric Code, unless otherwise noted.

M. All pull boxes shall be fabricated from No. 12 or heavier gauge galvanized steel as required by the National Electric Code and shall be equipped with screw fastened covers.

N. All conduit runs, 150 feet or longer, having the equivalent of more than two 90 degree bends shall have installed a pull box or standard outlet box for pulling purposes in the conduit run.

O. All junction boxes must have covers and be accessible after completion of the project. Where several feeders pass through a common pullbox or junction box, the feeders shall be tagged to indicate clearly their electrical characteristics circuit number and panel designation. Paint (stencil) same information on the cover of the box.

"END OF SECTION"

SECTION 16120
WIRES AND CABLES

PART 1 GENERAL
1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions, apply to work of this section.

1.2 DESCRIPTION OF WORK

A. Types of wire, cable and connectors in this section include the following:
Type THW/THWN/THHN, 75 degrees rated 600 volt minimum.
Tap type connectors.
Split-bolt connectors.

B. Applications for wire, cable, and connectors required for project are as follows:
Power distribution circuitry.
Appliance and equipment circuitry.
Motor-branch circuitry.
Fire alarm circuitry for Installation of smoke duct detectors.
Grounding system.

1.3 QUALITY ASSURANCE

A. NEC Compliance: Comply with NEC as applicable to construction and installation of electrical wire, cable and connectors.

B. UL Compliance: Comply with UL standards pertaining to wire cable and connectors.

C. UL Labels: Provide electrical wires, cables, and connectors which have been UL-listed and labeled.

D. NEMA/ICEA Compliance: Comply with applicable portions of NEMA/Insulated Cable Engineers Association standards pertaining to materials, construction, and testing of wire and cable.

E. ANSI/ASTM: Comply with applicable portions of IEEE standards pertaining to wire and cable.

PART 2 - PRODUCTS
2.1 ACCEPTABLE MANUFACTURERS

A. Available Manufacturers: Submit to compliance with requirements, manufacturers offering products which may be incorporated in the work include:
Wire and Cable:
General Cable Corp.
Southwire Company.
Triangle PWC, Inc.
Connectors:
Burndy Corp.
Ideal Industries, Inc.
Thomas and Betts Co.
or any other manufacturers equipment which are approved as equivalent by the Engineer.

2.2 WIRE, CABLE AND CONNECTORS

A. General: Except as otherwise indicated, provide wire, cable, and connectors of manufacturer's standard materials, as indicated by published product information; designed and construed as recommended by manufacturer, and as required for the installation.

B. Wire: Provide factory-fabricated wire of sizes, ratings, materials, and types indicated for each service. Where not indicated, provide proper selection as determined by installer to comply with project's installation requirements and NEC standards. Select from the following types, materials, conductor configuration, insulation, and covering:
UL Type: THW
UL Type: THHN
UL Type: THWN
Temperature Rating: 75 degrees C
Material: Copper
Conductors: Solid (AWG 20 to AWG 8 only)
Conductors: Concentric-lay-stranded (standard flexibility)

C. Conductors: Shall be color coded, full-length with a separate color for each phase, neutral and ground used consistently throughout. Conductors sizes No. 8AWG or larger may be taped with the appropriate color at each termination point and any accessible location. All wires shall have contrasting color identifying markings denoting conductors size, type of insulation, and manufacturer's trade name. Colors to be used in coding shall be in accordance with NEC requirements.
No wiring shall be smaller than #12 AWG except fire alarm wiring for smoke duct detectors may be #14 AWG unless otherwise required.

D. Cables: Provide factory-fabricated cable of sizes, ratings, materials, and jacketing/sheathing as indicated for each type of service. Where not indicated, provide proper selection as determined by installer to comply with installation requirements and NEC standards. Select from the following types:

E. Provide an insulated green ground wire with the branch circuit or feeder wiring for all 3 phase and single phase branch circuits and for all feeders shown or not shown.

2.3 CONNECTORS

A. General: Provide factory-fabricated, metal connectors of sizes, ratings, materials, types, and classes as indicated for each service. Where not indicated, provide proper selection as determined by installer to comply with installation requirements and NEC standards. Select from the following types, classes, kinds, and styles:
Type: Pressure
Type: Crimp
Class: Insulated
Kind: Copper (for Cu to Cu connection)
Style: "T" Connection
Style: Split-bolt parallel connection
Style: Tap connection
Style: Pigtail connection

PART 3 - EXECUTION
3.1 INSTALLATION

A. General: Install electrical cables, wires, and connectors as indicated in compliance with manufacturer's written instructions, applicable requirements of NEC and NECA's "Standard of Installation", and in accordance with recognized industry practices.

B. Coordinate cable and wire installation work with electrical raceway and equipment installation work, as necessary for proper interface.

C. Conductors installed in runs within 6 inches of heating pipes or equipment shall be type AVA. No conductors shall be drawn into conduit until all work, which may cause cable damage, is completed.

"END OF SECTION"

SECTION 16110
RACEWAYS

PART 1 GENERAL
1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions apply to work of this section.

B. This section is a Division-16 Basic Materials and Methods section, and is part of each Division-16 section making reference to electrical raceways specified herein.

1.2 DESCRIPTION OF WORK

A. Extent of raceways is indicated by drawings and schedules.

B. Types of raceways in this section include the following:
Electrical metallic tubing.
Flexible metal conduit.
Liquid-tight, flexible metal conduit.
Rigid metal conduit.
Rigid non-metal conduit.

1.3 QUALITY ASSURANCE

A. NEMA Compliance: Comply with applicable requirements of NEMA standards pertaining to raceways.

B. UL Compliance and Labeling: Comply with provisions of UL safety standards pertaining to electrical raceway systems; and provide UL-listed and labeled.

C. UL Compliance: Comply with requirements as applicable to construction and installation of raceway systems.

PART 2 - PRODUCTS
2.1 METAL CONDUIT AND TUBING

A. General: Provide metal conduit, tubing and fittings of types, grades, and sizes for each service indicated.

B. EMT: WWC-563 (latest revision) and A.N.S.I. specification C80.3. Installation shall be in accordance with N.E.C. Article 348, and U.L.

C. IMC: WWC-582 (latest revision) and U.L. #1242. Installation shall be in accordance with N.E.C. Article 345, and U.L

D. RIGID: WWC-581 (latest revision) and A.N.S.I. specification C80.1. Installation shall be in accordance with N.E.C. Article 346 and U.L.

E. EMT Fittings: All steel, zinc plated, set screw insulated throat type.

F. IMC/Rigid Fittings: Threaded

G. Flexible Metal Conduit: FS WW-C-566 of the following type
Type 2: Zinc-coated steel.

Flexible Metal Conduit Fittings: FS W-F-406, Type 1, Class 1 and Style A.

H. Liquid-tight Flexible Metal Conduit: Provide liquid-tight flexible metal conduit; constructed of single strip, flexible, continuous, interlocked, and double-wrapped steel, galvanized inside and outside; coat with liquid-tight jacket of flexible polyvinyl chloride (PVC).

I. Liquid-tight Flexible Metal Conduit Fittings:
W-F-406, Type 1, Class 3, Style G.

J. Set screw coupling will not be permitted. All coupling shall be compression type.

K. Aluminum conduits or fittings will not be allowed.

2.2 NON-METAL CONDUIT AND TUBING

A. General: Provide conduit and fittings of types, grades, and sizes for each service indicated.

B. Non-metal, PVC, Schedule 40: Install where conduits are buried underground or encased in concrete.

PART 3 - EXECUTION
3.1 INSTALLATION OF ELECTRICAL RACEWAYS

A. Install electrical raceways where indicated; in accordance with manufacturer's written instructions, applicable requirements of NEC and complying with recognized industry practices.

B. Coordinate with other work including metal and concrete deck work, as necessary to interface installation of electrical raceways and components with other work.

C. Level and square raceway runs, and install at proper elevations/heights.

D. Complete installation of electrical raceways before starting installation of cables/wires within raceways.

E. Install flexible conduit for motor connections, and for other electrical equipment connections, where subject to movement and vibration.

F. Install liquid-tight flexible conduit for connection of motors and for other electrical equipment where subject to movement and vibration, and also where subject to one or more of the following conditions:
Exterior location.
Moist or humid atmosphere where condensate can be expected to accumulate.
Corrosive atmosphere.
Subject to dripping oil, grease or water.

G. Where possible, install horizontal raceway runs above water piping.

H. Install rigid steel, threaded, thick wall conduit, galvanized or sheradized, or EMT for all panel feeders, and all exposed wiring in unfinished areas.

I. All wiring raceways in or passing through concrete walls or floor slabs shall be rigid steel threaded conduit, galvanized or sheradized, IMC or EMT.

J. All wiring conductors in or passing through fire walls , fire partitions, or slabs shall be run in rigid steel or EMT conduit and shall be sealed in accordance with N.E.C. Article 300-21.

K. Raceway and wiring run in hung ceiling space(s) where space is used as an air plenum shall conform to the Local Jurisdiction Code Authorities interpretation of N.E.C. Article 300-22. It shall be the Contractor's responsibility to clarify and conform to this interpretation.

L. All raceways must be installed in voids of masonry block partitions, voids of structural system or furring. Do not cut block or structural system.

M. Conduit sizes for branch circuits shall be as required by the Code. Conduit sizes for feeders shall be as noted on the drawings. All empty conduits shall have bushings (each end) and one No. 14 drag wire installed in them.

N. Where branch circuit wiring is shown in unfinished room s or spaces, all exposed wiring shall be installed in EMT in a neat and workmanlike manner with turns being made by use of approved condulet or tappet fittings. Conduit shall be run as close to ceiling as possible.

O. Flexible conduit shall be galvanized and shall not be used in sizes smaller than 1/2 inch.

P. All open ends of conduits must be kept sealed by screwed-on caps until ready for pulling wires.

Q. Metal conduit laid underground, exterior to building slabs shall be encased in 3 inch concrete envelope, unless indicated otherwise on the drawings.

R. All conduits concealed in ceiling space shall be rigidly and securely fastened to the ceiling or roof construction with galvanized No. 16 gauge wire. Conduits shall not be supported (hung) from any other trades work.

S. All grounding conductors shall be run in conduit, and conductor shall be bonded (each end) to conduit.

T. All conduit must be thoroughly grounded as required by the National or Local code. Conduits entering outlet boxes, panel cabinets, etc., must be fitted with a double locknut and bushing.

3.2 ADJUSTING AND CLEANING

A. Upon completion of installation of raceways, inspect interiors of raceways; remove burrs, dirt and construction debris.

"END OF SECTION"

SECTION 16050
BASIC MATERIALS AND METHODS

PART 1 - GENERAL
1.1 DESCRIPTION

A. Furnish, install, adjust, and test all electrical wiring systems, equipment and accessories in accordance with the drawings and specifications.

B. The drawings are diagrammatic unless indicated otherwise.

C. Capacities, ratings and arrangement for specified items are shown on the drawings.

D. Final connections to equipment shown on electrical drawings shall be made under this division unless otherwise indicated. Drawings indicate equipment that is to be connected and branch circuit requirements for same. The contractor shall check manufacturers mechanical equipment drawings for exact location of connection, number of connections required for equipment and any equipment needed for proper operation. The contractor shall furnish all items needed for proper operation of equipment that is not furnished with equipment.

E. Mechanical Section 15010, General conditions, shall be considered a part of Division 16 as well.

F. Refer to Section 15170 of Division 15 for Electrical Requirements for Mechanical Work.

1.2 APPLICABLE STANDARDS AND PUBLICATIONS

A. Standards and publications of the organizations listed below but referred to in the various sections by basic designation only, form a part of this specification to the extent indicated by the reference thereto:
1. American Society for Testing and Materials (ASTM).
2. National Fire Protection Association (NFPA).
3. American National Standards Institute (ANSI).
4. Institute of Electrical and Electronic Engineers (IEEE).
6. Insulated Cable Engineers Association (ICEA).
7. National Electrical Manufacturers Association (NEMA).
8. National Electrical Contractors' Association (NECA).
9. Underwriters Laboratories, Inc. (UL).

B. References shall mean to the latest edition of that standard.

1.3 CODES

A. Minimum requirements of the following codes shall be standard except where the drawings and specifications dictate a more stringent requirement. Where conflicts exist between these codes, the most stringent requirements shall apply.
1. The National Electrical Code (NEC), latest edition, as amended or supplemented by the authority having local jurisdiction over this project.
2. Occupational Safety and Health Administration (OSHA), as contained in the Code of Federal Regulations, Title 29, Part 1916, Subpart 9.
3. The Americans with Disabilities Act (A.D.A.) Public Law 101-366.

1.4 SUBMITTALS

A. The Contractor shall make submittals for all electrical items and equipment shown on the drawings or hereinafter specified in accordance with Section 16010, Section titled "Shop

Drawings, Product Data and Samples".

B. Proposed substitutions shall be made in with the approval by the Owner. In addition, complete shop drawings of equipment specified as well as shop drawings for proposed substitutions.

C. Submittals required by this section shall be made at one time. Partial submittals will not be accepted.

D. Material or equipment that has not been reviewed for acceptance prior to delivery to the site shall not be permitted for installation or storage at the site.

E. Submittals shall indicate compliance with specific standards required in each section.

PART 2 - PRODUCTS
2.1 MATERIAL AND EQUIPMENT

A. Material and equipment shall be listed, labeled or certified by UL, where such standards have been established. Equipment and material not covered by any UL Standard will be accepted provided equipment or material is listed, labeled, certified or otherwise determined to meet safety requirements of a recognized testing laboratory. Equipment of a class which no recognized testing laboratory accepts, certifies, lists, labels, or determines to be safe will be considered if inspected or tested in accordance with industrial standards such as NEMA, ICEA or ANSI.

B. Materials and equipment furnished shall be new and of current production by manufacturers regularly engaged in the manufacture of such items, for which replacement parts should be available. Special items not meeting this requirement, but which otherwise meet technical specifications, and the merits of which can be established through reliable test reports or physical examination of representative samples, will be considered.

C. When more than one unit of the same class of equipment or material is required, such units shall be the products of a single manufacturer.

D. Equipment Assemblies and Components:
1. Constituent parts which are similar shall be the product of a single manufacturer.
2. Contractor furnishing equipment assemblies which include components made by several manufacturers shall assume complete responsibility for the final assembled unit.

E. Warrantee - The entire insulation and any equipment furnished under these specifications shall be warranted for a period of One (1) year after acceptance.

PART 3 - EXECUTION
3.1 INSTALLATION

A. Equipment locations shall be as close as practical to locations shown on the plan drawings and subject to such revisions as may be found necessary or desirable at the time the work is installed.
1. Minor relocation of equipment, and offsets and rerouting of raceways may be made where required, provided that such work is coordinated with all other work and that there be no impairment of system operation as a result.
2. Major relocation of equipment, offsets, or rerouting of raceways shall not be made without prior approval from the Owner's Representative.

B. Where specific conduit size, number of conductors, and destination of circuit is shown, combining of circuits in raceways other than the manner indicated shall not be accepted unless shop drawings are presented and written approval obtained prior to installation.

C. All penetrations by electrical raceways or equipment through fire rated walls or roof shall be

sealed with fire retardant silicon foam equal to CTC PR 855 as supplied by Chase Technology Corporation.

D. Installer shall have the technical qualifications, experience, trained personnel and facilities to accomplish the installation in accordance with manufacturer's instructions and the best practices of the trade. NECA publication STANDARD OF INSTALLATION shall be used as a reference as to the quality of workmanship required.

3.2 EQUIPMENT IDENTIFICATION

A. System and equipment identification is shown on the drawings and in individual specification sections. Where nameplate tags are required and not otherwise described, they shall be one sixteenth inch thick laminated phenolic strips with engraved lettering white on black 3/16" high, and shall be fastened with self tapping metal screws. There shall be a minimum of one fastener at the end of each long dimension. As a minimum, nameplates shall be provided for:
1. Motor Starter & Controller
2. Individually mounted motor starters and disconnect switches - Indicate motor being controlled and device from which disconnect or starter is fed.
3. Any control device shown on the drawings that is located out of visual sight of the item being controlled.
4. Local or remotely mounted exhaust fan control device.

"END OF SECTION"

SECTION 16010
BASIC ELECTRICAL REQUIREMENTS

1.1 GENERAL CONDITIONS

A. The General and Special Conditions are hereby made a part of these specifications for electrical work. The Electrical Contractor shall assume all obligations contained therein that affect his work. The Electrical Engineer shall be consulted in each case of all disputes and the Engineer decisions shall be final.

1.2 WORK TO BE PERFORMED

A. The work to be performed, without limiting the generality thereof, consists of furnishing all labor, materials, and equipment required for the complete installation of the following items of work.
Lighting System.
Power system.
Testing of electrical systems.
Installing motor starters, wiring motors and starters.
Furnishing and installation of disconnect switches for motors.
All cutting and patching required for electric work.

B. This Electrical Contractor shall investigate the site prior to commence the electrical and shall bring to the Engineer attention any condition which would affect the work shown.

C. Provide all flashings and water-tight sleeves for electrical services penetrating exterior building walls and roof. Assume responsibility for water-tight installation of electrical work in all areas against water leak.

D. Clean up work and leave ready for use or for painter's finish as required. Remove all dirt and rubbish from the premises daily.

1.3 RELATED WORK IN OTHER SECTIONS

A. The following work is not included in this section of the specifications and is to be performed under other sections.
Flashing and counter flashing except as in Paragraph 1.2.C.
Furnishing of motor starter and motor controllers is covered under Division 15.
Thermostat and control wiring under Division 15.

1.4 CODES, PERMITS, INSPECTIONS

A. All work shall comply with rulings of the current edition of the local Electrical Code and the current edition of the National Electric Code NFPA-70.

B. This Contractor shall apply for and obtain all permits, licenses and obtain and pay all inspection fees necessary for the proper execution of the work.

C. Upon completion of the work and before requesting final payment, this Contractor shall furnish the Owner's agent with Certificates of Inspection and Approval.

1.5 ELECTRICAL DRAWINGS

A. Any questions regarding these plans or specifications shall be addressed to the General Contractor, in writing, prior to award of contract, otherwise, the Engineer of the meaning and intent of the plans and specifications shall be final.

B. Location of electrical equipment shown on the drawings are approximate. Exact locations shall be approved by the Owner before installation. Submit shop drawings for approval before installation.

C. The drawings and specifications are intended to supplement each other so that any details shown on drawings and not mentioned in the specifications or vice-versa shall be executed the same as if both mentioned in the specifications and shown on the drawings.

D. This Electrical Contractor shall refer to the mechanical and structural drawings which indicate the type of construction in which the work shall be installed and the work of other trades. Locations shown on the electrical plans shall be checked against the general and detailed drawings. All measurements must be taken at the building.

1.6 RECORD DRAWINGS

A. As work progresses, Electrical Contractor shall record on one set of the contract electrical drawings all changes from the installation originally indicated.

B. At the completion of electrical work, this Contractor shall submit to the Owner for approval and record, the above complete set of drawings, showing the entire work as actually installed.

1.7 APPROVAL OF MATERIALS

A. Electrical Contractor shall submit, in writing, to the Owner for approval, a complete list in quintuplicate, of specified material, fixtures, and equipment to be incorporated in the work, together with the names and addresses of the manufacturers and their catalog number and trade names, 30 days after award of contract. Approval of materials will be based on manufacturer's published ratings. Any materials, and equipment listed, which are not in accordance with the specification requirements, may be rejected. Approval of this list does not necessarily mean approval of the final item. Approval must be secured before these items are ordered or installed.

B. The list of materials as applicable shall include but not be limited to:
Lighting Fixtures
Wiring Devices
Panelboards & circuit Breakers
Disconnect Switches
Fuses
Wires & Cables
Raceways
Fire Alarm System

1.8 APPROVAL OF SHOP DRAWINGS

A. Within 30 days after the approval of the required list of materials, the Contractor shall submit six (6) 3-ring binders containing one copy each of shop drawings, manufacturer's bulletins, wiring diagrams, controls, and parts list of the aforementioned specific items for engineering approval.

B. This Contractor shall check and stamp all shop drawings, cuts sheets and system drawings before submitting them for approval. Submitted shop drawings shall be clearly marked to indicate each item being submitted.

C. No work shown on any shop drawing shall be executed until such drawing is approved by the Owner. Drawings submitted shall show means recommended for supporting this equipment.

D. This Contractor shall assume the cost of (and entire responsibility for) any changes in this work, as shown on the contract drawing, which may be occasioned by installation of materials or

equipment other than specified herein, or by change order.

1.9 EXCHANGE OF INFORMATION

A. The work must be so performed that the progress of the entire mechanical construction, including other trades involved , shall not be delayed nor interfered with.

B. Confer with General Contractor, Owner, and Sub-Contractors for heating and ventilating, air conditioning work as to the location of their work before beginning electric work and install electric work in such a manner as to avoid interference with the other trades.

1.10 INSPECTION OF SITE

A. This Contractor shall be held to have visited the site prior to submitting his estimate and to have examined and familiarized himself with its condition. He shall compare the drawings and specifications with the results of his examination of site.

1.11 MATERIAL AND WORKMANSHIP

A. All material and workmanship shall be of good quality and free from defects. All materials shall be new.

1.12 GUARANTEE

A. This Contractor shall give the Owner a written guarantee to make good any and all faults and defects in the electrical systems due to defective or improper materials or workmanship that may appear within one year from the date of beneficial use of the newly installed electrical system and make all changes within the guarantee period which are required to put the system in proper condition and operation without cost to the Owner.

1.13 MANUFACTURER'S BULLETINS

A. Three copies of the manufacturer's bulletins, operational manuals, shop drawings and wiring diagrams, and parts list for each apparatus shall be delivered by this Contractor to the Owner when all work is completed and this Contractor shall instruct Owner's Engineer in proper operation of all systems.

1.14 ELECTRICAL CONTRACTOR'S RESPONSIBILITY

A. The undertaking of periodic inspection by the Architect or engineer shall not be construed as supervision of actual construction nor make either of them responsible for providing a safe place for the performance of work of the various contractors or suppliers, or for visitors or occupants nor make them responsible for omission of any safety devices called for by codes, ordinances or by the specifications of the manufacturer of the equipment supplied.

1.15 PROTECTION

A. Protect all materials from loss or damage during construction until the complete installation is turned over to the Owner. All finished work damaged during construction shall be replaced at no cost to the Owner.

B. All dirt and debris resulting from the work shall be taken up and removed from premises. All fittings and exposed material shall be cleaned and ready for use in the best possible condition.

1.16 DAMAGE TO OTHER WORK

A. The Electrical Contractor will be held responsible and shall pay for all damage to other work caused by his work and workmen. Repairing of such damage shall be done by the Contractor who installed the work and as directed by the General Contractor.

1.17 TIME OF COMPLETION

A. Electrical Contractor must agree to keep pace with the time schedule upon which the General Contract is made, and also the General Contractor's working job schedule which will be updated on a regular basis.

1.18 SLEEVING INFORMATION

A. Electrical Contractor shall keep fully informed as to position of conduit and openings required for the work under this section so that there may be no delay caused by lack of information. Furnish and install all sleeves, inserts, etc.

1.19 CUTTING AND PATCHING

A. All cutting and patching for electrical work shall be the responsibility of the Electrical Contractor.

1.20 TESTS

A. Perform all tests required by local authorities and all other regulatory agencies. Notify the proper authorities having jurisdiction over the work prior to testing.

B. Test all wiring and connections for continuity and grounds before the fixtures are connected.

"END OF SECTION"

SECTION 16000
ELECTRICAL GENERAL PROVISIONS

PART 1 - GENERAL
1.1 GENERAL PROVISIONS

A. The drawings and the general provisions of the contract, including the General Conditions, Supplementary General Conditions, and General Requirements, apply to the work of this section.

1.2 SUMMARY

A. Provide all labor, materials, equipment, and services necessary for and reasonable incidental to the furnishing and installation of the work and the equipment of this section.

1.3 RELATED DOCUMENTS

A. The general provisions of the Contract, including General and Supplementary Conditions and General Requirements, apply to the work specified in this section.

1.4 DESCRIPTION OF WORK

A. **General**: This section specifies several categories of provisions for electrical work including:
1) General performance requirements within the electrical systems as a whole, and
2) General work to be performed as electrical work, because of its close association.

1.5 SUMMARY OF ELECTRICAL WORK:

A. **Drawings**: Refer to the E-Series drawings for graphic representations, schedules and notations showing electrical work.

B. **Specifications**: Refer to the Division-16 sections for the primary technical specifications of electrical work.

C. **General Outline:** The facilities and systems of the electrical work can be described (but not by way of limitation) as follows:
1. Primary and secondary services, power distribution system, including the electrical connecting of equipment specified under another Division,
2. Motor Control and control/protection work as indicated,
3. Interior and exterior lighting and lighting control systems,
4. Telephone and data systems (primarily an empty conduit system),
5. Fire alarm system.
6. Connections to HVAC equipment and other apparatus.
7. Line voltage wiring, and conduit.

1.6 COORDINATION OF ELECTRICAL WORK:

A. **General**: Refer to the Division 1 sections for general coordination requirements applicable to the entire work. It is recognized that the contract documents are diagrammatic in showing certain physical relationships which must be established within the electrical work, and in its interface with other work including utilities and mechanical work, and that such establishment is the exclusive responsibility of the Contractor.

B. Arrange electrical work in a neat, well organized manner with conduit and similar services running parallel with primary lines of the building construction.

C. Locate operating and control equipment properly to provide easy access, and arrange entire electrical work with adequate access for operation and maintenance.

D. Advise other trades of openings required in their work for the subsequent move-in of large units of electrical work (equipment).

E. **Coordination Drawings**: For locations where several elements of electrical (or combined mechanical and electrical) work must be sequenced and positioned with precision in order to fit into the available space, prepare coordination drawings (shop drawings) showing the actual physical dimensions (at accurate scale) required for the installation. Prepare and submit coordination drawings prior to purchase-fabrication-installation of any of the elements involved in the coordination. At minimum, provide for approval construction layout of the main electrical room with dimensions and elevations.

F. **As-Built Drawings**: The electrical contractor shall maintain at the site for the owner, two (2) copies of all drawings, specifications, addenda, approved shop drawings, change orders and other modifications, in good order and marked to record all changes made during construction. These drawings shall be delivered to the Owner upon completion of the work in a reproducible format. An additional set shall be given to the engineer for his records.

1.7 CODES, STANDARDS AND SYMBOLS:

A. **Codes and Standards** : Electrical equipment and materials shall conform to applicable IPCEA, EIA, AFBMA, ASME, IEEE, NEMA, ANSI, UL, ASTM, JIC, NFPA and latest NEC Standards. Electrical equipment and materials shall be installed in conformance with all applicable requirements of NEC, NFPA, local electric power company, and local codes including electrical code. Referenced codes and standards shall constitute minimum requirements and shall be strictly complied with unless supplemented or modified by more stringent requirements of the contract documents. Telephone raceway system shall be in accordance with requirements of local Telephone Company.

1.8 SUBMITTALS AND SHOP DRAWINGS:

A. Unless otherwise noted, submit eight (8) sets of shop drawings for release to Architect.

B. Shop drawings shall be certified by the manufacturer and the installing Sub-Contractor.

C. Copies of released shop drawings shall be available for job use.

D. Release of shop drawings shall not relieve electrical contractor, sub-contractor, or supplier from responsibility of meeting contract documents.

E. Shop drawings shall be submitted on all items listed in the general outline:
1. Shop drawings shall be reproducible (light penetrating contact printing) prints of the equipment manufacturer's drawings except that catalog sheets (eight copies plus those required by Contractor) may be furnished where such sheets fully set forth all information. If more than one item is included, the applicable item shall be clearly indicated, including material list symbol.
2. Shop drawings shall be certified by the manufacturer and shall contain the following information:
a. Dimension and size data.
b. Material used in fabrication.
c. Finish.
d. Ratings and performance data.
e. Mounting and installation details, including operating weights at points of support, type of support. (If not given, installing contractor shall assume

responsibility for all modification of building structural system. Such modifications shall be approved in writing by Owner's Representative).
f. Special features.
g. Other engineering data to describe construction, installation and performance of the equipment.
h. Reference to applicable specification section.
i. Notation indicating all deviations from contract requirements and reasons therefore.
3. All shop drawings shall be furnished within 30 days after award of contract, but not later than such date as to permit review of such drawings for deviations and errors, and to cause such revisions as may be required to be negotiated with suppliers without delay in fabrication and shipment beyond the date required by the construction schedule.

F. **Maintenance Manuals**: Two final copies, including wiring diagrams, maintenance and operating instructions, parts listings, and copies of other submittals indicated for inclusion.

G. **Guarantee**: Refer to other applicable sections for guarantee requirements.

PART 2 - PRODUCTS
2.1 ELECTRICAL WORK:

A. Compatibility: Provide products which are compatible with other products of the electrical work, and with other work requiring interface with the electrical work, including electrical connections and control devices. For exposed electrical work, coordinate colors and finishes with other work.
1. Whenever acceptable manufacturers are listed, it is understood that they represent the standard of quality which are acceptable for this project and unless stated to the contrary other manufacturers will be acceptable if they are approved equal by the engineer.

B. Permits: This contractor shall obtain and include the costs of all permits and fees in his proposal.

2.2 ELECTRICAL SYSTEM IDENTIFICATION:

A. Operational and Warning Signs:
1. General: Provide engraved plastic-laminated or baked enamel signs at locations of major units of electrical equipment including panelboards, control centers, disconnect and safety switches, lighting controls. Provide warning signs where there is hazardous exposure or danger associated with access to or operation of electrical facilities. Provide text of sufficient clarity and lettering of sufficient size to convey adequate information at each location; mount permanently in an appropriate and effective location after Owner’s approval. Comply with recognized industry standards for color and design.
2. Operational Tags: Where needed for proper and adequate information on operation and maintenance of electrical systems, provide tags of plasticized card stock, either preprinted or hand printed to convey the message. For example: "DO NOT OPEN THIS SWITCH WHEN BURNER IS OPERATING."

B. Cable/Conductor Identification:
1. General: Apply cable/conductor identification on each branch circuit for each panelboard and on each feeder in each panelboard, switchboard, and pull box. Use fibre or plasticize tags.
2. Color Coding: Color code distribution and branch circuit wiring as follows: Three phase, four wire 120/208 volt system; phase A - black, B-red, C-blue, neutral-white, ground-green. Three phase, four wire 277/480 volt system; phase A - brown, B-orange,

C-yellow, neutral-gray, ground-green.

2.3 ACCESS, CUTTING AND PATCHING:

A. Access Units:
1. General: The work of this article is limited to the provisions for access through other work for access to electrical work, and does not include internal access provisions (within the electrical work). In general and where possible, furnish or furnish and mount required access units to other trades prior to their work, so that cutting and patching for the subsequent installation of such access units will not be required. In occupied spaces, provide finished access units of the maximum concealment type, including locks where appropriate, and matching other access units provided in the same expanse of finish (for non-electrical access, if any).
2. Scope: The scope of access units to be furnished or provided as electrical work includes those units indicated on the electrical drawings or specified in Division 16 sections, and those additional units required for adequate access to electrical work and not shown or specified individually.

B. Cutting and Patching:
1. General: Comply with the requirements of Division 1 for the cutting and patching of other work to accommodate the installation of electrical work. Except as individually authorized by the Architect/Engineer, cutting and patching of electrical work to accommodate the installation of other work is not permitted.
2. Set sleeves, conduits, boxes, etc. accurately before any concrete is poured or partitions are erected or the electrical contractor may set boxes on the forms so as to leave openings in the floors or walls, in which case he shall be called upon to fill in the concrete voids around the sleeves, etc. shall be filled in by Contractor. Electrical Contractor shall be responsible for provisions of all sleeves as required for electrical work including coordination with structural elements. Sleeves shall be provided by Electrical Contractor for all perimeter unit connections. Should the Electrical Contractor neglect to perform the above said preliminary work and should cutting be required in order to install his conduit or equipment, then the expense of cutting and restoring of surfaces to their original condition shall be borne by the electrical contractor.
3. Prepare drawings indicating the exact size, location and material of all sleeve openings combined with all other trades. Sleeves within 1'6" of a column face shall be A-36 steel sleeve. Drawings shall be submitted at least 3 weeks prior to fabrication of reinforcing steel. Drawings shall be submitted to Architect, Structural Engineer, Concrete Subcontractor and General Contractor.
4. Mounting Heights: Mounting heights shown on the drawings are to the centerline of the device or item of equipment.
5. Replacement of Other Work: Where it is necessary to remove and replace landscape work, pavement, flooring and similar exposed finish work, engage the original installer to install the replacement work; except where the work existed prior to the work of this Contract, engage only experienced and expert firms and trades persons to replace the work.

2.4 CONCRETE FOR ELECTRICAL WORK:

A. General: The work of this article is defined to include whatever concrete work is necessary or shown specifically to install the following:
1. 4" housekeeping pad for free standing equipment
2. Bases for exterior light standards.
3. Primary and secondary duct banks.

2.5 PAINTING ELECTRICAL WORK:

A. General: Touch-up painting of electrical equipment at the project site. Coordinate the painting with the factory finish and comply with color matching requirements.

B. Do not paint over nameplates on equipment, sliding/rotating shaft surfaces, non-ferrous hardware/accessories/trim, and similar items where painting would normally be omitted.

PART 3 - EXECUTION
3.1 ELECTRICAL WORK CLOSEOUT:

A. General: Refer to the Division 1 sections for general closeout require ments. Maintain a daily log of operational data on electrical equipment and systems through the closeout period; record hour of operation, assigned personnel, power consumption and similar information; submit copy to Owner.

B. Coordination with Mechanical: Coordinate closeout operations with closeout of mechanical systems, HVAC, and other power consuming equipment. Accurately record locations of primary conductors which are underground or otherwise concealed. Test run electrical equipment in coordination with test runs of mechanical systems. Clean and lubricate operational equipment. Instruct Owner's operating personnel thoroughly in the operation, sequencing, maintenance and safety/emergency provisions of the electrical systems. Turn over the operations to the Owner's personnel at the time(s) of substantial completion. Until the time of final acceptance of the total work of the Contract, respond promptly with consultation and services to assist the Owner's personnel with operation of electrical systems.

C. Certificate of Inspection: This contractor shall, at his own expense, have an inspection made by the local electrical inspection department/agency of the complete electrical installation, and shall deliver certificate of approval of the complete work to the Owner before receiving his final payment.

3.2 CLEAN-UP PROTECTION:

A. General Clean-Up: During progress of work, remove from site discarded rubbish, cans and rags at end of each work day.

"END OF SECTION"

SECTION 15990
TESTING AND BALANCING

PART 1 - GENERAL
1.1 DESCRIPTION

A. The Testing and Balancing (TAB) Contractor shall perform all testing and balancing. The Contractor will proceed with testing and balancing after the Architect has been notified when the tests are to be conducted.
1. Air balance and testing shall not begin until system has been completed and is in full working order. The Mechanical Contractor shall put all heating, ventilating, and air-conditioning systems and equipment into full operation and shall continue the operation during each working day of testing and balancing. All tests shall be in accordance with (National Environmental Balancing Bureau) or AABC (Associated Air Balance Council).
2. After completion of test and balance work, the Owner or Engineer, at his discretion, may request a recheck or resetting of any outlet, supply air fan, or exhaust fan as listed in test report. The contractor shall provide technicians to assist the Company in making any tests required during this period.
3. The TAB Contractor shall coordinate and schedule this work in cooperation with other trades involved and comply with the completion date.
4. Upon completion of the air-conditioning system installation, the contractor shall perform the following tests, compile the test data, and submit six (6) copies of the complete test data to the Company.

PART 2 - PRODUCTS
2.1 INSTRUMENTS

A. The TAB Contractor shall provide all instruments required to perform the testing procedures. The instruments shall remain the property of the TAB Contractor.

B. The instruments shall have been accurately calibrated within six (6) months of the time the testing and balancing work is performed and maintained in good working order.

PART 3 - EXECUTION
3.1 AIR TESTING PROCEDURES

A. Preliminary Readings: The Contractor shall perform the following tests and balance the systems in accordance with the following requirements:
1. Test and adjust fan RPM to design requirements.
2. Test and record fan motor running load amperes and voltage.
3. Make pitot tube traverse of main supply ducts and obtain design CFM at fans. Locate test plugs to provide straight run of duct upstream of test plug.
4. Test and record system static pressures, suction and discharge.
5. Test and adjust system for CFM recirculated air, both minimum and maximum.
6. Test and record entering and leaving air temperatures. (D.B. heating and cooling) (W.B. cooling).

B. Adjustments
1. Adjust fan RPM to provide proper static pressure at inlet to last terminal box. This adjustment to be performed with clean filters at 0.20" to 0.40" w.c. The Mechanical Contractor shall make any changes in the motors, pulleys, belts, dampers, or other fan drive components required for correct balance at no additional cost to the Owner.
2. Adjust all zones to proper design CFM, supply and return.
3. Test and adjust all diffusers, grilles, and registers to within 5% of design requirements.
4. Each grille, diffuser, and register shall be identified as to location and area.

5. Size, type and manufacturer of diffusers, grilles, registers, and all tested equipment shall be identified and listed. Manufacturer's ratings on all equipment shall be used to make required calculations.
6. Readings and tests of diffusers, grilles and registers shall include required FPM velocity and test resultant velocity, required CFM and test resultant CFM after adjustments.
7. In cooperation with the Control Manufacturer's Representative, set adjustments of automatically operated dampers to operate as specified, indicated, and/or noted. Contractor shall coordinate all controls for proper calibration and list all controls requiring adjustment. See paragraph 3.4 of this section of the specification.
8. All diffusers, grilles, and registers shall be adjusted to minimize drafts in all areas.
9. All ductwork shall be tested for air leakage by the Sheet Metal Contractor and witnessed by the TAB Contractor in accordance with SMACNA Manual. Copies of these reports to be included with final test data. See paragraph 3.4 of this section of the specification.

3.2 DUCT LEAKAGE TESTING

A. The TAB contractor will supervise the duct leakage testing which will be performed by the sheetmetal contractor in accordance with Section 15881, paragraph 3.4. The TAB contractor will certify tht all duct leakage test have been satisfactorily completed in writing to the Engineer. The TAB contractor will deliver the "Air Duct Leakage Test Summary" forms to the Engineer.

3.3 DAMPER ADJUSTMENTS

A. The TAB contractor will meet at the project with the temperature control contractor and will permanently adjust and set all dampers on air handling equipment to closed, minimum and maximum air flow positions. The TAB contractor will inspect the installation of all field and factory installed dampers and will supervise the repair of any and all improperly installed dampers. The TAB contractor will certify that all dampers are properly installed and operating and that all air flow settings have been completed in writing to the Engineer.

3.5 REPORT

A. All above information shall be inserted on appropriate sheets, listing all items required by specifications. These are to be included in the completed Test and Balance Report.

"END OF SECTION"

SECTION 15950
CONTROLS AND INSTRUMENTATION
(ELECTRONIC)

PART 1 - GENERAL
1.1 DESCRIPTION

The Contractor shall furnish all labor, materials, equipment and services necessary for installation of a complete electronic temperature control system. The control equipment shall be the standard manufactured and cataloged items of one manufacturer.

1.2 SUBMITTAL

Submit complete detailed control diagrams, sequences, and wiring diagrams for all systems. All control components shall be identified by function and part number. Complete performance on each component shall be provided.

PART 2 - PRODUCTS
2.1 PRODUCT MANUFACTURERS

A. Product manufacturer's shall be Trane Tracker or equal.

2.2 THERMOSTATS

A. Electronic temperature sensors and thermostats shall be of the thermistor (NTC) type with a large resistance versus temperature change to insure high resolution and accuracy. Sensors shall be available for wall, duct or well mounting. Sensors shall be connected to the remote controllers by two or three wire unshielded cable and the accuracy shall be unaffected by wiring distances up to 250 feet.

B. Electronic temperature readout indicator shall interface with a sensor/controller to indicate a measured value at the sensor. Each device shall be capable of indicating temperature, pressure, humidity, etc., and provide continuous indication. Provisions for calibration of range and starting point shall be provided. Indication shall be capable of being installed internal to the control panel or mounted on the face of the panel as required.

2.3 CONTROLLERS

A. Electronic controllers shall be back plate mounted in control panels and be plug-in type with integrated circuitry. Controllers shall be capable of having up to 3 discrete outputs. Each output shall have independent zero, differential and/or proportional band adjustments. Indicating lamps shall be provided for each output. Controllers shall be available with either 0-20 VDC proportional, 2-position, or three point floating outputs. Provide switch selectable preset and reset rate adjustments if PI or PIPD control is specified in the control sequences. Controllers shall have internal switches for each output to change the output signal to either direct or reverse acting. Controllers shall be available with integral electronic circuits for absolute high or low limit control. Where 2-position outputs are indicated, the respective output shall have independent adjustments for switching differentials of +0.4oF to 12.6oF. Both proportional and 2-position outputs shall have "zero" or dead band adjustment capability of +0oF to 9oF, as measured from controller set point. Proportional band shall have adjustment capability of 0.9oF to 16.2oF.

2.4 ACTUATORS

A. Damper operators shall be fully proportioning and shall be either push-pull or rotary as required. Motors shall be of the low voltage synchronous type and shall be non-overloading at a continuous stall. Provide each motor with fuse protection. Control signal shall be 0-20 VDC 2-wire phase

cut, or 3 point floating as required.

2.5 MISCELLANEOUS

A. Safety High Limit: Shall be manual reset, fixed temperature line voltage type with bimetal actuated switches. Switch shall have an adequate rating for the applied load.

B. Safety Low Limit: Shall be automatic reset line voltage type with bellows actuated switches. Twenty foot capillary shall be responsive to the coolest section of its length.

2.6 SEQUENCE OF OPERATION

A. AC units shall have two modes of operation, occupied mode and unoccupied.

B. Occupied- Upon signal from building management panel, the outside air damper shall open to minimum setpoint and the supply fan shall run continuously, compressor and/or heater shall energize as required to maintain the cooling and heating setpoints. Each rooftop unit shall be furnished with one heating/cooling thermostat with an adjustable setpoint thumb wheel and a night setback override button.

C. Unoccupied mode- upon a signal from the building management panel, the outside air damper shall close and the unit shall de-energize. The supply air fan and heater shall cycle as required to maintain the heating setpoint.

D. Smoke Detector- wire duct mounted smoke detectors in the supply and return duct to each unit as shown on drawings. Detector shall stop supply fan and close the outside air dampers in unit when the products of combustion are sensed and activate the fire alarm system.

PART 3 - EXECUTION
ELECTRICAL WORK

A. All control wiring (line voltage or low voltage), required to complete the temperature control system, including field mounting and wiring of control devices specified elsewhere in the Mechanical specifications to be supplied as field installed devices by the equipment manufacturer, shall be installed by the Temperature Control Contractor.

B. Electrical work required for system interlock and installation of the temperature control system shall be provided by the Temperature Control Contractor in accordance with Division 16, Electrical and all National and Local Codes.

C. All wiring shall be run in electric metallic tubing, armored cable, or Teflon coated wire, all as approved by Code, and installed concealed where possible. Wiring run outdoors, where subject to physical damage, or where exposed in equipment rooms, shall be run in conduit.

D. Electrical controls shall be fed from a separate circuit or circuits in the distribution panels and shall not be taken from receptacles or lighting circuits. The circuit or circuits within the distribution panels shall be so marked. Minimum conduit size shall be ½".

E. The Temperature Control Contractor shall coordinate all electrical work associated with his installation with the Electrical Contractor. All wiring for automatic temperature controls, including interlock wiring, starter control wiring, and control wiring for flow switches, selector switches, pilot lights, thermostats, etc., shall be the responsibility of the ATC Contractor but installed in conformance with requirements of Division 16. Power wiring for all equipment shall be the responsibility of the Electrical Contractor under Division 16. Power wiring for automatic temperature controls shall be the responsibility of the ATC Contractor.

F. Refer to Division 16 for electrical voltage characteristics.

INSTALLATION AND GUARANTEE

A. The temperature control system shall be installed in a first-class manner using all new and properly applied equipment. All capillary and tubing entries into ductwork shall be made in a neat manner. Holes made in ductwork shall be capped with metal plates. All capillaries, tubing and wiring, cable, etc., shall be fastened at regular intervals to provide a neat and workmanlike installation. Excess lengths of tubing, capillaries, wire, etc., shall be removed where possible, and where not possible, shall be neatly coiled and secured with nylon ties behind the control cabinet or point of entry into ductwork. Providing heating and/or cooling media are available in proper quantities, and properly balanced, the manufacturer shall guarantee room thermostats to control within plus or minus 1 degree F of setting, duct-mounted controllers to control within plus or minus 2 degrees F. Temperature indication on control cabinets (thermometer or receiver gauge) shall be within plus or minus 1 degree

B. Mount in an easily read location in each mechanical equipment room, a copy of the approved temperature control diagram for the system, or systems, in that respective room. The control diagram shall be bonded in rigid plastic or lucite.

INSTRUCTION AND SERVICE

A. Upon completion of the project and before issuance of the certification letter described above, the Contractor shall provide, four (4) complete Operator's Manuals and maintenance instructions which shall include bulletins on all of the devices of this control system and control diagrams. This Operator's Manual shall be furnished to the Company for review and delivery to the Owner. a competent technician shall be provided to instruct the Company's personnel in the operation and care of the control system and use of the Operator's Manual.

GUARANTEE AND SERVICE CONTRACT

A. From the date of acceptance of the control system installation, the Contractor shall provide a one (1) year guarantee and full parts and labor service contract.

"END OF SECTION"

SECTION 15932
SHEET METAL SPECIALTIES

PART 1 - GENERAL
1.1 DESCRIPTION

A. This section contains sheet metal items such as intake and relief hoods, exhaust hoods, dampers, etc.

B. Submit manufacturer's catalog data, indicating sizes, type, and performance data.

PART 2 - PRODUCTS
2.1 AUTOMATIC DAMPERS

A. This contractor shall set all outside air, return air, exhaust air control dampers furnished under automatic control contract.

B. Dampers shall be the ARROW-FOIL Damper No. BPDAF-206 (Parallel) or No. OBDAF-207 (Opposed) as manufactured by the Arrow Louver & Damper Corp. of Maspeth, N.Y. 11378.

C. Frames and blades to be minimum 12 gauge (.081") extruded aluminum. Blades to be of single unit ARROW-FOIL design, 6" wide with the PIN-LOCK and integral section within the blade core.

D. Frames to be a combination of 4" extruded aluminum channel and angle with reinforcing bosses and groove inserts for vinyl seals.

E. Minimum size dampers are to have 2" x 5/8" aluminum frames.

F. Pivot rods to be 1/2" dia. extruded aluminum, PIN-LOCK design interlocking into blade section. Bearings to be "Double-Sealed" type with Celcon inner bearing on rod riding in Merlon Polycarbonate bearing inserted in frame so that outer bearing cannot rotate.

G. Rod bearings to be designed so that there shall be no metal-to-metal or metal-to-bearing riding surfaces. Interconnecting linkage to have a separate Celcon bearing to eliminate friction in linkage.

H. Blade linkage hardware is to be installed in angle or channel frame section out of air stream. All hardware to be of non-corrosive reinforced material or to be cadmium plated.

I. Dampers to be engineered for minimum air leakage by means of overlapping design and by extruded vinyl seals to fit into integral ribbed groove inserts in both frames and blades. All dampers in excess of 10 sq. ft. free area to have reinforced corners by means of gussett plates.

J. Opposed Blade Dampers (when closed) to have less than 3/4 of 1% leakage at 5" and less than 1% at 9" w.g. static pressure.

K. Parallel Blade Dampers (when closed) to have less than 1-1/4% leakage at 5" and less than 1-1/2% at 9" w.g. static pressure.

2.2 GRAVITY DAMPERS

A. Provide low leakage gravity dampers as shown on the drawing and as specified.

B. Construction:

Frame: 3-1/2" x 1" x 16 ga. galvanized steel.
Blade: 16 ga. aluminum.
Axles: 1/2" galvanized steel rod.
Bearings: Flanged ball.
Seals: Vinyl on blades, EPT sponge on jambs.
Linkage: Blade to blade.

C. Dampers shall have adjustable counterweights when indicated on drawings.

D. Damper Air Leakage Rate: Except where indicated, provide low leadage dampers with leakage limited to 26 CFM per sq. ft. at .5" w.g. differential pressure and temperature of 70 degrees F.

E. Manufacturers: American Warming and Ventilating, Inc., Air Balance Inc., Penn Ventilation Co., Ruskin Mfg. Co or approved equivalent companies.

2.3 FLEXIBLE CONNECTIONS

A. Provide flexible connections on the inlet and outlet of each fan and unit to which duct connections are made. Connections shall be made of 20 oz. Ventfab, fire, water and weather resistant fabric. At least one inch slack shall be allowed to ensure that no vibration is transmitted.

B. Connections in high pressure systems, in corrosive fume ducts and connections exposed to outdoor weather shall be made of 30 oz. Ventglas woven glass fabric double coated with neoprene.

2.4 WALL CAP

A. Provide weatherproof wall cap with built-in backdraft damper and birdscreen unless otherwise specified herein or indicated on drawings. Wall cap shall be bonderized steel with baked enamel finish and shall be equal to ACME Metal VWC.

2.5 ROOF CAP

A. Provide weatherproof roof cap with built-in (backdraft damper) and birdscreen unless otherwise specified herein or indicated on drawings. Roof cap shall be bonderized steel with baked enamel finish and shall be equal to ACME model VC (or VRJ).

PART 3 - EXECUTION

A. Installation shall conform to manufacturer's written instructions and details shown on drawings.

"END OF SECTION"

SECTION 15930
AIR DISTRIBUTION DEVICES

PART 1 - GENERAL
1.1 DESCRIPTION

A. The extent of the air distribution device work is indicated on the drawings, details, schedules, and as specified herein.

B. ARI Standards: Comply with Air-Conditioning and Refrigeration Institute (ARI) Standard 650 "Air Outlets and Inlets".

C. ASHRAE Standards: Comply with American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ASHRAE) Standard 70 "Methods of Testing for Rating the Air Flow Performance of Outlets and Inlets".

D. ADC Test Code: Comply with Air Diffusion Council (ADC) Equipment Test code 1062R4 "Certification, Rating and Test Manual".

E. ANSI/NFPA Standards: Comply with National Fire Protection Association (NFPA) Standard 90A "Installation of Air Conditioning and Ventilating Systems".

F. Manufacturers: Barber-Colman, Tuttle and Bailey, Titus, Anemostat, or approved equivalent.

1.2 SUBMITTALS

A. Submit manufacturer's data on air distribution devices indicating the model number, size, construction, finish, accessories furnished, specified performance, and mounting details for each type.

B. A sample of each type of air distribution device shall be submitted to the Company's Representative at time of second stage submittal, if requested.

PART 2 - PRODUCTS
2.1 AIR DISTRIBUTION DEVICES

A. Furnish and install air distribution devices to control air in all areas of the project.

B. Except as otherwise indicated, provide manufacturer's capacity air devices where shown of the size, shape, capacity, and type indicated, constructed of materials and components as indicated and as required for complete installation.

C. Supply and return air outlet shall be of sizes and in location shown on drawings. The manufacturer shall be responsible for checking these sizes and shall submit for approval any deviation from sizes as shown to provide proper air distribution within occupied zone that will be free from unequal temperature and draft complaints.

D. All diffusers, registers, and grilles shall have a white enamel finish, unless otherwise specified.

E. Diffusers, registers and grilles shall be as hereinafter listed. Manufacturers' types are listed to show type and minimum construction features. Other manufacturers' products will be acceptable if approved equal.

F. Square diffusers unless otherwise noted will be equal to Tuttle and Bailey DMF multicone type with opposed blade balancing dampers and shall be nominal 24" x 24" for T Bar, lay-in ceilings, concealed spline ceilings or drywall/plaster ceilings as required.

G. Round diffusers will be equal to Tuttle & Bailey PA adjustable core diffuser with a no. 4 balancing damper and air control grid. The entire center core shall be removable from below.

H. Linear diffusers will be equal to Tuttle and Bailey Imperialine model 4400B3 for side wall application, model 6400EO for ceiling application (with number of slots called for on the drawings) and Titus CT 540 with frame types and heavy-duty core for floor applications.

I. Supply registers will be equal to Tuttle & Bailey T64 double deflection with opposed blade dampers.

J. Return registers and grilles high on walls or in ceilings will be Tuttle & Bailey T70D Series with opposed blade dampers for registers.

K. Return registers and grilles low on walls will be equal to Tuttle & Bailey T50 Series with opposed blade dampers for registers.

L. Perforated ceiling return panels shall be Tuttle & Bailey PDR, 24" x 24" with duct connection flanges, for lay-in ceiling grid, concealed spline ceiling systems or drywall/plaster ceilings as required.

PART 3 - EXECUTION
3.1 INSTALLATION

A. General: Install air devices in accordance with manufacturer's written instructions and recognized industry practices to ensure that products serve the intended function.

B. Coordinate with other work, including ductwork and ductwork accessories, as necessary to interface installation of air properly with other work.

3.2 FIELD QUALITY CONTROL

A. Test operate installed grilles and registers to demonstrate compliance with the requirements.

"END OF SECTION"

SECTION 15884A
FLEXIBLE DUCTWORK - INSULATED

PART 1 - GENERAL
1.1 DESCRIPTION

A. Provide flexible ductwork as shown on the drawings in accordance with specifications.

B. Submit manufacturer's data including air friction chart and installation instructions.

C. Use everywhere except in return air plenum ceilings.

PART 2 - PRODUCTS
2.1 INSULATED FLEXIBLE DUCT

A. Insulated flexible duct shall be all metal, constructed of 2 ply corrugated aluminum laminate. Flexible duct shall be semi-rigid and capable of being easily hand-preformed into elbows, offsets, etc.

B. Insulation shall be 1/2 inch thick 3/4 lb. density fiberglass wrapped around twice to 1 inch thickness of 3/4 lb. density.

C. Vapor barrier jacket shall be gray, 0.004 inch thick seamless vinyl sleeve.

D. Temperature: 0-350oF.

E. Working Pressure: minus 20" to plus 20" w.g.

F. Velocity: To 4000 FPM.

G. Code Compliance: UL-181, Class O NFPA 90A.

H. Manufacturers: Triplelock or approved equal.

PART 3-EXECUTION
3.1 INSTALLATION

A. Install flexible duct work in accordance with manufacturer's instructions. Band flexible duct to solid duct and then make air tight with duct sealant. Seal vapor barrier to metal duct or duct insulation jacket.

B. Maximum length allowed for flexible duct is four (4) feet.

"END OF SECTION"

SECTION 15881
LOW PRESSURE METAL DUCTWORK

PART 1 - GENERAL
1.1 DESCRIPTION

A. All ductwork, supply, return or exhaust duty will be velocity classification 2500 FPM and static pressure classification 2" w.g., positive or negative. Duct sealing requirements will be Seal Class

B. See section 15887 for Carbon Monoxide duct specification.

C. Standards are as defined in SMACNA HVAC duct construction standards first Edition, 1985.

1.2 INDUSTRY STANDARDS

A. Comply with SMACNA (Sheet Metal and Air Conditioning Contractors' National Association) HVAC duct construction standards (Metal and Flexible First Edition, 1985) recommendations for fabrication, construction and details, and installation procedures, except as otherwise indicated.

B. Comply with ASHRAE (American Society of Heating, Refrigerating and Air-Conditioning Engineers) recommendations, except as otherwise indicated. SMACNA takes precedence.

C. Comply with National Fire Protection Association (NFPA) Standards: No. 90A - Air Conditioning and Ventilating Systems, No. 91 - Blower and Exhaust Systems, and No. 96-1976 - Removal of smoke and grease-laden vapors from commercial cooking equipment.

D. All tables, figure numbers, and standards referred to are 1985 SMACNA as specified above.

1.3 SUBMITTALS

A. Provide detailed shop drawings and details. Refer to Section 15010, General Conditions - Mechanical.

PART 2 - PRODUCTS
2.1 DUCTWORK MATERIALS

A. Exposed Ductwork Materials: Where ductwork is exposed to view in occupied spaces, provide materials which are free from visual imperfections including pitting, seam marks, roller marks, oil canning, stains and discolorations, and other imperfections, including those which would impair painting.

B. Ductwork Metal: Gauges shall conform to SMACNA Manual except the discharge ducts connected to variable air volume system supply fans shall be a minimum of 18 gauge for a distance of 20 feet from the fan connection.

C. Sheet Metal: Except as otherwise indicated, fabricate ductwork from galvanized sheet steel complying with ASTM A 527, lock forming quality, with ASTM A 525, G90 zinc coatings. Submit certifications of compliance with this specification. Work metal with mill markings outside and visible after fabrication.

D. Rectangular Ductwork: Sheet metal gauges and reinforcement per SMACNA Tables 1-5.

E. Low Pressure Round and Flat Oval Ductwork: Galvanized spiral or galvanized sheet steel of gauges conforming to SMACNA Manual Table 3-2 for round and Table 3-4 for flat oval.
1. Seal joints between sheet metal pipe using sealant, screws and airtight pressure-sensitive

tape.
2. Provide 90 degree elbows in compliance with Table 3-1 with radius 1-1/2 times the diameter or formed factory fabricated elbows.
3. Provide conical tee or 45 degree lateral branch takeoffs. Fabricate reducing fittings with an angle of not more than 15 degrees with the airstream.

F. All underground ducts shall be polyvinyl coated ductwork fittings and accessories equal to PDC by Farmost Mfg. Co. or UPD by Union Poly-duct Mfg. Co.

G. **Duct Sealant: Seal all joints and seams of rectangular and round ducts** with fiber tape impregnated with a mineral gypsum compound set into an adhesive. Flame spread rating not to exceed 5, smoke rating not to exceed 25, and fuel contributed 0. Products shall be Hardcast DT tape set into Hardcast D-14 adhesive.

H. Duct Connection Systems: At the Contractor's option, the Ductmate Duct Connection System manufactured by Ductmate Industries, Inc., or approved equal, and as specified herein, may be used as a method for connecting sections of rectangular ductwork.
1. The Ductmate System shall result in the creation of a tight joint with zero leakage.
2. System shall be assembled and installed per manufacturer's instructions.
3. All component parts shall be of the composition and materials manufactured only by Ductmate Industries, Inc., and guaranteed against defective material and workmanship.
4. The Ductmate System shall not be used for applications with duct gauges heavier than 16 gauge or lighter than 26 gauge.
5. Factory trained personnel shall be available upon the Company's request at no charge to instruct Contractor in the use of the Ductmate System.

I. Duct Liner: Provide duct liner as specified herein and indicated on the drawings, in conformance with SMACNA Duct Liner Application Standard.
1. Duct liner shall meet all the requirements of:
ASTM C 1071, Type I
(Replaces HH-I-545B and TIMA AHC101)
ASTM G21 and G22
SMACNA Application Standards for Duct Liners
NFPA 90A and 90B
2. Duct liner shall be approved equal to Manville Permacote Linacoustic Standard. Submit samples and manufacturers published data.
3. Duct liner will be flexible duct liner insulation made from strong, glass fibers bonded with a dark thermosetting resin. The airstream surface will be protected with a durable state-of-the-art acrylic surface coating. Temperature limits will be 250 F.
4. Edge coating will be factory applied to the edges of the blanket assuring coverage of the leading edges per SMACNA requirements. Shop fabrication cuts will be coated with the Manville SuperSeal Permacote products or approved equal.
5. Duct liner will be tested at velocities as high as 12,500 FPM and will be installed in accordance with factory specifications to withstand 6000 fpm.
6. The line noise reduction coefficient of 0.65 minimum and K value of 0.28 at 75 F (ASTM C518).
7. The surface coating will be specially formulated so it will not support the growth of fungus or bacteria, as determined by tests in accordance with ASTM C 1071 and ASTM G21 and G22.
8. The liners surface shall be cleanable with commonly available duct cleaning equipment following the procedures detailed in the North American Insulation Manufacturers Associate (NAIMA) Duct Cleaning Guide.
9. All portions of duct designated to receive duct liner shall be completely covered with duct liner. Transverse joints shall be neatly butted and there shall be no interruptions or gaps.
10. The black coated surface of the Duct Liner shall face the air stream.

11. **Duct Liner shall be adhered to the sheet metal with 100% coverage of adhesive,** and all exposed edges and all transverse joints coated with adhesive. In addition to the adhesive edge coating of transverse joints, any longitudinal joints shall be similarly coated with adhesive.
12. **The Duct Liner shall be additionally secured with welded mechanical fasteners** which shall compress the duct liner sufficiently to hold it firmly in place. **Mechanical fasteners glued to the ductwork will not be acceptable.**
13. Duct Liner shall be cut to assure overlapped and compressed longitudinal corner joints.
14. Welded fasteners shall be spaced as shown in Fig. 2-22. Metal nosing, as shown in Fig. 2-24, shall be installed to secure the Duct Liner at all upstream transverse edges.
15. Adhesive shall conform to Adhesive and Sealant council Standards for Adhesives for Duct Liner; ASC-A-7001A-1971.
16. Mechanical fasteners shall conform to Mechanical Fastener Standard MF-1-1971, available from Sheet Metal and Air Conditioning Contractors National Association.
17. Ductwork dimension shown on drawings are sheet metal dimensions. Net free area shall be sheet metal dimensions less than the liner thickness on lined ductwork.
18. Provide duct liner where indicated in the drawings.

J. Duct Insulation: Refer to Section 15250, Insulation for Mechanical Systems.

K. Flexible duct shall be installed and supported in accordance with Fig. 3-9 and 3-10.

2.2 MISCELLANEOUS DUCTWORK REQUIREMENTS

A. General: Provide miscellaneous materials and products of the types and sizes indicated and where not otherwise indicated, provide type and size required to comply with ductwork system requirements including proper connection of ductwork and equipment. Comply with Fig. 2-1 through 2-13 except as hereafter modified.
1. Linear diffuser plenums shall be in accordance with Fig. 2-18.
2. Fabricate branch takeoffs full size of register , grille, and diffuser sizes in accordance with Fig. 1-16 and 2-17.
3. Provide splitter dampers with adjustment from side of duct. Extractors shall be adjustable from face of register, from above (if accessible) or from below.
4. Provide transition fittings made as gradually as possible and in no case shall the angle be greater than 20 degrees with the airstream.

B. Manual Dampers:
1. Manual volume dampers, rectangular sizes 18" x 12" and smaller, round and all register dampers shall conform to SMACNA Manual Fig. 2-14, Fig. 2-16.
2. Manual volume dampers larger than above shall be multiple blade type and conform to Fig. 2-15.
3. Provide dampers with locking quadrants at all branch runouts (to diffusers, grilles, registers, etc.) and on all branch ducts serving more than one supply outlet or return inlets on both supply and return ducts, and as required to balance the entire air distribution system.
4. Provide spin-in fittings with balancing dampers with locking quadrants on all round branch runouts (to diffusers, etc.).

C. Gravity Dampers
1. Provide low leakage gravity dampers as shown on the drawing and as specified.
2. Construction:
Frame: 31/2" x 1" x 16 ga. galvanized steel.
Blade: 16 ga. aluminum.
Axles: 1/2" galvanized steel rod.
Bearings: Flanged ball.
Seals: Vinyl on blades, EPT sponge on jambs.

Linkage: Blade to Blade.
3. Dampers shall have adjustable counterweights when indicated on drawings.
4. Damper Air Leakage Rate: Except where indicated, provide low leakage dampers with leakage limited to 26 CFM per sq. ft. at .5" w.g. differential pressure and temperature of 70o F.
5. Manufacturers: American Warming and Ventilating, Inc., Air Balance Inc., Ventilation Co., Ruskin Manufacturing Co, or any other manufacturers which are approved as equivalent by the Engineer.

D. Provide casings and housing as shown on drawings and constructed per Figs. 6-1 through 6-12 of the Duct Manual.

E. Provide belt guards, not furnished with equipment, constructed per the Duct Manual.

F. Ductwork Supports:
1. Except as otherwise indicated, provide hot-dipped galvanized steel fasteners, anchors, rods, straps, trim and angles for support of ductwork. For copper, stainless steel and aluminum ductwork, provide matching support materials.
2. Installation shall be in accordance with Fig. 4-1 through 4-4 and Tables 4-1 and 4-2.

G. Flexible Connections: Provide flexible connections on the inlet and outlet of each fan and air handling unit to which duct connections are made. Connections shall be made of 20 oz. Ventfab, fire, water and weather resistant fabric. At least one inch slack shall be allowed to ensure that no vibration is transmitted. Connections exposed to outdoor weather shall be made of 30 oz. Ventglas woven glass fabric double coated with neoprene. See Fig 2-19.

H. Wall Cap: Provide weatherproof wall cap with built-in backdraft damper and birdscreen unless otherwise specified herein or indicated on drawings. Wall cap shall be bonderized steel with baked enamel finish and shall be equal to ACME Metal VWC.

I. Roof Cap: Provide weatherproof roof cap with built-in (backdraft damper) and birdscreen unless otherwise specified herein or indicated on drawings. Roof cap shall be bonderized steel with baked enamel finish and shall be equal to ACME model VC (or VRJ).

J. Access Requirements:
1. Access doors shall be in accordance with Fig. 2-12, Fig. 2-13, and Fig. 6-11. Access doors in sound lined or insulated ducts shall be double wall sandwiching insulation.
2. The Contractor at his option may use manufactured access doors. Access doors, 16" x 24" and smaller shall be Ventlok stamped insulated access doors. Door, door frame and pans shall be one piece stamping with 1/2" fiberglass insulation between welded door and pan. Door shall have Ventlok #100 latches, loose pin hinges, sponge rubber gasketing and finished in natural gray high gloss enamel.
3. Provide duct access to all extractors, splitter dampers, fire dampers smoke dampers, smoke detectors, humidifiers, controllers, and sensors, and other devices requiring service, adjustment or inspection. Provide access door for duct cleaning every twenty (20) feet and between each change of direction of ducts if the straight run of duct is less than 20 feet.
4. Lift out ceiling panels may serve as access to adjustment devices on ducts. Damper regulators shall be Ventlok #620, #635, #637, #638, and #639 dial type as required for the particular duty and #635 spring end bearings.
5. Fixed ceiling access doors located for access to adjustment devices in duct must be provided where required.
6. Ceiling adjustment devices: Ventlok #666 concealed damper regulators.
7. Contractor shall coordinate access requirements with the testing and balancing requirements. Establish test and balance openings before shop drawings are submitted.

K. Instrument Test Holes: Furnish instrument test holes, Ventlok #699, at each coil and fan inlet and discharge.

L. Turning Vanes:
1. Provide turning vanes for all rectangular and short radius elbows.
2. Turning vanes in rectangular elbows shall be double wall vanes installed in accordance with Figure 2-3.
3. Short radius elbow vanes shall be installed in accordance with Figure 2-4.

PART 3 - EXECUTION
3.1 INSTALLATION OF DUCTWORK

A. Assemble and install ductwork in accordance with recognized industry practices which will be capable of performing each indicated service. Install each run with a minimum of joints. Align ductwork accurately at connections and with internal surfaces smooth.

B. Install concrete inserts for support of ductwork in coordination with framework, as required to avoid delays in the work.

C. Locate ductwork runs, except as otherwise indicated vertically and horizontally and avoid diagonal runs wherever possible. Hold ducts close to walls, overhead construction, columns, and other structural and permanent-enclosure elements of the building. Limit clearance to 0.5" where furring is shown for enclosure or concealment of ducts. Do not encase horizontal runs in solid partitions, except as specifically shown. Coordinate the layout with suspended ceiling and lighting layouts and similar finished work.

D. Where ducts pass through partitions and exterior walls, conceal the space between the construction opening and the duct with sheet metal flanges. Overlap the opening on all sides by at least 1-1/2". At exterior walls, caulk around exterior flange and pack between duct and wall opening with fiberglass insulation.

E. Coordinate duct installations with installation of accessories, dampers, coil frames, equipment, controls and other associated work of the ductwork system.

F. Ducts shall not have field mitered joints. All offsets will have shop fabricated elbows.

G. Provide temporary closure of polythylene film covering open end ducts which will prevent the entrance of dust and debris until the time connections are to be completed.

3.2 DUCT LEAKAGE TEST

A. Provide duct leakage test on all ductwork in accordance with the guidelines set forth in SMACNA HVAC Air Duct Leakage Test Manual, first edition, 1985.

B. Leakage Classes are as follows:
1. All ductwork from the supply air connection on variable air volume (VAV) air handling units to the inlet connections on the VAV terminal units will be velocity classification 4000 FPM and static pressure classifications + 4" w.g. positive and - 3" w.g. negative.
Duct sealing requirements will be Seal Class A.
Rectangular Duct - Class 6
Round Metal - Class 3
2. All other ductwork, supply, return or exhaust duty will be velocity classification 2500 FPM and static pressure classification 2" w.g., positive or negative. Duct sealing requirements will be Seal Class B.
Rectangular Duct - Class 12
Round Metal - Class 6

C. Seal all audible leaks regardless of test results.

D. Submit test results in "Air Duct Leakage Test Summary" forms as shown on page 6-2 of the SMACNA manual.

"END OF SECTION"

SECTION 15745
WATER COOLED AC UNITS

PART 1 - GENERAL
1.1 WORK INCLUDED

A. Piping insulation.

B. Ductwork insulation.

C. Equipment insulation.

D. Adhesive, tie wires, tapes.

E. Recovering (special additional, finished jackets).

1.2 SUBMITTALS

A. Product Data: Include rated capacities for each model; shipping, installed, and operating weights; furnished specialties; and accessories for each type of product specified.

B. Shop Drawings: From manufacturer, detailing equipment assemblies and indicating dimensions, weights, loadings, required clearances, method of field assembly, components, and location and size of each field connection.
1. Wiring Diagrams: Detail wiring for power, signal, and control systems and differentiate between manufacturer-installed and field-installed wiring.

C. Coordination Drawings: Reflected ceiling plans drawn to scale and coordinating penetrations and ceiling-mounted items. Show the following:
1. Ceiling suspension assembly members.
2. Method of attaching hangers to building structure.
3. Size and location of initial access modules for acoustical tile.
4. Other ceiling-mounted items including light fixtures, diffusers, grilles, speakers, sprinklers, access panels, and special moldings.

D. Samples for Initial Selection: Manufacturer's color charts showing the full range of colors available for units with factory-applied color finishes.

E. Samples for Verification: Of the following products, in manufacturer's standard sizes, showing the full range of color, texture, and pattern variations expected. Prepare Samples from the same material to be used for the Work.

F. Product Certificates: Signed by manufacturers of WATER COOLED AC UNITS certifying that the products furnished comply with requirements.

G. Maintenance Data: For WATER COOLED AC UNITS to include in the maintenance manuals specified in Division 1.

H. Warranties: Special warranties specified in this Section.

1.3 QUALITY ASSURANCE

A. Source Limitations: Obtain WATER COOLED AC UNITS through one source from a single manufacturer.

B. Product Options: Drawings indicate size, profiles, and dimensional requirements of WATER COOLED AC UNITS and are based on the specific system indicated. Other manufacturers' systems with equal performance characteristics may be considered. Refer to Division 1 Section "Substitutions."

C. Listing and Labeling: Provide electrically operated equipment specified in this Section that is listed and labeled.
1. The Terms "Listed" and "Labeled": As defined in the NFPA 70, Article 100.
2. Listing and Labeling Agency Qualifications: A "Nationally Recognized Testing Laboratory" as defined in OSHA Regulation 1910.7.

D. Test and rate WATER COOLED AC UNITS according to ARI 320, "WATER COOLED AC UNITS." Provide ARI certification.

E. Comply with ASHRAE 15, "Safety Code for Mechanical Refrigeration."

F. Comply with the minimum COP/efficiency levels according to ASHRAE 90.1, "Energy Efficient Design of New Buildings except Low-Rise Buildings."

G. Comply with NFPA 70.

H. Comply with safety requirements of UL 484, "Room Air Conditioners," for assembly of free-delivery WATER COOLED AC UNITS.

I. Comply with safety requirements of UL 559, "Heat Pumps," for duct-system connections.

1.4 COORDINATION

A. Coordinate layout and installation of WATER COOLED AC UNITS and suspension components with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system components, and partition assemblies.

B. Coordinate installation of roof curbs, equipment supports, and roof penetrations. These items are specified in Division 7 Section "Roof Accessories."

1.5 WARRANTY

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

B. Special Warranty: Submit a written warranty, executed by the manufacturer, agreeing to repair or replace components of WATER COOLED AC UNITS that fail in materials or workmanship within the specified warranty period.
1. Warranty Period: 5 years from date of Substantial Completion.

1.6 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed, are packaged with protective covering for storage, and are identified with labels describing contents.
1. One set of matched fan belts for each belt-driven fan.
2. One set of filters for each unit.
3. One spare heat-pump unit of each size and model furnished.

PART 2 - PRODUCTS
2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering WATER COOLED AC UNITS that may be incorporated into the Work include, but are not limited to, the following:

B. Manufacturers: Subject to compliance with requirements, provide WATER COOLED AC UNITS by one of the following companies or products from other manufacturers, which can be approved as equivalent by engineer.
1. Bard Manufacturing Company.
2. Carrier Corp.
3. Climate Master, Inc.
4. McQuay International.
5. MESTEK; Hydrotherm Corporation.
6. Trane Co. (The).
7. Water Furnace International, Inc.
8. York International Corporation.

2.2 CONCEALED HORIZONTAL AND VERTICAL WATER COOLED AC UNITS

A. Description: Factory-assembled and -tested, packaged WATER COOLED AC UNITS consisting of cabinet; sealed refrigerant circuit including compressor, refrigerant to water heat exchanger, refrigerant to air heat exchanger, and reversing valve; evaporator fans; refrigeration and temperature controls; filters; dampers; and isolation valves to allow servicing of components in refrigeration circuit.

B. Cabinet: Manufacturer's standard galvanized-steel casing with the following features:
1. Access panels for inspection and access to internal parts.
2. Cabinet Insulation: Glass fiber insulation, 1/2 inch (13 mm) thick, 1.5-lb/cu. ft. (24-kg/cu. m) density.
3. Knockouts for electrical and piping connections.
4. Condensate drain connection.
5. Construct cabinet with compartments, so compressor, reversing valve, and water coil are out of air stream.

C. Evaporator Fans: Direct-driven, centrifugal fan with permanently lubricated motor.

D. Refrigerant-to-Water Heat Exchanger: Coaxial heat exchanger with inner copper water tube and outer steel refrigerant tube.

E. Refrigerant-to-Air Heat Exchanger: Copper-tube coil with aluminum fins.

F. Reversing Valve: Manufacturer's standard control valve designed to be fail-safe in heating position.

G. Compressor: Hermetic compressor installed on vibration isolators and enclosed in acoustically treated enclosure with built-in safeties as follows:
1. High-temperature cutouts.
2. Low-temperature cutouts.
3. Compressor motor overload protection.
4. Capability to reset compressor lockout circuit at either remote thermostat or circuit breaker.

H. Refrigerant Piping Materials: Drawn-temper, Type ACR copper tube with wrought-copper fittings and brazed joints. Insulate refrigerant piping with 3/8-inch- (10-mm-) thick, flexible elastomeric insulation.
1. Insulation Fire-Performance Rating: 25 flame-spread and 50 smoke-developed rating according to ASTM E 84.

I. Unit Controls: Manufacturer's standard electromechanical, factory-mounted and -wired controls, including fan, reversing-valve, and heat- and cool-function controls.

J. Unit Controls: Field-installed, single-stage, manual-changeover thermostat with cool/off/heat system switch, on/off fan switch, and no deadband.

K. Unit Controls: Field-installed, single-stage, manual-changeover thermostat, with cool/off/heat system switch, auto/on fan switch, and adjustable deadband.

L. Unit Controls: Field-installed, single-stage, automatic-changeover thermostat, with auto/off system switch, auto/on fan switch, and adjustable deadband.

M. Unit Controls: Field-installed, single-stage, automatic-changeover thermostat, with auto/off system switch, auto/on fan switch, light-emitting diode alarm indicator, and adjustable deadband.

N. Unit Controls: Field-installed, single-stage, automatic-changeover thermostat, with auto/off system switch, auto/on fan switch, night setback, and adjustable deadband.

O. Unit Controls: Field-installed, programmable, manual-changeover thermostat, with cool/off/heat system switch, auto/on fan switch, and 7-day programming.
1. ASHRAE BACnet(TM) Compatibility: Controls compatible with ASHRAE BACnet(TM) protocol.
2. Relays: Provide each unit with 2 factory-mounted and -wired relays to facilitate interface with energy management and control systems.

P. Filters: Glass-fiber throwaway type, 1/2 inch (13 mm) thick, located in return-air stream.

Q. Dampers: Motorized, outside-air dampers that open when unit is energized with a manual-override switch.

R. Hangers: Isolate horizontal suspended units with vibration isolation hangers.

S. Factory-installed lubrication lines and external fittings extended for servicing fan bearings.

T. Hose Kit: 36 inches (900 mm) long by 1-inch- (25-mm-) diameter hose with automatic self-balancing valve and strainer.

2.3 FACTORY FINISHES

A. Manufacturer's standard prime-coat finish ready for field painting.

B. Finish: Manufacturer's standard color paint applied to factory-assembled and -tested units before shipping.

2.4 SOURCE QUALITY CONTROL

A. Factory test and rate heat exchangers for 400-psig (2760-kPa) refrigerant working pressure, minimum.

PART 3 - EXECUTION
3.1 EXAMINATION

A. Examine areas and conditions for compliance with requirements for installation tolerances, other specific conditions, and other conditions affecting performance of WATER COOLED AC UNITS. Do not proceed with installation until unsatisfactory conditions have been corrected.

B. Examine piping and electric rough installations for WATER COOLED AC UNITS to verify actual locations of piping connections before installation.

3.2 INSTALLATION

A. Install WATER COOLED AC UNITS according to manufacturer's written instructions.

B. Install units level and plumb, firmly anchored in locations indicated, and maintain manufacturer's recommended clearances.

3.3 CONNECTIONS

A. Piping Connections: Drawings indicate the general arrangement of piping, fittings, and specialties. Specific connection requirements are as follows:
1. Connect supply and return piping to heat pump with unions and shutoff valves.
2. Connect heat-pump drain pan to nearest indirect waste connection, or as indicated.

B. Duct Connections: Connect supply and return ducts to heat pumps with flexible duct connections. Provide transitions to match unit duct-connection size.

C. Install electrical devices furnished by manufacturer but not specified to be factory mounted.

D. Ground equipment.
1. Tighten electrical connectors and terminals according to manufacturer's published torquetightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.4 CLEANING

A. Replace filters used during construction.

3.5 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Provide services of a factory-authorized service representative to supervise the field assembly of components and installation of WATER COOLED AC UNITS, including piping and electrical connections. Report results in writing.
1. Test and adjust controls and safeties.
2. Replace damaged and malfunctioning controls and equipment.

3.6 COMMISSIONING

A. Startup Services: Engage a factory-authorized service representative to perform startup services.

B. Operate fan motors and verify proper rotation and connections.

C. Operate controls and verify proper response to control inputs.

3.7 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel as specified below:
1. Train Owner's maintenance personnel on procedures and schedules related to startup and shutdown, troubleshooting, servicing, and preventive maintenance.
2. Review data in the maintenance manuals specified in Division 1.
3. Schedule training with Owner, through Architect, with at least 7 days' advance notice.

“END OF SECTION”

SECTION 15250
PIPING AND EQUIPMENT INSULATION

PART 1 - GENERAL
1.1 WORK INCLUDED

A. Piping insulation.

B. Ductwork insulation.

C. Equipment insulation.

D. Adhesive, tie wires, tapes.

E. Recovering (special additional, finished jackets).

1.2 FIRE AND SMOKE HAZARD RATING

A. All insulation materials, adhesives, coatings and other accessories shall have a fire hazard rating not to exceed 25 for flame spread and 50 for fuel contributed and smoke developed as determined by ASTM E 84, NFPA No. 255 or UL 723.

B. Label or Listing: Underwriters Laboratories, Inc., label or listing, satisfactory test results from the National Bureau of Standards, or satisfactory certified test report from an approved testing laboratory will be required to indicate that fire hazard ratings for materials proposed for use do not exceed those specified. When insulation, vapor barrier covering, wrapping materials, and adhesives are applied separately in the field, each item shall be tested individually. When insulation, vapor barrier covering, wrapping materials, and adhesives are factory composite systems, they shall be tested as an assembly.

1.3 SUBMITTALS

A. Submit shop drawings which indicate complete material data, a list of materials proposed for this project and indicate thickness of material for individual services.

B. Submit samples of proposed insulating materials upon request.

1.4 MANUFACTURER-INSTALLER

A. All insulation materials shall be as manufactured, and installed by the authorized installation agencies of: Armstrong, CertainTeed, Johns-Manville, Knauf, Owens-Corning Fiberglas, Rubatex, or equivalent as approved by the Engineer.

PART 2 - PRODUCTS
2.1 MATERIALS

A. Cold Piping: Fine glass fiber insulation, with factory applied vapor barrier jacket, molded to conform to piping, "k" value of 0.24 maximum at 75 F. Perm rating not to exceed 0.02.

B. Hot Piping: Fine glass fiber insulation with factory applied general purpose jacket, molded to conform to piping, "k" value of 0.25 maximum at 75 F.

C. Roof Drain Bodies, and Above Grade Storm Piping: Flexible glass fiber insulation, "k" value of 0.26 maximum at 75 F, with all service jacket, stapled and sealed with vapor barrier mastic. Perm rating not to exceed 0.02.

D. Concealed ductwork (as specified), flexible glass fiber insulation "k" value of 0.26 maximum at 75 F, with factory applied reinforced aluminum foil vapor barrier jacket. Perm rating not to exceed 0.02.

E. Exposed ductwork (as specified), rigid board glass fiber insulation with all purpose vapor barrier jacket or FSK vapor barrier jacket. Nominal density 4 lb. pcf. Temperature minus 60 F to 450 F. The "k" value not to exceed 0.23. Perm rating not to exceed .01. Exposed ductwork in gymnasium shall not be insulated.

PART 3 - EXECUTION
3.1 APPLICATION

A. The application recommendations and instructions of the insulation manufacturer are of the essence of this specification and are incorporated herein by reference.

B. Insulation shall be applied on clean, dry surfaces, and after inspection, testing and release for insulation application.

C. All insulation shall be continuous through walls (except duct insulation through fire walls), ceiling openings and sleeves.

D. Insulation on cold surfaces where vapor barrier jackets are used shall be applied with a continuous, unbroken vapor seal. Hangers, supports, anchors, etc., that are secured directly to cold surfaces must be adequately insulated and vaporsealed to prevent condensation.

E. Vapor barrier jacketed pipe covering shall be installed with hangers outside the jacket.

F. Cold Piping: Cover fittings and valves with equivalent thickness of insulation material. Cover with open mesh glass cloth sealed with vapor barrier sealant. Seal lap joints with 100 percent coverage of vapor barrier sealant and adhesive. Seal butt joints with 4 inch wide strips of vapor barrier sealed with vapor barrier adhesive. For exposed fittings and valve, apply hydraulic setting cement paste over insulation material before applying recovering.

G. Hot Piping: Cover fittings and valves with equivalent thickness of insulation material. For exposed fittings and valves apply hydraulic setting cement paste over insulating material before applying recovering.

H. Refrigerant Piping: Cover fittings and valves with equivalent thickness of insulation material. Apply with edges tightly butted. Seal joints with vapor barrier tape or sealer.

I. Blanket Duct Insulation, Roof Drain Bodies and Conductors: Insulation shall be adhered to duct surface with fire-retardant adhesive applied in 6" wide strips on 12" centers, and wired with #16 galvanized annealed wire on 24" centers. Mechanical fasteners on 12" centers may be used in lieu of wire. All joints shall be sealed with tape of material similar to facing, not less than 4" wide, ends lapped at least 3" or sealed with 2" lap of facing glued down with fire-retardant adhesive. All penetrations of vapor barrier shall be sealed with adhesive. Sagging insulation will not be acceptable.

J. Rigid Duct Insulation: Application of rigid board insulation shall be by impaling board on welded pins, or mechanical fasteners with suitable washers or clips on 12" to 18" centers with a minimum of two rows of fasteners per side. Seal all joints, cracks and breaks with vapor barrier mastic worked in joints and tape adhered with vapor barrier mastic.

K. Insulate exposed hot and cold water supplies and trap and waste pipe for each handicap, sink and lavatory to be Tru-Bro Handi-Lav Guard Model 102G insulating kit with accessory #105.

L. Insulation of piping, ductwork, equipment, etc. inside of the building will be protected from the weather at all times and only be applied after the building is closed-in and weather tight.

M. Insulation of piping, ductwork, equipment, etc. outdoors will be protected from weather at all times and be applied during times when weather is clear. Protect unfinished insulation by covering with weatherproof material.

N. Any insulation damaged by the weather, that becomes wet for any reason or is otherwise damaged will be completely removed and replaced.

O. Deliver material to job site in original non-broken factory packaging, labeled with manufacturer's density and thickness.

P. Perform work at ambient and equipment temperatures as recommended by the adhesive manufacturer.

3.2 APPLICATION TO SPECIAL FITTINGS & SPECIAL SHAPES INCLUDING FINISHES

A. Flexible foams plastic pipe and sheet insulation: 100% coverage of adhesive and apply two coats of grey epoxy paint to cover.

B. Glass fiber pipe insulation: Molded or mitered pieces adhered with adhesive. Cold pipe condition: cover with vapor barrier mastic and recovering. Apply open mesh glass cloth set in two coats of foster 30-36 or PVC covers.

3.3 PIPE SADDLES

A. Flexible foamed plastic pipe insulation: provide rigid insulation section and 16 gauge x 9" galvanized steel saddle at each hanger.

B. Glass fiber pipe insulation, hot and cold piping: provide 16 gauge x 12" galvanized saddle at each hanger for pipe sizes up to 2 ½" inches. For piping 3 inches and larger, provide 16 gauge x 12" galvanized saddle and ½ section calcium silicate or treated wood insert at hanger.

3.4 FINISHES IN EXPOSED LOCATIONS

A. Piping, duct or equipment exposed to water or weather shall have an additional covering with .016 gauge aluminum jacket with felt backing, held in place with aluminum bands, spaced on 12" centers. Flanges, fittings and valves exposed to outdoor weather shall have an additional covering of weatherproof mastic, reinforced with open mesh glass fabric applied in two coats of sufficient thickness to give a 1/8" dry coat. Joints of jacketing shall be sealed with mastic to prevent penetration of water to the insulation. Heat trace all piping before applying insulation.

B. Ducts exposed to weather shall be insulated by either of the following methods:
Method 1: Tape all joints and seams with hard cast before applying insulation. Insulate with two inches of rigid board duct insulation as specified above complete with vapor barrier jacket. Weather protected as follows: Apply coat of weatherproof mastic and embed into tack coat a layer of open weave glass cloth. Smooth membrane to avoid wrinkles and overlap all seams at least 2". Apply finish coat of same type mastic. The total thickness of coating shall be a minimum of 1/8".
Method 2: Tape all joints and seams with hard cast before applying insulation. Ductwork exposed to weather shall have urethane foam sprayed in place, 2" thick. An elastomeric coating in at least 30 mils thickness will be sprayed over the urethane. Materials shall be as manufactured by Witco or equal. Coating shall be equal to Insulcoustic M.O.H.
The insulation on all ductwork exposed to weather will be tapered, by varying the thickness of the insulation, to provide for drainage of water from the top of the insulated ducts. The slope of

the taper shall be a minimum of one inch per foot. The minimum insulation thickness will be two inches.

3.5 INSULATION THICKNESS SCHEDULE

The following schedule indicates the piping ductwork and equipment to be insulated and the thickness of the insulation to be used.
NOTE: If Victaulic fittings are used on piping requiring insulation, this contractor will provide additional insulation over fittings as required to meet thickness listed here.
Pipe Insulation
Sizes Thickness

A. Piping Inches Inches
Domestic Cold Water Up to 2 ½
Piping Over 2 1
Domestic Hot Water Circulating Lines 1½
Piping Runouts 1
Roof Drains, Storm All Sizes 1
Piping Above Grade
Air Conditioning All Sizes ½
Condensate Drains

B. Ductwork
Description Thickness-Inches
All concealed supply, return, fresh
air, 2
Concealed:
- return air ducts 2
- Return air ducts 2
- Supply air ducts 2
All exposed supply, return 1
Exposed:
- Fresh air ducts 2
- Combination fresh air/
return air ducts 1
- Return air ducts 1
- Supply air ducts 1

NOTE: Omit insulation on sound lined ductwork provided the sound lining provides complete coverage.
Ductwork exposed to weather apply two coats of anti-rust paint. Color to be selected by the Architect.

"END OF SECTION"

SECTION 15200
NOISE AND VIBRATION ISOLATION

PART 1 - GENERAL
1.1 DESCRIPTION

A. All items of equipment, whether suspended, floor-mounted or otherwise supported, which are capable of producing vibration, shall be installed with vibration isolation in accordance with these specifications and the recommendations of the isolation equipment manufacturer and as accepted by the Engineer. The isolation shall prevent the transmission of objectionable noise or vibration to the building structure.

B. All isolators and isolation materials shall be of the same manufacture and shall be selected and certified, using published or factory-certified data, that all such isolators or isolation materials comply with these specifications. Should any noise or vibration be objectionable to the Owner, field instrumentation tests and measurements shall be made by the isolator manufacturer or his authorized representative to determine source and cause of such disturbance, and the necessary steps taken to correct such causes at no additional cost to Owner. Any variance or noncompliance with these specification requirements shall be corrected by the Contractor in an approved manner and retested.

C. The Contractor and manufacturer of isolation equipment shall refer to drawings and details.

D. The Contractor shall submit in one brochure, for approval data showing disturbing frequency (lowest RPM of rotating equipment), supported weight, static deflection or natural frequency, and calculations supporting same for each isolator he proposes to use. Vibration isolators shall be so selected as to produce uniform loading and deflection even when equipment weight is not evenly distributed. Vibration isolation shall be stable during starting and stopping of equipment without excessive traverse and eccentric movement of equipment. Vibration isolators shall be selected for lowest operating speed of equipment. Refer to Schedule below.

1.2 ISOLATION EFFICIENCIES AND DEFLECTION

A. Vibration isolators for equipment installed on grade or equipment up to one hp installed on floors other than grade selected for the following minimum isolation efficiencies, unless otherwise noted:
Below 450 rpm - Shock absorption application 0.60" to 0.25" deflection.
450-599 rpm - 80% eff. 0.50" to 1.0" deflection.
600-900 rpm - 90% eff. 1.0" to 0.74" deflection.
901-1750 rpm - 90% eff. 0.50" to 0.25" deflection.
Above 1750 rpm - 90% eff. 0.15" to 0.60" deflection.
B. Vibration isolators for equipment above one hp and installed on floors other than one grade, shall have following minimum deflections or efficiencies, unless otherwise noted:
Below 45 rpm - 80% to 90% eff. 3.0" deflection.
450 to 599 rpm - 90% eff. 2.0" to 1.1" deflection.
600 rpm and up - 90% of better eff. 1.0" deflection.

1.3 FOUNDATIONS FOR MACHINERY

A. All equipment is to be mounted on housekeeping pads (sub-bases). In addition, either structural or concrete inertia blocks shall be provided for isolated machinery such as fans, and compressors. This Contractor shall provide detail drawings showing size and location of sub-bases to General Contractor who will build structural slabs.

B. Each electric motor shall be mounted on the same base as the driven machine except for utility

sets, HV and AC units, etc., where motor is mounted on the unit.

C. Contractor shall furnish wood or sheet-metal forms for inertia blocks, where required. Forms shall be complete with reinforcement bars secured in place, and where required, metal "Pockets" for recessing of mountings. Pockets to be furnished by isolation manufacturer when height of sub-base, mounting and block exceeds 22".

D. Foundations for machines having reciprocating parts and machine driven through flexible or rigid couplings shall be of 2500 psi concrete with all exposed surfaces, except those that have steel protection, finished with cement mortar, trowelled smooth. Inertia blocks shall be mounted on spring isolators with a minimum of 1.0" deflection.

E. Machines shall be secured to concrete foundations with anchor bolts of ample size. Bolts shall have bottom plates and pipes sleeves and shall be securely embedded in the concrete. All machines having bedplates and flexibility or solidly coupled motors shall be grouted under the full area of the bedplates with nonshrinking, premixed grout. After grout has se, all wedges, shims and jack-bolts shall be removed and the space filled with grout.

1.4 BASES FOR FANS, AND COMPRESSORS

A. Up to 1-1/2 hp: Structural channel base between equipment and vibration isolators.

B. 2 to 10 hp: Reinforced concrete inertia block equal to weight of equipment.

C. 15 to 50 hp: Reinforced concrete inertia block equal to 1-1/2 times weight of equipment.

D. 60 hp and over: Reinforced concrete inertia block 2 times weight of equipment.

E. Weight of equipment shall include pump or compressor, driven motor and base plate. Weight of non-moving parts may be credited to inertia block weight.

F. Inertia blocks will not exceed 16" height.

1.5 VIBRATION ISOLATION FOR PIPE

A. Furnish vibration isolation on all piping except fire standpipe and sprinkler piping in the following locations:

B. Piping connected to vibrating or rotating equipment for a distance of not less than 50 feet from equipment and throughout the Boiler Rooms and the Mechanical Equipment Rooms. Vibration isolators selected for same deflection as that of connecting equipment, but not more than 1½" and not less than ¼.

C. Vibration isolators shall be either a combination neoprene and spring type, just spring or just neoprene for deflection requirements ranging from 1½" to ¼".

PART 2 - PRODUCTS
2.1 MANUFACTURERS

A. Mason Industries, Inc.

B. Peabody Kinetics

C. Vibration Mountings and Controls, Inc.

D. Amber-Booth, or

Any manufacturer’s items, which are approved equal.

2.2 TYPES OF ISOLATORS

A. Static deflection up to ¼" - Single neoprene-in-shear mounting or pads.

B. Static deflection 5/16" to ½" - Double neoprene-in-shear mountings.

C. Static deflection above ½" - Spring isolators.

D. Neoprene-in-shear isolators shall have bolt holes for bolting to equipment base and shall be mounted on bottom steel plates for bolting to sub-base when type base requires it. These isolators are to be molded in color coded oil-resistant neoprene for easy identification of capacity. All metal parts of isolator to be embedded in neoprene.

E. Spring vibration mountings shall consist of cast telescoping housings containing one or more steel springs of 2" minimum diameter. Spring deflection shall range from 1.0" to 3.0" deflection as required. The mounting shall have built-in leveling device, neoprene stabilizers for vertical and lateral motion control without binding, and a corrugated neoprene acoustical pad bonded to the base, where used under concrete inertia block, furnish pad on top and bottom plate.

F. Neoprene pads shall consist of cross-ribbed neoprene, 3/8" thick, with alternately raised ribs to insure adequate deflections over a load range of 20 to 70 psi. Where concentrated load bearing is encountered, steel bearing plates shall be bonded to neoprene pads to spread the load.

2.3 FLEXIBLE PIPE CONNECTIONS

A. Connectors shall be same size as connected piping and shall be approved equal to Vibration Mountings "Quite-Sphere Expansion Joints". The body shall be constructed of molded neoprene and nylon. Flanges shall be cadmium plated steel flanges. Joints shall be capable of four way performance, elongation, compression, lateral and angular deflection. Working pressure shall be 225 psi. Working temperature shall be 240 degrees F.

B. Connectors shall be required at all chiller and pump connection.

2.4 ISOLATORS EXPOSED TO WEATHER

A. Outdoor spring isolators steel parts shall be hot dipped galvanized, except springs which shall be neoprene coated.

PART 3 - EXECUTION
3.1 INSTALLATION

A. Except as otherwise indicated, comply with manufacturer's instructions for the installation and load application to vibration isolation materials and units. Adjust to ensure that units do not exceed rated operating deflections or bottom out under loading, and are not short-circuited by other contacts or bearing points. Remove space blocks and similar devices (if any) intended for temporary protection against overloading during installation.

B. Locate isolation hangers as near the overhead support structure as possible.

C. Adjust leveling devices as required to distribute loading uniformly onto isolators. Shim units as required where leveling devices cannot be used to distribute loading properly.

D. Install inertia base frames on isolator units as indicated, so that a minimum of 1" clearance below

base will result when frame is filled with concrete and supported equipment has been installed and loaded for operation.

"END OF SECTION"

SECTION 15200
NOISE AND VIBRATION ISOLATION

PART 1 - GENERAL
1.1 DESCRIPTION

A. All items of equipment, whether suspended, floor-mounted or otherwise supported, which are capable of producing vibration, shall be installed with vibration isolation in accordance with these specifications and the recommendations of the isolation equipment manufacturer and as accepted by the Engineer. The isolation shall prevent the transmission of objectionable noise or vibration to the building structure.

B. All isolators and isolation materials shall be of the same manufacture and shall be selected and certified, using published or factory-certified data, that all such isolators or isolation materials comply with these specifications. Should any noise or vibration be objectionable to the Owner, field instrumentation tests and measurements shall be made by the isolator manufacturer or his authorized representative to determine source and cause of such disturbance, and the necessary steps taken to correct such causes at no additional cost to Owner. Any variance or noncompliance with these specification requirements shall be corrected by the Contractor in an approved manner and retested.

C. The Contractor and manufacturer of isolation equipment shall refer to drawings and details.

D. The Contractor shall submit in one brochure, for approval data showing disturbing frequency (lowest RPM of rotating equipment), supported weight, static deflection or natural frequency, and calculations supporting same for each isolator he proposes to use. Vibration isolators shall be so selected as to produce uniform loading and deflection even when equipment weight is not evenly distributed. Vibration isolation shall be stable during starting and stopping of equipment without excessive traverse and eccentric movement of equipment. Vibration isolators shall be selected for lowest operating speed of equipment. Refer to Schedule below.

1.2 ISOLATION EFFICIENCIES AND DEFLECTION

A. Vibration isolators for equipment installed on grade or equipment up to one hp installed on floors other than grade selected for the following minimum isolation efficiencies, unless otherwise noted:
Below 450 rpm - Shock absorption application 0.60" to 0.25" deflection.
450-599 rpm - 80% eff. 0.50" to 1.0" deflection.
600-900 rpm - 90% eff. 1.0" to 0.74" deflection.
901-1750 rpm - 90% eff. 0.50" to 0.25" deflection.
Above 1750 rpm - 90% eff. 0.15" to 0.60" deflection.
B. Vibration isolators for equipment above one hp and installed on floors other than one grade, shall have following minimum deflections or efficiencies, unless otherwise noted:
Below 45 rpm - 80% to 90% eff. 3.0" deflection.
450 to 599 rpm - 90% eff. 2.0" to 1.1" deflection.
600 rpm and up - 90% of better eff. 1.0" deflection.

1.3 FOUNDATIONS FOR MACHINERY

A. All equipment is to be mounted on housekeeping pads (sub-bases). In addition, either structural or concrete inertia blocks shall be provided for isolated machinery such as fans, and compressors. This Contractor shall provide detail drawings showing size and location of sub-bases to General Contractor who will build structural slabs.

B. Each electric motor shall be mounted on the same base as the driven machine except for utility

sets, HV and AC units, etc., where motor is mounted on the unit.

C. Contractor shall furnish wood or sheet-metal forms for inertia blocks, where required. Forms shall be complete with reinforcement bars secured in place, and where required, metal "Pockets" for recessing of mountings. Pockets to be furnished by isolation manufacturer when height of sub-base, mounting and block exceeds 22".

D. Foundations for machines having reciprocating parts and machine driven through flexible or rigid couplings shall be of 2500 psi concrete with all exposed surfaces, except those that have steel protection, finished with cement mortar, trowelled smooth. Inertia blocks shall be mounted on spring isolators with a minimum of 1.0" deflection.

E. Machines shall be secured to concrete foundations with anchor bolts of ample size. Bolts shall have bottom plates and pipes sleeves and shall be securely embedded in the concrete. All machines having bedplates and flexibility or solidly coupled motors shall be grouted under the full area of the bedplates with nonshrinking, premixed grout. After grout has se, all wedges, shims and jack-bolts shall be removed and the space filled with grout.

1.4 BASES FOR FANS, AND COMPRESSORS

A. Up to 1-1/2 hp: Structural channel base between equipment and vibration isolators.

B. 2 to 10 hp: Reinforced concrete inertia block equal to weight of equipment.

C. 15 to 50 hp: Reinforced concrete inertia block equal to 1-1/2 times weight of equipment.

D. 60 hp and over: Reinforced concrete inertia block 2 times weight of equipment.

E. Weight of equipment shall include pump or compressor, driven motor and base plate. Weight of non-moving parts may be credited to inertia block weight.

F. Inertia blocks will not exceed 16" height.

1.5 VIBRATION ISOLATION FOR PIPE

A. Furnish vibration isolation on all piping except fire standpipe and sprinkler piping in the following locations:

B. Piping connected to vibrating or rotating equipment for a distance of not less than 50 feet from equipment and throughout the Boiler Rooms and the Mechanical Equipment Rooms. Vibration isolators selected for same deflection as that of connecting equipment, but not more than 1½" and not less than ¼.

C. Vibration isolators shall be either a combination neoprene and spring type, just spring or just neoprene for deflection requirements ranging from 1½" to ¼".

PART 2 - PRODUCTS
2.1 MANUFACTURERS

A. Mason Industries, Inc.

B. Peabody Kinetics

C. Vibration Mountings and Controls, Inc.

D. Amber-Booth, or

Any manufacturer’s items, which are approved equal.

2.2 TYPES OF ISOLATORS

A. Static deflection up to ¼" - Single neoprene-in-shear mounting or pads.

B. Static deflection 5/16" to ½" - Double neoprene-in-shear mountings.

C. Static deflection above ½" - Spring isolators.

D. Neoprene-in-shear isolators shall have bolt holes for bolting to equipment base and shall be mounted on bottom steel plates for bolting to sub-base when type base requires it. These isolators are to be molded in color coded oil-resistant neoprene for easy identification of capacity. All metal parts of isolator to be embedded in neoprene.

E. Spring vibration mountings shall consist of cast telescoping housings containing one or more steel springs of 2" minimum diameter. Spring deflection shall range from 1.0" to 3.0" deflection as required. The mounting shall have built-in leveling device, neoprene stabilizers for vertical and lateral motion control without binding, and a corrugated neoprene acoustical pad bonded to the base, where used under concrete inertia block, furnish pad on top and bottom plate.

F. Neoprene pads shall consist of cross-ribbed neoprene, 3/8" thick, with alternately raised ribs to insure adequate deflections over a load range of 20 to 70 psi. Where concentrated load bearing is encountered, steel bearing plates shall be bonded to neoprene pads to spread the load.

2.3 FLEXIBLE PIPE CONNECTIONS

A. Connectors shall be same size as connected piping and shall be approved equal to Vibration Mountings "Quite-Sphere Expansion Joints". The body shall be constructed of molded neoprene and nylon. Flanges shall be cadmium plated steel flanges. Joints shall be capable of four way performance, elongation, compression, lateral and angular deflection. Working pressure shall be 225 psi. Working temperature shall be 240 degrees F.

B. Connectors shall be required at all chiller and pump connection.

2.4 ISOLATORS EXPOSED TO WEATHER

A. Outdoor spring isolators steel parts shall be hot dipped galvanized, except springs which shall be neoprene coated.

PART 3 - EXECUTION
3.1 INSTALLATION

A. Except as otherwise indicated, comply with manufacturer's instructions for the installation and load application to vibration isolation materials and units. Adjust to ensure that units do not exceed rated operating deflections or bottom out under loading, and are not short-circuited by other contacts or bearing points. Remove space blocks and similar devices (if any) intended for temporary protection against overloading during installation.

B. Locate isolation hangers as near the overhead support structure as possible.

C. Adjust leveling devices as required to distribute loading uniformly onto isolators. Shim units as required where leveling devices cannot be used to distribute loading properly.

D. Install inertia base frames on isolator units as indicated, so that a minimum of 1" clearance below

base will result when frame is filled with concrete and supported equipment has been installed and loaded for operation.

"END OF SECTION"

SECTION 15190
PIPING AND EQUIPMENT IDENTIFICATION SYSTEM

PART 1 - GENERAL
1.1 DESCRIPTION

A. Provide pipe, valve, and equipment identification system as specified herein.

B. Submit manufacturer's catalog data in each item proposed for approval.

C. Manufacturers: Seton Name Plate Corp., W. H. Brady Co., or approved equal.

1.2 RELATED SECTIONS

A. Section 09900 - Painting: Identification painting.

1.3 REFERENCES

A. ASME A13.1 - Scheme for the identification of Piping Systems.

1.4 SUBMITTALS

A. Submit under provisions of Section 01300.

B. Submit list of wording, symbols, letter size, and color coding for mechanical identification.

C. Submit valve chart and schedule, including valve tag number, location, function, and valve manufacturer's name and model number.

D. Product Data: Provide manufacturer's catalog literature for each product required.

PART 2 - PRODUCTS
2.1 NAMEPLATES

A. Description: Laminated three-layer plastic with engraved black letters on light contrasting background color.

2.2 TAGS

A. Plastic Tags: Laminated three-layer plastic with engraved black letters on light contrasting background color. Tag size minimum 1½ inch diameter.

B. Chart: Typewritten letter size list in anodized aluminum frame.

2.3 STENCILS

A. Stencils: With clean cut symbols and letters of following size:
1. ¾ to 1¼" Outside Diameter of Insulation or Pipe: 8" long color field, ½" high letters.
2. 1½ to 2" Outside Diameter of Insulation or Pipe: 8" long color field, ¾ high letters.
3. 2½ to 6" Outside Diameter of Insulation or Pipe: 12" long color field, 1¼" high letters.
4. 8 to 10" Outside Diameter of Insulation or Pipe: 24" long color field, 2½" high letters.
5. Over 10" Outside Diameter of Insulation or Pipe: 32" long color field, 3½" high letters.
6. Ductwork and Equipment: 2½" high letters.

B. Stencil Paint: As specified in Section 09900, semi -gloss enamel, colors conforming to ASME A13.1.

2.3 PIPE MARKERS

A. Color: Conform to ASME A13.1.

B. Plastic Pipe Markers: Factory fabricated, flexible, semirigid plastic, preformed to fit around pipe or pipe covering; minimum information indicated flow direction arrow and identification of fluid being conveyed.

C. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printing markings.

D. Underground Plastic Pipe Markers: Bright colored continuously printed plastic ribbon tape, minimum 6 inches wide by 4 mil thick, manufactured for direct burial service.

2.4 CEILING TACKS

A. Description: Steel with ¾" diameter color coded head.

B. Color Code as follows:
1. Yellow - HVAC Equipment
2. Red - Fire dampers/smoke dampers
3. Green - Plumbing valves
4. Blue - Heating/cooling valves

PART 3 - EXECUTION
3.1 PREPARATION

A. Degrease and clean surfaces to receive adhesive for identification materials.

B. Prepare surfaces in accordance with Section 09900 for stencil painting.

3.2 INSTALLATION

A. Install plastic nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.

B. Install tags with corrosion resistant chain.

C. Apply stencil painting in accordance with manufacturer's instructions.

D. Install plastic pipe markers in accordance with manufacturer's instructions.

E. Install underground plastic pipe markers 6 to 8 inches below finished grade, directly above buried pipe.

F. Identify Roof top units, tanks, and Fans with stencil painting. Small devices, such as in-line pumps, may be identified with tags.

G. Identify control panels and major control components outside panels with plastic nameplates.

H. Identify thermostats relating to terminal boxes or valves with nameplates.

I. Identify valves in main and branch piping with tags.

J. Identify piping, concealed or exposed, with plastic pipe markers. Plastic tape pipe markers or

stenciled painting. Use tags on piping ¾ inch diameter and smaller. Identify service, flow direction, and pressure. Install in clear view and align with axis of piping. Locate identification service, flow direction, and pressure. Install in clear view and align with axis of piping. Located identification not to exceed 20 feet on straight runs including risers and drops, adjacent to each valve and Tee, at each side of penetration of structure or enclosure, and at each obstruction.

K. Provide ceiling tacks to located valves or dampers above T-bar type panel ceilings. Locate in corner of panel closest to equipment.

L. Identification symbols and colors.
SERVICE COLOR STENCIL
Cold Water Potables " Potable Water
Hot Water " HW
Hot Water Recirculating " HWR
Gas " GAS
Oil " OIL
Air " AIR

"END OF SECTION"

SECTION 15170
ELECTRICAL REQUIREMENTS OF MECHANICAL WORK

PART 1 - GENERAL
1.1 DESCRIPTION OF WORK

A. The extent of electrical provisions to be provided as mechanical work is indicated in other Division 15 sections, on the drawings and as further specified in this section.

B. The types of work, normally recognized as electrical but provided as mechanical, specified or partially specified in this section, include but are not necessarily limited to the following:
1. Motors for mechanical equipment shall be furnished and installed by mechanical contractor.
2. Starters for motors of mechanical equipment shall be furnished by mechanical contractor and installed by electrical contractor.
3. Float control switches, thermostats and similar mechanical-electrical devices necessary for proper operation of mechanical systems shall be furnished and installed by mechanical contractor.
4. Wiring to pushbuttons, thermostats, pilot lights, interlocks and similar devices as required shall be furnished and installed by mechanical contractors.
5. All power wiring between the panelboard circuit breaker and the motor terminals, no matter how many disconnects, starters, etc. are included, shall be installed by the electrical contractor. If the equipment is a package unit prewired to a single connection point, only the wiring from the circuit breaker to this point is by the electrical contractor.
6. Where motor control center is furnished (and installed) by electrical contractor for specific motors, the mechanical contractor shall not furnish starters for those specific motors, the mechanical contractor shall furnish electrical contractor with starter requirements to insure proper operation of those motors.

1.2 QUALITY ASSURANCE

A. Coordination with Electrical Work: Wherever possible, match the elements of the electrical work specified in Division 16 sections. Comply with the applicable requirements of Division 16 for electrical work of this section, which is not otherwise specified.

B. Standards: For electrical equipment and products, comply with applicable NEMA standards, and refer to NEMA standards for definitions of terminology herein. Comply with National Electrical Code for workmanship and installation requirements.

PART 2 - PRODUCTS
2.1 MOTORS

A. Motor Characteristics: Except where more stringent requirements are indicated, and except where required item of mechanical equipment cannot be obtained with a fully complying motor, comply with the following requirements for motors of mechanical work:
1. Temperature Rating: Rated for 40 degree C environment with a maximum 50 degree C temperature rise for continuous duty at full load (Class A Insulation).
2. Starting Capability: Provide each motor capable of making starts as frequently as indicated by the automatic control system, and not less than 5 starts per hour for manually controlled motors.
3. Phases and Current Characteristics: Provide squirrel-cage induction polyphase motors for 1/2 hp and larger, and provide capacitor-start single-phase motors for 1/3 hp and smaller. Coordinate current characteristics with power specified in Division 16 sections, and with individual equipment requirements specified in other Division 15 requirements. For 2-speed motors provide 2 separate windings on polyphase

motors. Do not purchase motors until power characteristics available at locations of motors have been confirmed, and until rotation directions have been confirmed.
4. Service Factor: 1.15 for polyphase motors and 1.35 for single-phase motors.

B. Motor Construction: Provide general purpose, continuous duty motors, Design "B" except "C" where required for high starting torque.

C. Bearings: Ball or roller bearings with inner and outer shaft seals, regreasable except permanently sealed where motor is normally inaccessible for regular maintenance. Where belt drives and other drives produce lateral or axial thrust in the motor, provide bearings designed to resist the thrust loading. Refer to individual sections of Division 15 for fractional-hp light-duty motors where sleeve-type bearings are permitted.

D. Enclosure Type: Except as otherwise indicated, provide open dip-proof motors for indoor use where satisfactorily housed or remotely located during operation, and provide guarded drip-proof motors where exposed to contact by employees or building occupants. Provide weather-protected Type I for outdoor use, Type II where not housed. Refer to individual sections of Division 15 for other enclosure requirements.

E. Overload Protection: Provide built-in thermal overload protection and, where indicated, provide internal sensing device suitable for signaling and stopping the motor at the starter.

F. Minimum motor efficiencies for all motors supplied for this project shall be:
-1 thru 10 horsepower, 89.5% eff.
-15 thru 100 horsepower, 94.1% eff.

G. Provide motor size for duty to be performed, not exceeding the full-load nameplate current rating when driven equipment is operated at specified capacity under most severe conditions likely to be encountered. When motor size provided differs from size indicated or specified, make adjustments to wiring, disconnect devices, and branch circuit protection at no cost to accommodate equipment actually provided.

2.2 MOTOR CONTROLLERS (STARTERS), ELECTRICAL DEVICES, AND WIRING

A. Motor Controller Manufacturer: Except where an item of mechanical equipment must be integrally furnished with a motor controller produced by another manufacturer, provide motor starters for mechanical equipment manufactured by any of the following or approved equal quality:
Allen-Bradley Co.
Cutler-Hammer, Inc.
General Electric Co.
Klockner Moeller Co.
Square D Co.
Westinghouse Electric Co.

B. Quality Assurance: Controllers shall comply with the following standards:
1. NEC as applicable to construction and installation.
2. Provide devices which have been U.L. listed and labeled to conform with U.L. 508.
3. NEMA Standards ICS-1, 1CS-2.

C. Motor Controller (Starter):
1. Shall have thermal overload protection in each phase. Overload protective devices shall provide adequate protection to motor windings; be thermal inverse, time limit type; and include manual reset type pushbutton on the outside of the motor controller case.
2. Shall have single-phase protection.
3. Magnetic-type motor controllers shall have undervoltage protection when used with

momentary-contact push-button stations or switches and shall have undervoltage release when used with maintained-contact pushbutton stations or switches. When used with pressure, float, or similar automatic-type or maintain-contact switch, controller shall have hand/off/automatic selector switch. Connections to selector control devices are bypassed when switch is in "hand" position. Safety control devices such as low and high pressure cutouts, high temperature cutouts, and motor overload protective devices shall be connected in motor control circuit in "hand" and "automatic" positions. Control circuit connections to hand/off/ automatic selector switch or to more than one automatic regulatory device shall be made in accordance with sequence indicated or manufacturer's approved wiring diagram. Selector switch shall have means for locking in all positions.
4. Magnetic-type motor controls shall be full voltage, non-reversing with three (3) normally open auxiliary contacts, control transformer, pilot light, pushbutton station, test-off-normal or selector switch mounted in the motor controller case.

D. Control Circuits: Control circuits shall have maximum voltage of 120 volts derived from control transformer in same enclosure. Transformers shall conform to U.L. 506, as applicable. Transformers, other than transformers in bridge circuits, shall have primaries wound for voltage available and secondaries wound for correct control circuit voltage. Size transformers so that 80 percent of rated capacity equals connected load. Control transformers shall have grounded secondary and shall have fused secondary voltage and short circuit protection.

E. Enclosures for Starters and Controllers:
1. Shall be NEMA 1 general purpose for all dry locations.
2. Shall be NEMA 3R where installed in locations exposed to the elements or in moist, humid, or wet areas (shown or not shown).
3. Shall conform to NEMA ICS-6.

F. Multiple-Speed Motor Controllers: Shall be electrically and mechanically interlocked. Multiple-speed controllers shall have compelling relays and shall be multiple-button, stationtype with pilot lights for each speed.

G. Pushbutton Stations: Provide with "start/stop" momentary contacts having one normally open and one normally closed set of contacts and red lights to indicate when motor is running. Stations shall be heavy-duty, oil-tight design. Pilot light shall be transformer, resistor, or DIODE type.

H. Remote Control Stations: Remote control stations shall be momentary contact type, heavyduty, flush mounted, start-stop pushbutton stations with transformer base pilot lights and satin finished stainless steel plates, located where indicated on the drawings. Provide engraved designation denoting item controlled.

I. Reduced-Voltage Controllers:
1. Provide part winding type reduced voltage controller for motors within the horsepower and the application voltage range as follows:
a. 250 volts or below - 15 horsepower to and including 30 horsepower.
b. Above 250 volts - 40 horsepower to and including 75 horsepower.
2. Provide reduced-voltage starter single-step, closed transition, autotransformer (solid state-type acceptable), and shall have adjustable time interval between application of reduced and full voltages to motors, for all motors within the horsepower and the application voltage range as follows: Y Delta.
a. 250 volts or below -40 horsepower and larger.
b. Above 250 volts - 75horsepower and larger.

J. Starters for Multi-Speed Motors
1. Where multi-speed motor is scheduled on the drawings they each shall be provided

with a multi-speed starter.
Starter shall be for separate winding or reconnectable winding to suit motor furnished. Provide pilot lights and pushbutton controls mounted in the device cover. Control transformer, etc. shall be provided as hereinbefore specified.

K. Magnetic Starters: Provide magnetic starters for motors 1/2 hp and larger, and for smaller motors where interlock or automatic operation is indicated or required. In all cases, starter required for proper operation of motor shall be provided.

PART 3: EXECUTION
3.1 INSTALLATION

A. All motor controls shall be provided with laminated plastic labels which clearly identify equipment each control will operate.

B. All motor controls shall be wall mounted, equipment mounted, or floor stand mounted to suit job conditions.

C. All starters shall be furnished by Division 15 and installed, wired and connected for power by Division 16. Deliver starters and wiring devices to Division 16 and coordinate exact placement location relative to unit served.

"END OF SECTION"

SECTION 15094
HANGERS, SUPPORTS, ANCHORS, AND SEALS

PART 1 - GENERAL
1.1 DESCRIPTION

A. This section specifies pipe hangers and supports, duct hangers and supports, flashing for mechanical equipment, sleeving for mechanical equipment and supports for mechanical equipment.

1.2 QUALITY ASSURANCE

A. Manufacturer: A firm regularly engaged in the manufacture of hangers, supports and anchors, of types and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.

B. This installation will be in compliance with the following.

C. Pipe Supports: ANSI B 31.1, Power Piping.

D. Automatic Sprinkler Pipe Supports: NFPA No. 13, Standard for the Installation of Sprinkler Systems.

E. Standpipe System Pipe Supports: NFPA No. 14, Standard for the Installation of Standpipe and Hose Systems.

F. Duct Hangers: SMACNA Duct Manuals.

G. Manufacturers Standardization Society of Valves and Fittings Industry (MSS) for type indicated in standards as follows:
1. MSS-58, 1983 Edition, Pipe Hangers and Supports - Materials, Design and Manufacture.
2. MSS-69, 1983 Edition, Pipe Hangers and Supports - Selection and Application.

H. Federal Specifications (Fed. Spec.) for type indicated in specifications as follows:
1. Fed. Spec., WW-H-171D, Hangers and Supports, Pipe.
2. Fed. Spec., WW-H-171E (1), Hangers and Supports, Pipe. This specification now references MSS standards above and NFPA standards below, and no longer is a complete specification.

I. National Fire Protection Association (NFPA): NFPA No. 13, sprinkler systems, for type indicated.

J. Underwriters Laboratory (UL) and Factory Mutual (FM) Compliance: Provide products which are UL listed and FM approved, when applicable.

K. See schedule in Part 3 for cross-referencing between MSS, Fed. Spec., and NFPA types.

1.3 SUBMITTALS

A. Submit manufacturer's data on hangers, supports and anchors including, but not limited to, dimensions, sizes, loading capacities, and installation instructions.

PART 2 - PRODUCTS

2.1 HORIZONTAL-PIPING HANGERS AND SUPPORTS

A. General: Except as otherwise indicated, provide factory fabricated horizontal piping hangers and supports of MSS type and size indicated, bolts (if any) and washers; comply with MSS SP-58 and manufacturer's published product information. Where MSS type or size is not indicated, provide proper selection as determined by Installer for installation requirements, and comply with MSS SP-69 and manufacturer's published product information; size hangers and supports properly for piping, including insulation.

B. Adjustable Clevis Hanger: MSS Type 1, fabricated from steel.

C. Adjustable Band Hanger: MSS Type 7, fabricated from steel.

D. Adjustable Swivel-Band Hanger: MSS Type 10.

E. Clamp: MSS Type 4.

F. Double-Bolt Clamp: MSS Type 3, including pipe spacers.

G. Single-Roll Support: MSS Type 41, including axle-roller and threaded sockets.

H. Adjustable Roller Hanger: MSS Type 43, including axle-roller and clevis.

I. Roll & Stand: MSS Type 44, including roller, stand and axle.

J. Roll & Plate: MSS Type 45, including roller and base.

K. Adjustable Roll & Base: MSS Type 46, including roller, adjustable base and stand.

L. Slide & Plate: MSS Type 35, including one of the following plate types:
Plate: Unguided type.
Plate: Guided type.
Plate: Hold-down clamp type.

M. Steel Brackets: Welded structural steel shapes complying with one of the following:
Light Duty: MSS Type 31.
Medium Duty: MSS Type 32.
Heavy Duty: MSS Type 33.

N. Adjustable Saddle-Support: MSS Type 38, including saddle, pipe and reducer. Fabricate base-support from steel pipe and include cast-iron flange or welded-steel plate.

O. Stanchion Saddle Support: MSS Type 37, including saddle and U-bolt. Fabricate base-support from steel pipe and include cast-iron flange or welded-steel plate.

P. Saddle Support: MSS Type 36, Fabricate base-support from steel pipe and include cast-iron flange or welded-steel.

2.2 VERTICAL-PIPING CLAMPS

A. General: Except as otherwise indicated, provide factory fabricated vertical-piping clamps of MSS type and size indicated; comply with MSS SP-58 and manufacturer's published product information. Where MSS type or size is not indicated, provide proper selection as determined by Installer for installation requirements, and comply with MSS SP-69 and manufacturer's published product information. Size clamps properly for piping, including insulation (if any).

B. Two-Bolt Riser Clamp: MSS Type 8.

C. Four-Bolt Riser Clamp: MSS Type 42, include pipe spacers at inner bolt-holes.

2.3 HANGER-ROD ATTACHMENTS

A. Except as otherwise indicated, provide factory-fabricated hanger-rod attachments of MSS type and size indicated; comply with MSS SP-58 and manufacturer's published product information. Where MSS type or size is not indicated, provide proper selection determined by Installer for installation requirements, and comply with MSS SP-69 and manufacturer's published product information. Size attachments properly for piping, including insulation (if any).

B. Turnbuckle: MSS Type 13.

C. Weldless Eye-Nut: MSS Type 17.

D. Malleable Eye-Socket: MSS Type 16.

E. Clevise: MSS Type 14.

2.4 BUILDING ATTACHMENTS

A. General: Except as otherwise indicated, provide factory-fabricated building attachments of MSS type and load-rating indicated; comply with MSS SP-58 and manufacturer's published product information. Where MSS type or load-rating is not indicated, provide proper selection determined by Installer for installation requirements, and comply with MSS SP-69 and manufacturer's published product information. Size units properly for the piping loading.

B. Concrete Insert: MSS Type 18, malleable or steel.

C. Top Beam C-Clamp: MSS Type 19.

D. Steel C-Clamp: MSS Type 23, steel.

E. Malleable Iron C-Clamp: MSS Type 23.

F. Side I-Beam Clamp: MSS Type 27.

G. Top I-Beam Clamp: MSS Type 25.

H. Side Beam Clamp: MSS Type 20.

I. Beam Clamp w/Eye Nut: MSS Type 28.

J. Wide-Flange Beam Clamp w/Eye Nut: MSS Type 29.

K. Beam Clamp w/Extension Piece: MSS Type 30.

2.5 SADDLES AND SHIELDS

A. General: Except as otherwise indicated, provide factory fabricated saddles and shields of MSS type and size indicated; comply with MSS SP-58 and manufacturer's published product information. Where MSS type or size is not indicated, provide proper selection determined by Installer for installation requirements, and comply with MSS SP-69 and manufacturer's published product information. Size saddles and shields properly for insulation and vapor barrier (if any).

B. Protection Saddle: MSS Type 39.

C. Wood Insulation Saddle: Provide products manufactured by Elcen Metal Products Company.

2.6 SPRING HANGERS AND SUPPORTS

A. General: Except as otherwise indicated, provide factory fabricated spring hangers and supports of MSS type and load rating indicated; comply with MSS SP-58 and manufacturer's published product information, and include limit stops (if any).

B. Spring Cushion: MSS Type 48; include enclosure.

C. Spring Cushion Roll: MSS Type 49, including springs and retainers.

D. Sway Brace: MSS Type 50.

E. Variable Spring Hanger: MSS Type 51; preset to indicated load and limit variability factor to 25%.

F. Variable Spring Base Support: MSS Type 52, preset to indicated load and limit variability factor to 25%; include load flange.

G. Trapeze Variable Spring Hanger: MSS Type 53; preset to indicated load and limit variability factor to 25%.

H. Horizontal Constant-Support: MSS Type 54; include auxiliary stops for erection and hydrostatic test and field load-adjustment capability.

I. Vertical Constant-Support: MSS Type 55; include auxiliary stops for erection and hydrostatic test and field load-adjustment capability.

J. Trapeze Constant-Support: MSS Type 56; include auxiliary stops for erection and hydrostatic test and field load-adjustment capability.

2.7 HANGER RODS

A. Provide steel hanger rods, threaded both ends, threaded one end, or continuous threaded.

2.8 DUCT HANGERS AND SUPPORTS

A. Hangers: Galvanized steel band iron or rolled angle and 3/8 inch rods.

B. Wall Supports: Galvanized steel band iron or fabricated angle bracket.

C. Vertical Support at Floor: Rolled angle.

2.9 FLASHING

A. Steel Flashing: 26 gauge galvanized steel.

B. Lead Flashing: 4 lb./sq. ft. sheet lead for waterproofing, except that sheets requiring joining by burning shall be not less than 6 lb./sq. ft., and one lb./sq. ft. sheet lead to soundproof.

C. Safes: 6 lb./sq. ft. sheet lead or 8 mil thick neoprene.

D. Caps: Steel, 22 gauge minimum, 16 gauge at fire resistance structures.

E. Copper safing of equivalent thickness shall be provided where indicated.

2.10 SLEEVES

A. Pipes through floors: Form with 18 gauge galvanized steel.

B. Pipes through beams, walls, fire proofing, footings, potentially wet floor: Form with galvanized steel pipe.

C. Round Ducts: Form with galvanized steel.

D. Rectangular Ducts: Form with galvanized steel or wood.

E. Size large enough to allow for movement due to expansion and to provide for continuous insulation.

2.11 MISCELLANEOUS MATERIALS

A. Metal Framing: Provide products complying with NEMA STD ML 1.

B. Steel Plates, Shapes and Bars: Provide products complying with ASTM A 36.

C. Cement Grout: Portland cement (ASTM C 150, Type I or Type III) and clean, uniformly graded, natural sand (ASTM C 404, Size No. 2). Mix at a ratio of 10 parts cement to 3.0 parts sand, by volume, with minimum amount of water required for placement and hydration.

D. Heavy Duty Steel Trapezes: Fabricate from steel shapes selected for loads required; weld steel in accordance with AWS standards.

E. Pipe Guides: Provide factory-fabricated guides, of cast semi-steel or heavy fabricated steel, consisting of a bolted two-section outer cylinder and base with a two-section guiding spider bolted tight to pipe. Size guide and spiders to clear pipe and insulation (if any), and cylinder. Provide guides of length recommended by manufacturer to allow indicated travel.

PART 3 - EXECUTION
3.1 PREPARATION

A. Proceed with installation of hangers, supports and anchors only after required building structural work has been completed in areas where the work is to be installed. Correct inadequacies including (but not limited to) proper placement of inserts, anchors and other building structural attachments.

3.2 INSTALLATION OF BUILDING ATTACHMENTS

A. Install building attachments at required locations within concrete or on structural steel for proper piping support. Space attachments within maximum piping span length indicated in MSS SP-69.

Install concrete inserts before concrete is placed; fasten insert securely to forms. Where concrete with compressive strength less than 2500 psi is indicated, install reinforcing bars through openings at top of inserts. Prior to placing concrete, install nut in insert and screw threaded rod through nut until rod is firmly against top of insert body.

3.3 INSTALLATION OF HANGERS AND SUPPORTS

A. General: Install hangers, supports, clamps and attachments to support piping properly from

building structure; comply with MSS SP-69. Arrange for grouping of parallel runs of horizontal piping to be supported together on trapeze type hangers where possible. Install supports with maximum spacings complying with MSS SP-69. Where piping of various sizes is to be supported together by trapeze hangers, space hangers for smallest pipe size or install intermediate supports for smaller diameter pipe. Do not use wire or perforated metal to support piping, and do not support piping from other piping.

B. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers and other accessories. Except as otherwise indicated for exposed continuous pipe runs, install hangers and supports of same type and style as installed for adjacent similar piping.

C. Support fire-water piping independently of other piping.

D. Prevent electrolysis in support of copper tubing by use of hangers and supports which are copper plated, or by other recognized industry methods.

E. Provisions for Movement:
1. Install hangers and supports to allow controlled movement of piping systems and to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends and similar units.
2. Load Distribution: Install hangers and supports so that piping live and dead loading and stresses from movement will not be transmitted to connected equipment.
3. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes, and so that maximum pipe deflections allowed by ANSI B 31 are not exceeded.

F. Insulated Piping: Comply with the following installation requirements.
1. Clamps: Attach clamps, including spacers (if any), to piping with clamps projecting through insulation; do not exceed pipe stresses allowed by ANSI B 31.
2. Shields: Where low-compressive-strength insulation or vapor barriers are indicated on cold or chilled water piping, install coated protective shields. For pipe 8" and over, install wood insulation saddles.
3. Saddles: Where insulation without vapor barrier is indicated, install protection saddles.

G. Do not hang piping, ductwork or equipment form bottom chords or flanges of structural members; hang from top chords or flanges.

3.4 INSTALLATION OF PIPE GUIDES

A. Install pipe guides complying with manufacturer's published product literature. Where not otherwise indicated, install pipe guides near expansion loops, expansion joints and ball joints.

3.5 INSTALLATION OF ANCHORS

A. Install anchors at proper locations to prevent stresses from exceeding those permitted by ANSI B 31, and to prevent transfer of loading and stresses to connected equipment.

B. Fabricate and install anchor by welding steel shapes, plates and bars to piping and to structure. Comply with ANSI B 31 and with AWS standards.

C. Where expansion compensators are indicated, install anchors in accordance with expansion unit manufacturer's written instructions, to limit movement of piping and forces to maximums recommended by manufacturer of each unit.

D. Anchor Spacings: Where not otherwise indicated, install anchors at ends of principal pipe runs, at intermediate points in pipe runs between expansion loops and bends. Make

provisions for preset of anchors as required to accommodate both expansion and contraction of piping.

E. Painting of Base Supports: Refer to painting work sections of these specifications.

3.6 INSTALLATION OF LOW VELOCITY DUCT HANGERS AND SUPPORTS

A. See Section 15881, "Low Pressure Metal Ductwork". The following applies to all ductwork covered under 1.1B.

B. Hanger Minimum Sizes:
1. Up to 30 inches wide: one inch x 16 gauge at 10 feet spacing.
2. 31 inches to 48 inches wide: 1-1/2 inches x 16 gauge at 10 feet spacing.
3. Over 48 inches wide: 1-1/2 inches x 16 gauge at 8 feet spacing.

C. Horizontal Duct on Wall Supports Minimum Sizes:
1. Up to 18 inches wide: 1-1/2 inches x 16 gauge or one inch x one inch x 1/8 inch at 8 feet spacing.
2. 19 inches to 40 inches wide: 1-1/2 x 1-1/2 x 1/8 inch at 4 feet spacing.

D. Vertical Duct on Wall Supports Minimum Sizes:
1. At 12 inch spacing.
2. Up to 24 inches wide: 1-1/2 inches x 16 gauge; 25 inches to 36 inches wide: one inch x one inch x 1/8 inch.
3. 37 inches to 48 inches wide: 1-1/4 x 1-1/4 x 1/8 inches.

E. Vertical Duct Floor Supports Minimum Sizes:
1. Riveted or screwed to duct;
2. Up to 60 inches wide: 1-1/2 x 1-1/2 x 1/8 inches.
3. Over 60 inches wide: 2 x 2 x 1/8 inches.

3.7 INSTALLATION OF MEDIUM AND HIGH VELOCITY DUCT HANGERS AND SUPPORTS

A. See Section 15881, "Low Pressure Metal Ductwork". The following applies to all ductwork covered under 1.1A.

B. Rectangular Duct Hangers Minimum Sizes:
1. Up to 36 inches wide: 2 at one inch x 16 gauge at 10 feet spacing.
2. 37 inches to 60 inches wide: 2 at one inch x 16 gauge at 8 feet spacing and 2 x 2 x 1/4 inch trapeze.
3. 61 inches to 120 inches wide: 2 at 1-1/2 inches x 12 gauge at 8 feet spacing and 2 x 2 x 1/4 inch trapeze.
4. 121 inches to 240 inches wide: 3 at 3/8 inch diameter at 4 feet spacing and 2-1/2 x 2-1/2 x 3/16 inch trapeze.

C. Round Duct Hangers Minimum Sizes:
1. At 10 feet spacing;
2. Up to 18 inches diameter: one inch x 16 gauge.
3. 19 inches to 36 inches diameter: one inch x 12 gauge.
4. 37 inches to 50 inches diameter: 1-1/2 inches x 12 gauge.
5. 51 inches to 84 inches diameter: 2 at 1-1/2 inch x 12 gauge from girth reinforcing angle.

D. Vertical Duct Floor Supports Minimum Sizes:
1. Rivet to duct and tie angles together with rod, angles or cinch band.
2. Up to 48 inches wide: 1-1/2 x 1-1/2 x 1/8 inch.
3. Over 48 inches wide: 2 x 2 x 3/16 inch.

E. Angle reinforcing may be used for support omitting trapeze.

3
.8 EQUIPMENT BASES AND SUPPORTS

A. Provide for all floor mounted equipment, reinforced concrete housekeeping bases poured directly on and keyed to structural floor slab, 4 inches thick minimum, extended 4 inches minimum beyond machinery bedplates. Provide templates, anchor bolts and accessories required for mounting and anchoring equipment.

B. Construct supports of structural steel members or steel pipe and fittings. Brace and fasten with flanges bolted to structure.

C. Provide rigid anchors for ducts and pipes immediately after vibration connections to equipment.

3.9 PRIMING

A. Prime coat exposed steel hangers and supports. Hangers and supports located in crawl spaces, pipes shafts and suspended ceiling spaces are not considered exposed.

3.10 FLASHING

A. Flash and counterflash where mechanical equipment passes through weather or waterproofed walls, floors, and roofs.

B. Provide curbs for mechanical roof installations 12 inch minimum high. Flash and counterflash with steel, soldered and waterproofed.

C. Provide continuous lead or neoprene safes below air supply casings. Solder at joints as required, flash into floor drains, and turn up 6 inches into walls or to top of curbs and caulk into joints. Lead sheets being joined shall be lapped and burned using lead burning rods of same composition.

D. Provide lead flashing around ducts and pipes passing from equipment rooms, installed according to manufacturer`s data for sound control.

E. Installation of lead sheets and other lead materials shall be in accordance with Lead Industries Association recommendations, as appropriate.

3.11 SLEEVES

A. Set sleeves in position in advance of concrete work. Provide suitable reinforcing around sleeves.

B. Extend sleeves through one inch above finished floor level. Caulk sleeves full depth and provide floor plate.

C. Where piping or ductwork passes through floor, ceiling or wall close off space between pipe or duct and construction with non-combustible insulation. Provide tight fitting metal caps on both sides and caulk.

D. Sleeves in exterior building walls above and below-grade shall be sealed with link seal bolted gaskets as manufactured by Thunderline.

E. Install chrome plated escutcheons where piping passes through finished surfaces.

3.12 DUNNAGE

A. Provide all necessary structural steel and reinforced concrete supports required to properly install equipment.

3.13 ADJUSTMENT OF HANGERS AND SUPPORTS

Adjust hangers and supports and place grout as required under supports to bring piping to proper levels and elevations.

3.14 HANGER AND SUPPORT SCHEDULE

A. Cross reference of types:
MSS FED. SPEC. NFPA DESCRIPTION
SP-58/69 WW-H-171D/E NO. 13 OF TYPES
1 1 H Adjustable steel clevis.
2 2 - Alloy steel pipe clamp.
3 3 - Carbon or alloy steel double bolt pipe clamp.
4 4 - Steel pipe clamp.
5 -- - Pipe Hanger
-- 5 E, F Adjustable swivel pipe ring solid ring type.
6 6 E,F Adjustable swivel pipe ring split ring type.
7 7 G Adjustable steel band hanger
8 8 - External pipe or riser clamp
9 9 G Adjustable band hanger.
10 10 E, F Adjustable swivel ringhanger.
11 11 - Split pipe ring w/wo turn-buckle adjustment.
-- 12 H Light Duty Clevis Hanger
12 25 - Extension split pipe clamp.
13 13 - Steel turnbuckle.
14 14 - Steel clevis.
15 15 - Adjustable turnbuckle/swivelturnbuckle.
16 16 - Malleable iron socket only for split ring.
17 17 - Steel weldless eye nut.
18 18 O Malleable concrete insert.
18 19 - Steel concrete insert.
19 -- - Top Beam C-Clamp.
20 20 J, K Side beam clamp for channelor I-beam.
21 21 M Center I-beam clamp.
22 22 - Welded attachment.
23 23 P C-clamp, steel or malleable iron.
24 24 - U-bolt.
25 53 - Top I-beam clamp.
26 26 - Long clip.
27 54 - Side I-beam clamp.
-- 27 - Offset J-Hook
28 28 - I-beam clamp w/eye nut.
29 29 - Steel wide flange clamp w/eye nut.
30 -- - Malleable Beam Clamp with extension piece.
-- 30 - I-beam clamp w/wing nut.
-- 31 - Wide flangeclamp w/links and swing nuts.
31 32 - Light welded steel bracket.
32 33 - Medium welded steel bracket.
33 34 - Heavy welded steel bracket.
34 35 D Side beam bracket.
35 -- - Pipe slide and slide plate, of type indicated.
-- 36 - Saddle support w/base.
36 37 - Pipe saddle support.

37 38 - Pipe stanchion saddle.
38 39 - Adjustable pipe saddle support.
39 40A - Steel pipe covering protection saddle.
39 40B - Steel pipe covering protection saddle.
40 41 - Insulation protection shield
41 42 - Single pipe roll.
42 -- - Carbon or alloy steel riser clamp.
-- 43 - Malleable steel adjustable swivel pipe roll.
43 44 - Adjustable roller hanger, w/wo swivel.
44 45 - Pipe roll complete.
45 46 - Pipe roll and plate.
46 47 - Adjustable pipe roll and base.
47 -- - Restraint control device.
-- 48 - Adjustable pipe roll.
48 49 - Spring cushion hanger.
49 50 w/42 - Spring cushion hanger w/roll
50 55 - Spring sway brace.
51 51 - Variable spring cushion hanger.
52 56 - Variable spring base support
53 57 - Variable spring trapeze hanger.
54 52 - Constant support, horizontal
55 58 - Constant support vertical type.
56 59 - Constant support trapeze type.
57 -- - Plate lugs
58 -- - Horizontal traveler.
-- 60 - Split-ring type.
-- -- A U-type hanger for branch lines.
-- -- B U-type hanger for cross mains and feed mains.
-- -- C Adjustable clip for branch lines.
-- -- I Cantilever bracket.
-- -- L C-type clamp w/restraining strap.
-- -- N Top I-beam clamp.
-- -- Q Eye rod and ring hanger.
-- -- R Wrap around U-hook.

3.15 PIPE HANGER SPACING SCHEDULE

Hanger Rod
Hanger Rod
Pipe Size Max. Hanger Spacing Pipe Size Max. Hanger Spacing
½" to 1¼" 6.5' PVC (All Sizes) 6'
1½" to 2" 10' C.I. Bell & Spigot
2½" to 3" 10' (Or No-Hub) & a Joints 5'
4" to 6" 10'
8" to 12" 14'
14" and Over 20'

"END OF SECTION"

SECTION 15010
GENERAL CONDITIONS - MECHANICAL

PART 1 - GENERAL
1.1 DESCRIPTION AND SCOPE

A. Refer to the sections listed in Division 1 of these specifications. These are applicable to and a part of Division 15, Mechanical Specifications.

B. Division of the specification into divisions and sections is for the purpose of simplification alone. Responsibility for the work of various trades shall rest with the Contractor.

C. The specifications and drawings establish the quality of materials, equipment, workmanship and methods of construction. The Contract Documents are intended to secure for the Owner first class installation in every respect.

D. The work included under Division 15 of the specifications shall include complete mechanical systems as shown on the drawings and as specified herein. Provide all supervision, labor, material, equipment, machinery, and other items necessary to complete the mechanical system. Labor shall be performed by skilled mechanics and the entire plant, when delivered to the Owner, shall be ready for satisfactory and efficient operation.

E. Minor details not usually shown or specified, but necessary for the proper installation and operation, shall be included in the work, the same as if herein specified or shown.

F. Contractor shall coordinate all work in the building in order to facilitate the intelligent execution of the work.

1.2 CONTRACT DOCUMENTS

A. The drawings and specifications cover the extent and general arrangement of the various systems, subject to the individual characteristics of the mechanical equipment with the regard to size and arrangement. The mechanical and electrical drawings shall be considered as being diagrammatic. The attention of the Contractor is called to the fact that while these drawings are generally to scale and are made as accurately as the scale will permit, all important dimensions shall be determined in the field. They are not to be considered as erection or shop drawings. They do not indicate every fitting, elbow, offset, valve, pullbox, etc., which is to complete the job. Contractor shall prepare field erection drawings as required for the use of his mechanics to insure proper installation.

B. Interference between trades must be determined before the work is fabricated or installed. The Contractor must coordinate the work during the preliminary stages to insure that actual erection will proceed without such interferences. Such coordination is of paramount importance and no request for additional payment will be considered where such request is based upon interferences between trades.

C. Contractor shall carefully examine the Contract Documents and bring to the Architect's attention any discrepancies.

1.3 SITE EXAMINATIONS

A. All bidders, prior to submitting a bid, shall visit the site and thoroughly acquaint themselves with the conditions under which the work will be performed. Particular attention shall be given to existing conditions.

B. Examine all services, equipment, surfaces, etc., which this is in any way dependent upon and

report to the Architect any condition which will result in less than a first class installation.

C. Connections to existing work are shown diagrammatically. These conditions shall be made as required by existing conditions.

D. Waiver of responsibility or requests for additional payment based on lack of knowledge of conditions at the site will not be acceptable or considered.

1.4 REFERENCES AND DEFINITIONS

A. References to catalogs, standards, codes, specifications and recommendations, etc., means latest edition of such publications in effect at date of invitation to submit proposal.
"Engineer" - means the" OPM ENGINEER".
"Directed" - means "directed by Architect".
"Provide" - means "furnish and install".
"Indicated" - means "indicated in contract drawings".
"Concealed" - means items referred to are hidden from normal sight. This includes items in partly excavated or crawl spaces and in service tunnels used solely for repairs and maintenance.
"Exposed" - means items are not "concealed".
B. Where any device or piece of equipment is referred to in the singular number, such reference shall be deemed to apply to as many devices as are required to complete the installation.

1.5 CODES, RULES AND PERMITS

A. Installation shall be made in compliance with all applicable state and local codes and regulations, N.E.C., and NFPA requirements and utility company rules, all of which shall be considered a part of this specification and shall take precedence in the order of listing.

B. Unless otherwise directed, all connection fees to public utilities will be paid by the Contractor. btain all required Certificates of Inspection for his work and deliver same to the Architect before request for acceptance and final payment for his work.

C. Contractor shall pay for all cost of connections to and running from local utility lines, whether the work is performed by this Contractor, Utility Company or Government Agency.

1.6 PROTECTION OF WORK AND MATERIALS

A. Contractor shall be responsible for the proper care and protection of all portions of all materials delivered and work performed by him until completion and acceptance of the work as a whole. Payment made on account of the contract shall in no way relieve the Contractor from this responsibility.

B. Contractor shall cap all pipes, ducts, etc., (not completed) until ready for final inspection, after which they shall be thoroughly cleaned and left unobstructed in any way. Cap with like material, i.e. galvanized steel, copper, etc.

C. If during the progress of the work, any portion thereof shall be liable to damage from inclement weather or other work, such effective protection as may be deemed necessary by the Architect must be provided by this Contractor.

D. All work which does not comply with the requirements of the Contract, or all work damaged by reason of neglect on the part of the Contractor, or lack of protection prior to acceptance, shall be removed.

E. Contractor shall be responsible for damage caused by leaks in any of the equipment or material

installed by him through equipment or material failures or disconnected pipes or fittings, and shall make, at his own expense, all repairs or replacements required as a result of such damage.

1.7 TEMPORARY SERVICE

A. Unless specifically called for, and outlined under the individual section of the specifications, all temporary services required for building construction including water, heat, air conditioning, ventilation, electricity, sanitary facilities, etc., will be furnished by the General Contractor. The general contractor will provide heat to maintain the building above freezing throughout the construction period.

1.8 GUARANTEE

A. The Contractor shall guarantee that all work performed and all materials and equipment installed by him are free from defects. He shall repair or replace any defective equipment, materials, or workmanship, free of cost to the Owner for a period of two (2) years from date of acceptance, upon notice from the Architect.

PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

A. The materials or products specified herein and/or indicated on the drawings by trade names, manufacturer's names or catalog numbers establish the quality of materials or products to be furnished and shall be the basis of each bid. Contracts will be awarded on that basis. Substitutions may be permitted in accordance with Division 1 requirements.

2.2 STANDARDS FOR MATERIALS AND EQUIPMENT

A. Materials and equipment shall be new, unless specifically exempt.

B. Like materials or equipment shall be the product of one manufacturer.

C. Materials and equipment furnished under this specification shall be the standard products of manufacturers regularly engaged in the production of such materials and equipment and shall be the manufacturer's latest standard design.

D. Where Underwriters' Laboratories, Inc., Standards are recommended or required, all materials and equipment shall be approved by them and shall bear the U.L. label.

E. Third Party Certification: All packaged equipment shall be independently Third Party as a system for it’s intended use by a Nationally Recognized Testing Laboratory (NRTL) in accordance with OSHA Federal Regulations 29CFR1910.303 and .399, as well as NFPA Pamphlet #70, National Electric Code (NEC), Article 90.7.

2.3 MECHANICAL SUBMITTALS, SHOP DRAWINGS AND SAMPLES

A. Submit in accordance with the General Conditions of the contract and the additional stipulations and format set forth herein.

B. Where one or more products are named in the specifications and the phrases "or equal", "approved equal", or their equivalent, accompanies the listing, requests for approval of substitute products will be considered after award of contract only. Requests shall be made in writing including all information, such as, delivery dates and descriptive data, and all samples required by the Architect, together with the amount to be added to or deducted from the contract price for such substitution. Decisions of the Architect as to whether a product proposed for substitution is fully

equal will be final and not subject to arbitration. Where products are named in the specification but are unaccompanied by the phrases "or equal", "or approved equal", or their equivalent, applications for approval of substitute products will not be considered at any time.

C. When any specified item or "approved equal" item of equipment or material is submitted which required changes or additions to the designed structures, finish or Plumbing, Heating, Ventilating and/or Electrical services because its requirements exceed or are different from those shown on the Contract Documents, such changes shall be made at no additional cost to the Owner, and shall be itemized in writing and attached to the submittal. No changes shall be made without approval in writing from the Owner. The requirements of this paragraph apply also when no manufacturer is named and when more than one manufacturer is listed as acceptable.

D. Coordinated shop drawings drawn to a scale of ½ inch to the foot shall be submitted for approval. The mechanical contractor shall have employed or available for his use persons skilled in producing shop drawings/coordination drawings and that are capable of producing these in a timely fashion so as not to impede progress or cause delay in execution of the work.
The coordinated shop drawings shall coordinate and show architectural features, structural features, all duct work, lighting fixtures, piping, electrical conduits, mechanical equipment, HVAC equipment, plumbing equipment and fixtures and electrical equipment.
The mechanical contractor will coordinate these drawings with all other trades.

E. Submit complete plan and section views with the above coordinated drawings.

F. Forward shop drawings in single copy sepia or other equivalent transparency and one blueline print. Notations as to acceptance or correction will be noted on transparency. Upon return of transparency, the Contractor shall correct the original tracing and submit a new transparency for review. Upon final acceptance of the transparency, prepare prints for the use of the various trades as may be required.

G. Submit complete wiring diagrams for all equipment furnishes under Division 15, for the use of the electrical trades, showing all equipment and control device terminals and the relationship to the electrical service.

H. Furnish samples of materials when requested by the Architect prior to acceptance of submittals.

I. Submittal stamping: The intent of the submittals is to help the Contractor avoid mistakes in the , to advise him of the related equipment that might be affected by substitution and to help avoid purchases of equipment that is not equal to the specified equipment: Approved by the Architect or Engineer does not modify the requirements of the Contract Documents. Deviations from these requirements must be specifically requested and approval received in writing from the Architect or Engineer before such deviation will be permitted. The "Approval" stamp does not constitute such written approval.

J. Shop drawings or submittals stamped "Approved as Corrected" give authority to proceed in accordance with the notes. However, final shop drawings bearing all corrections noted shall be resubmitted prior to receipt of that item on the job site.

2.4 ACCESS PANELS

A. Panels to be Higgins Products Co., Milcor Steel Co., Karp Assoc., Inc., Walsh Spencer Co., Wilkinson Co., or Zurn Industries, Inc., or approved equal and shall be set in frames with counter sunk screws and shall have cylinder locks. All locks shall have one master key.

PART 3 - EXECUTION
3.1 GENERAL CONSTRUCTION REQUIREMENTS

A. Contractor shall base all measurements, both horizontal and vertical from established bench marks. All work shall agree with these established lines and levels.

B. Make provisions for easy access to valves, strainers, panels, motors, drives, dampers, filters, controls devices, and similar items requiring inspection or maintenance.

C. All appliances and equipment shall be installed and connected in accordance with the best engineering practice. Manufacturer's instructions and recommendations shall be followed and all auxiliary piping, water seals, valves, electric connections, etc., shall be provided.

D. All piping, ducts and conduits shall be run parallel with the lines of the building, except as otherwise indicated.

E. Provide approved shields to prevent the contact of dissimilar metals. The shield shall provide a separation so that the electrical current is below one percent of the current which would exist with metal-to-metal contact.

3.2 EXCAVATION AND BACKFILL

A. Trenches for Piping underground and under floor slabs shall be excavated to a uniform grade. Holes shall be provided for hub and spigot piping so that each length of pipe shall have a solid bearing for the full length of the barrel.

B. Organic materials, leaf mold, debris, mud and other unstable material shall be removed to a depth sufficient to allow the construction of a stable foundation. All cuts below the required trench grade will be refilled with compacted sand or fine gravel to insure a stable base for the piping.

C. Trenches shall be braced and sheathed. Water shall be removed as necessary to protect workmen and adjacent structures. No pipe or masonry shall be laid under water.

D. After piping has been tested and approved, the trenches shall be backfilled by compacting each lift, by whatever means necessary, to assure the following percentages of maximum dry density:
Underlying lifts - 95%
Top 12 inches - 95%

E. Backfill shall be compacted mechanically in layers not exceeding 6 inches deep. Backfill shall be placed and sheathing removed in such a manner that pipes will not be disturbed.

F. The Contractor shall provide barricades around all open trenches.

G. The Contractor shall confirm to invert grades shown on the drawings and shall verify the location of mains as indicated before trench exc avation is started.

3.3 UTILITY CONNECTIONS

A. Ascertain from the utility department or utility company the exact amount of work required in connection of utilities. Work required which is not provided by the utility department or company shall be provided by the Contractor, unless indicated otherwise.

B. Verify the location and depth of all utilities and call to the attention of the Architect any discrepancies which involve additional work before signing of the contract.

C. After the contract is signed, any additional work required for the complete and working job shall be provided at no additional cost to the Owner, unless indicated otherwise.

D. Locations, depths, sizes, capacities, etc., of utility lines shall be verified by the Contractor prior to doing any other work on piping systems which are to connect to such utility lines. Any work rendered unusable by failure to comply with this provision shall be replaced at no cost.

E. Utilities as mentioned in this division of the specifications shall include water, sewers, gas, and other piping systems necessary to the operation of any new or existing systems and equipment.

3.4 NOISE AND VIBRATION

A. Mechanical equipment and devices shall operate without objectionable noise and vibration being transmitted to occupied portions of the building or any part of the building structure by apparatus, piping, ductwork, conduits, or other parts of the mechanical work. Secure and brace all piping and ductwork, provide flexible connections, vibration isolators, or other devices where indicated or required to prevent the transmission of noise and vibration to the building.

B. Air distribution devices, air moving units, light fixture air diffusers, fans, thermostats and other such equipment that may produce sound or vibration either outside or within the occupied space of the building shall, as a minimum requirement, conform to the installation details and recommendations in Chapter 46 of the ASHRAE Handbook1999 HVAC Applicatons.

3.5 ACCESS PANELS

A. Provide metal access panels at all points where valves, traps, cleanouts, etc., are concealed in walls, floors, or ceilings. Metal access panels shall be labeled with the same fire protection rating as the wall, floor or ceiling in which it is being installed.

3.6 CLEARANCES

A. Check layout of systems with the Architectural drawings and verify all dimensions and conditions at the project site. No extra compensation will be allowed because of differences between actual dimensions and spaces and sizes indicated on the drawings.

B. All work shall be neatly installed so as to be readily accessible for operation, maintenance, and repair, without the reduction of necessary headroom and passage clearance.

C. Dimensions or equipment shall permit the entrance into space allotted to it, and shall permit ready access to it and adjoining equipment for maintenance and repair. Equipment which does not fit into its allowed spaces with sufficient clearance for proper maintenance will be rejected as unsuitable. Contractor shall check equipment for major differences in size shall be indicated on the submission to avoid inaccessible locations.

3.7 RUBBISH

A. All rubbish and other debris due to or connected with work performed under this division of the Contract shall not be allowed to accumulate and shall be hauled from the premises to provide a clean work site.

B. All trades shall at the end of each work day leave the area broom clean and all materials stored in an orderly fashion.

3.8 MANUALS

A. Contractors shall furnish three (3) manuals in looseleaf binders.

B. The names of the Project, Owner, and Discipline, "Heating, Ventilation and Air Conditioning, or Plumbing, Electrical, etc....," will be glued in the front of each manual.

C. An index will be included with Section tabs for each subject included.

D. Manuals will be submitted for approval.

E. The manuals shall include as a minimum the following for all equipment and systems installed.
1. Complete and correct manufacturer's shop drawings and submittal data. All model numbers, equipment capacities and characteristics will be clearly indicated. Each piece of equipment will be identified the same as identified on the contract drawings and its location shall be indexed to a key plan.
2. Manufacturer's installation manual, Service manual, and parts list.
3. Start-up and shutdown instructions for all major seasonal changeover instructions.
4. Trouble shooting instructions.
5. Valve charts and electric motor schedules.
6. Lubrication time schedule for all equipment with schedule of lubricants to be used.
7. Belt sizes, types, lengths, and belt number.
8. Description of each system installed and operating instructions.
9. "As installed" control diagrams and description of sequence of operation by the Control Manufacturer.
10. Complete "as installed" color coded wiring diagrams of refrigeration system and all electrical connections of other mechanical equipment.
11. Copies of pipe, ductwork, and equipment identification charts.
12. Manufacturer's guarantees or warranties.
13. Name, Address, and Telephone Number of local or nearest Manufacturer's Representative.
14. Name, Address, and Telephone Number of firm or persons to perform service work during guarantee and warranty period.

3.9 OPERATING INSTRUCTIONS

A. Prior to final inspection or acceptance, fully instruct Owner's designated operating and maintenance personnel in the operation, adjustment and maintenance of all products, equipment and systems. Instruction time shall be sufficient to fully instruct all shifts of the Owner's operating and maintenance personnel.

B. Operations and maintenance manual shall constitute the basis of instruction. Review contents of manual with personnel in full detail to explain all aspects of operations and maintenance.

3.10 COMPLETION REQUIREMENTS

A. Before acceptance and final payment, the Contractor shall provide the following:

B. The mechanical contractor shall maintain at the site for the owner, one (1) copy of all drawings showing in red ink all changes from the original plans made during installation of the work, specifications, addenda, approved shop drawings, change orders and other modification. This set shall remain in the office at all times and shall not be used for the construction references. These As-Built drawings shall be delivered to the owner upon completion of the work in a reproducible and electronic format. An additional set shall be given to the engineer for his records.

C. Three bound manuals.

D. All required testing and balancing reports.

E. Framed, under glass, complete diagrams of operating instructions for air conditioning and heating controls, including new and existing equipment.

F. Framed, under glass, complete valve charts.

G. Electric Motor Schedule: Before final inspection of the project, submit a schedule listing each motor connected, regardless of under which division of these specifications the motor was furnished. Include the following information for each motor:
-Location room number, area, etc.
-Description of motor duty. Air unit fan motor, refrigeration compressor motor, chilled water pump motor, for examples.
-Type of coupling. Direct drive, V-belt, flexible coupling, etc., belt specification.
-Motor manufacturer's name and serial number of motor.
-Motor rated horsepower.
-Motor speed, rpm.
-Motor nameplate ratings, voltage, number of phases, temperature rise.
-Nameplate amperage at connected voltage.
-Starter and heater manufacturer, size and rating.
-Type of motor bearing type and lubrication instructions.
-Catalog information for starters as follows:
-Manufacturer's name and catalog number.
-Rating.
-Manuals as described in these specifications mean binders filled with all required information.
-Copies of submittal alone will not be accepted nor will generic manufacturer's maintenance manuals. Generic maintenance manuals must be altered to show specific data concerning models of equipment installed at this project, along with equipment designation shown on the contract drawings.

H. Cleanup Requirements:
1. Refer to Division 1.
2. Clean equipment and restore to new condition.
3. Touch up paint finish damage.
4. When paint damage is extensive, as determined by the Engineer, repaint completely with paint equal to original finish.
5. Exposed metal that is not painted, that has rusted shall be brushed down with steel brush to remove rust and other spots and left smooth and clean.
I. Upon completion of the entire work covered by this specification, a certificate of approval from the different departments having jurisdiction, shall be obtained and be delivered to the Architect. After the certificates have been received and final inspection of the work has been found satisfactory by the Architect, the Architect will issue to the Contractor a certificate of approval and acceptance. The certificate will in no way relieve this Contractor from the terms of his guarantee.

"END OF SECTION"

GOVERNMENT OF THE DISTRICT OF COLUMBIA

Project: Voice and Data Infrastructure
Cable Installation

BLANKET STATEMENT OF WORK

I. Project Description

As part of an effort to insure the District of Columbia government's physical infrastructure for voice and data telecommunications meets or exceeds industry-wide standards and specifications, the Office of the Chief Technology Officer (OCTO) has determined the minimum technical requirements for voice and data cabling used by all District Government agencies. As authorized by District of Columbia Municipal Regulations (DCMR) (1-1402), the OCTO provides telecommunications oversight for all agencies within the District government and acts as an agent for various District agencies in securing a compliant, high-performance voice and data network structured cabling systems. The OCTO works with individual agencies to determine their requirements; assists in the preparation an agency specific Statements of Work (SOW); reviews quotations, inspects the work of various contractors and recommends the acceptance or rejection of the effort. As the authorizing agent, OCTO is not responsible for any changes to the initial scope of the task or project once a contractor quotation has been accepted. The OCTO shall not be held responsible for any activity increasing the scope of effort unless specifically requested in writing from the OCTO. Deviations from the requirements of this Statement of Work must be issued on agency letterhead and countersigned by a responsible OCTO representative.

PURPOSE: This document details the minimum services and practices the Contractor shall provide the District Government as part of their proposal for the installation of voice and/or data cabling infrastructure. The requirements in this Blanket Statement of Work shall be incorporated in any proposal, contract, Blanket Purchase Agreement or task order to perform voice or data infrastructure cabling for the Government of the District of Columbia.

UNDERSTANDING OF THE TECHNICAL REQUIREMENTS: The Chief Technology Officer (CTO) desires to maximize the utilization of any existing cabling system that is compliant with current ANSI/TIA/EIA specifications and recommendations for voice or LAN cabling. The Contractor shall dedicate the time and resources necessary to develop a thorough understanding of the technical requirements for this request and the business goals of the agency, the CTO and the District government. The Contractor shall meet or exceed these requirements, as specified. The Contractor must understand that a standardized, intelligent distribution network allowing efficient and effective centralized management must be in place as the foundation for our strategic plan. The technical design and cable components used in our communications infrastructure are straightforward in design. The infrastructure is based on proven state-of-the-art industrystandard
techniques and technologies.

DEFINITIONS: For the purposes of this Statement of Work, the following
additional definitions shall apply.

ACP – Association of Cabling Professionals. A telecommunications body serving the cabling and building industries that develops standardized installation practices.

ANSI – American National Standards Institute. The administrator and coordinator for the United States private sector voluntary standardization system.

BICSI – Building Industry Consulting Services International. An international telecommunications body serving the building industry that develops standardized installation practices. The Telecommunications Distribution Design Manual (TDMM) published by BICSI is used as the reference for the installation practices for telephone and data cabling. All references to the BICSI TDMM refer to the current edition.
CENELEC – European Committee for Electrotechnical Standardization. The administrator and coordinator for the European private sector voluntary standardization system.
CSA – Canadian Standards Association. A Canadian testing and certification agency comparable in function to the Underwriter's Laboratories.
CTO – Chief Technology Officer. The CTO has oversight and approval of all technology projects conducted within the District of Columbia as prescribed by District law.
ECMA – European Computer Manufacturer's Association – An international industry association that promulgates and publishes industry-wide standards insuring compatibility between devices and systems.
EIA/TIA – Electronic Industries Association, Telephone Industries Association. Electronic and telephone Industry associations that promulgate and publish industrywide standards insuring compatibility between devices and systems.
ETL – Electrical Testing Laboratories. An independent testing laboratory that provides product testing and certification.
IDC – Insulation Displacement Contact
IEEE – Institute of Electrical and Electronics Engineers, Inc. An international organization that is responsible for promulgating and publishing minimum standards insuring compatibility between devices and systems.
FCC – Federal Communications Commission. The US Government agency having the power to regulate all electrical communications systems originating in the United States including radio, television facsimile, telegraph, telephone and cable systems.
ISO – International Organization for Standardization. An international organization with the responsibility for developing, promulgating and publishing international standards that relate to health, safety and practices.
NEMA – National Electrical Manufacturers Association. An industry association with the responsibility for developing, promulgating and publishing standards that relate to health, safety and practices.
NFPA 70 NEC – National Fire Protection Association, National Electrical Code. A nationally recognized code containing provisions that detail the practical safeguarding of persons and property from hazards relating to the use of electricity. All references to the NEC refer to the current edition.
OCTO – Office of the Chief Technology Officer. See CTO.
Outside Plant (OSP) – Cable and equipment designed for exposure to the elements or burial without enclosing in conduit or other protective sheathing.
TIA/EIA – See EIA/TIA.

UL – Underwriter's Laboratories. A non-profit corporation established to maintain and operate laboratories for the examination and testing of devices, systems and materials to determine their relation to hazards to life and property.
WAO – Work Area Outlet. The outlet at which horizontal cabling is terminated at the user's workstation location. A WAO may be located in a floor, wall or systems furniture space.

II. GENERAL SCOPE OF WORK ITEMS

1. Provide support for the general objectives of this scope of work:

(a) The Contractor shall provide an industry-standard and compliant, highperformance structured cabling system design that meets or exceeds all current standards and accommodates multi-media applications. The resulting design shall utilize any existing and compliant Category 3 and 5 legacy cabling systems and equipment whenever possible. The Contractor's site survey and this Blanket Statement of Work shall form the basis for the Contractor's quotation. The Contractor shall install, test and certify the structured cabling infrastructure to support the agency and CTO requirements on a firm fixed-price (FFP) basis.

(b) The Contractor shall perform a physical site survey for each specified site and provide the requesting agency and the CTO with a detailed infrastructure design and installation plan that incorporates and maximizes the use of any existing compliant cable infrastructure. The plan shall indicate the number and types of cables proposed, recommended outlet locations and contain a project Gantt chart with applicable tasks, work breakdown structure, milestones showing completion dates and other logic leading to a successful project prior to beginning the cabling effort.

(c) The Contractor shall remove any existing telecommunications cabling in any space that is either abandoned or displaced as a result of the installation of new telecommunications infrastructure under this Statement of Work.

(d) Material and work specified herein shall comply with the applicable requirements of:

a. ANSI/ICEA S–80–576
b. ANSI/ICEA S-83-596-1994
c. ANSI/ICEA S-87-640-2000
d. ANSI/TIA/EIA – 26–7–1998
e. ANSI/TIA/EIA – 455–A-1991
f. ANSI/TIA/EIA – 455–1.07
g. ANSI/TIA/EIA – 455–50B
h. ANSI/TIA/EIA – 525–14–A
i. ANSI/TIA/EIA – 526–7–1998
j. ANSI/TIA/EIA – 526–14–A–1998
k. ANSI/TIA/EIA – 568
l. ANSI/TIA/EIA – 569
m. ANIS/TIA/EIA – 570
n. ANSI/TIA/EIA – 598–A–1955
o. ANSI/TIA/EIA – 604–3–1997
p. ANSI/TIA/EIA – 606
q. ANSI/TIA/EIA – 607

r. BICSI Telecommunications Distribution Methods Manual (BICSI TDMM)
s. CENELEC – EN 50173
t. CTO Standards and Practices
u. District Regulation
v. FCC 47 CFR 68
w. IEEE 802.3ab
x. ICEA S–90–661

y. ISO – 11801
z. NEMA WC–63.1–2000
aa. NEMA – 250
bb. CTO Standards and Practices
(e) All active equipment attached to the public switched telephone network (PSTN) shall be tested, accepted and registered by the Federal Communications Commission in accordance with the Commission's rules and regulations as published in 47 CFR 68.
(f) All cable and equipment shall be installed in a neat and workmanlike manner. All methods of installation and construction that are not specifically described or indicated by standard or practice shall be subject to the control and approval of the OCTO or OCTO's representative.
(g) **Order of Precedence:** The installation and workmanship standards and practices of the District's Electrical Code, NEC, ANSI/TIA/EIA Standards and then the BICSI TDMM shall have precedence in the event of conflict. The Department of Consumer and Regulatory Affairs and the District Fire Marshal shall arbitrate all disputes regarding materials and/or the interpretation of installation standards and practices. Their decisions shall be binding on all parties.
(h) All cable runs shall follow normal building hallways and be installed either parallel to or orthogonal from building exterior walls. The Contractor shall use BICSI or Manufacturer's certified installers and provide the CTO with a manufacturer's warranted cabling system. All voice and data cabling systems installed under this Statement of Work shall carry a minimum of a 10 year warranty against failure due to materials or workmanship.
(i) The Contractor's installers shall have completed a minimum of 10 classroom hours or have accumulated 6 BICSI continuing education credits of copper and fiber optic cable installation training. The District recognizes only courses qualifying for continuing education credit or credit toward obtaining and/or renewing a BICSI Registered Communications Distribution Designer or BICSI Registered Installer designation. The Contractor shall provide copies of certificates of training on all personnel used on District projects upon request by the District.
(j) All Contractor personnel shall be readily identifiable through either uniform dress or identification badges. Identifying dress or identification badges shall be plainly visible at all times while on Government sites.
(k) The Contractor is responsible for maintaining a neat and clean work area. The Contractor shall remove and dispose of all trash and debris at the end of each work period. The contractor is responsible for removal of all trash and debris

from the work site. The use of government trash receptacles or trash removal facilities is prohibited unless specifically approved in writing by the agency.
(l) All ceiling tiles or access panels opened for the purpose of installing telecommunications cabling shall be closed at the end of each work period. The Contractor shall protect all desks and furnishings by protective coverings when working in occupied areas. The Contractor shall replace, at the Contractor's expense, any ceiling tile, access panel or other fixture damaged by Contractor personnel during the execution of this Statement of Work. The Contractor shall,

at the end of each work period, remove any debris dislodged from opening and closing access panels and ceiling tiles from all surfaces, including floors before departing the facility.
(m) Collect and document project constraints, for cost, schedule and quality. Support analysis with graphical drawings, charts and other presentation instruments. Obtain approval from the District.
(n) Provide project management, administrative management and administrative support necessary for the work hereunder. This support shall be provided at no cost to the District, unless the District specifically pre-approves assignment of personnel dedicated to such tasks.
(o) Provide, and obtain approval for, a detailed project plan the Contractor will be responsible for following. The plan will show, item-by-item, how Contractor proposes to comply with the general and detailed scope of work items identified herein.
(p) Submit for approval a timeline schedule for performance of the work. The default format is MS Project 98. The timeline shall contain activity logic.
(q) Provide the baseline and updates of the schedule in printed and electronic form.
(r) Continuously communicate status of the work relative to the approved schedule.
(s) Provide schedule status information to the District when requested.
(t) Every two weeks provide an updated, statused schedule for Contractor's work.
(u) In order to provide quality control of Contractor's work, develop, obtain approval for, and execute a quality control plan.
(v) Provide periodic quality control oversight supervision of the work in this contract, by senior management personnel who are not involved in the day-to-day execution of the work hereunder. Report findings to the District manager, with proposed actions. Provide this service at least every two weeks.
(w) Provide District management timely information regarding possible problems and proposed action required to mitigate such problems.
(x) Prepare and present monthly reports, throughout the performance of Contractor work, setting out current and upcoming activities, decisions required and issues of concern. Timely, complete and satisfactory provision by Contractor to District of such reports shall be a condition precedent to payment of Contractor.
(y) Provide reporting and communications in copies and form requested by designated District manager.

(z) Provide limited support after submission of deliverables and work products, as necessary to clarify the contents of deliverables to District staff and other contractors to the District.
(aa) Label infrastructure elements in accordance with ANSI/TIA/EIA – 606A "Administration Standard for Telecommunications Infrastructure."
(bb) Ground telecommunications equipment in accordance with ANSI/EIA/TIA – 607 "Commercial Building Grounding and Bonding Requirements for Telecommunications" and Article 800-40 of the NEC.
(cc) Provide two (2) bound copies of all cable certification reports and an electronic copy in Microsoft Word rich text format to the Office of the Chief Technology Officer.
(dd) Provide two (2) sets of "as-built" drawings to the Office of the Chief Technology Officer. The drawings shall plainly show the major cable path(s)

used and identify each WAO.

III. DETAILED SCOPE OF WORK ITEMS

1. The Contractor shall:

(a) Install communications wire and cable listed as being suitable for the purpose and in accordance with Articles 770 and 800 of the current edition, NFPA 70, National Electrical Code. The Contractor shall abide by the installation practices referenced in the NEC, ANSI/EIA/TIA standards and the BICSI TDMM;

A. Horizontal Cable

1) The Contractor shall:

(a) Provide three (3) Category 5 (Enhanced) [Cat 5(e)] cables for data and voice to the user locations specified for all new installations. Cat 5(e) high performance plenum rated copper cabling shall meet or exceed ANSI/EIA/TIA – 568 – B, CENELEC EN 50173, ICEA S–90–661, NEMA WC-63.1 and ISO 11801 requirements. The primary data cable shall have a gray jacket. The primary voice telephone cable shall have a blue jacket. The swing cable shall have a white jacket. Additional cables shall have a unique color jacket for each cable;

(b) Exercise care when installing category rated cable. Cable shall not be subjected to a pulling tension greater than 25 LBF (40 Newtons), nor shall the cable be kinked at any point. Cables subjected to more than 25 LBF of pulling tension or exhibiting evidence of kinks, as disclosed by a discoloration or deformation of the cable jacket, shall be replaced.

(c) Terminate each voice and data cable on an 8 position, 8 contact (8p8c) unkeyed keystone style Cat 5(e) insulation displacement contact (IDC) jacks at the Work Area Outlet (WAO);

(d) Category 5(e) cable shall be independently tested by a third party to deliver proof the product will support Gigabit transmission in accordance with EIA/TIA 568–B and the IEEE 802.3AB standard. These tests must verify full compliance with the standards set forth in the EIA/TIA 568–A–5 specifications and ICEA S–90–661–1997 Cat 5X–100 Horizontal Cable specifications.

(e) Cable pair twist shall be maintained up to the IDC, terminating all conductors adjacent to its pair mate to better maintain pair characteristics designed by the cable manufacturer. Jacks shall be installed to provide minimal signal impairment by preserving wire pair twists as close as possible to the point of mechanical termination. The amount of untwisting in a pair as a result of termination to the jack IDC shall be no greater 0.5 inches (13 mm). The maximum amount of cable pair that shall be exposed from the cable jacket or sheath shall be 1 inch (25 mm).

(f) Category 5(e) cable shall be certified as having a maximum delay skew for all pairs of 25 ns or less.

(g) The primary data cable shall terminate on a Cat 5(e) IDC jack that is orange in color or identified with an orange icon/bezel at the WAO.

(h) The primary voice cable shall terminate on a Cat 5(e) IDC jack that is office blue in color or identified with a blue icon/bezel at the WAO.

(i) The swing cable shall terminate on a Cat 5(e) IDC jack that is office white in color or identified with a white icon/bezel at the WAO.

(j) Voice cables may be terminated on Category 5/5(e) 110-style IDC blocks or

Category 5(e) patch panels at the telecommunications closet.
(k) All cable shall be tested and certified as exceeding the ANSI/EIA/TIA – 568 – A – 5 and TIA TSB-67 “TRANSMISSION PERFORMANCE SPECIFICATIONS FOR FIELD TESTING OF UNSHIELDED TWISTED-PAIR CABLING SYSTEMS” Level II requirements for basic link.

B. Riser Cable

1) Riser cable is defined as multi-pair cable having more than 4 pairs of 22 AWG to 24 AWG solid conductors with a thermoplastic insulating cover. The conductors are assembled into binder groups of 25 pairs that adhere to ANSI/ICEA S–80–576 color code.
2) Riser cable shall be designated as type CMR or CMP.
3) Riser cable used for voice communications shall be UL or ETL verified to meet all requirements of ANSI/TIA/EIA 568–B.2 Category 3.
4) Riser cable shall only be terminated on type 66 or type 110 blocks.

C. Backbone Cable

1) Backbone cable is defined as multi-pair cable to support inter-closet data links, cross-connect links between switch and hub equipment and patch panels as well as zone distribution cabling between wiring closets and multiple work area transition points.
2) Backbone cable used as risers shall be designated as type CMR.
3) Backbone cable used in horizontal configurations including zone cabling shall be designated as type CMP.
4) Backbone cable shall be UL or ETL verified to meet all requirements of TIA/EIA 568-B.2

5) Backbone cables shall not exceed the distances shown:

Maximum Backbone Distance
Media Type Main to Horizontal
Cross Connect
Main to Intermediate
Cross Connect
Intermediate to
Horizontal Cross
Connect
Copper (Voice) 800 m (2,624 ft) 500 m (1640 ft) 300 m (984 ft)
Multimode
Fiber
2000 m (6560 ft) 1700 m (5575 ft)
300 m (984 ft)
Singlemode
Fiber
3000 m (9840 ft) 2700 m (8855 ft)
300 m (984 ft)

D. Fiber Optic Cabling

1) All fiber optic cable shall meet the following transmission specifications:

Cable Type Cable Type
Wavelength

(nm)
Maximum
Attenuation
(db/km)
Minimum
Transmission Capacity
(MHz* km)
850 3.5 500
50/125 micron
multimode 1300 1.5 500
850 3.5 160
62.5/125 micron
multimode 1300 1.5 500
1310 1.0 N/A
Singlemode inside
plant 1550 1.0 N/A
1310 1.0 N/A
Singlemode outside
plant 1550 1.0 N/A
NOTE: The manufacturer's documentation on the fiber's performance can be used to demonstrate compliance with the above performance requirements.
2) Fiber optic cables may be used in lieu of copper cables for horizontal distribution designs, zone distribution designs, vertical (riser) cable and campus-wide outside plant (OSP) designs.
3) Outside plant optical fiber shall have a water block construction and meet the requirements for compound flow and water penetration. OSP cable shall have a pull strength of 2,670 Newtons (600 lbf).

4) Outside plant optical fiber cable shall support a bend radius of 10 times its diameter under no load (on reel), and 20 times the outside diameter the outside diameter when subject to the cable's rated load limit.
5) Fiber optic cables will be terminated using 568SC connectors as the primary connector type. Secondarily, LC style connectors, thirdly, MT-RJ connectors may be used if specified. In some instances, ST style connectors may be used providing the connector body is stainless steel and the ferrule is ceramic or zirconium. No other connectors may be used without a written exemption from the Director of Telecommunications, DC Government.
6) Multimode connectors shall be identified with a beige coloring of the housing or boot.
7) Singlemode connectors shall be identified with a blue coloring of the housing or boot.
8) Centralized cable designs joining horizontal cables to intrabuilding backbone cables shall:
a. Use re-mateable connectors or splices;
b. Allow mating in single or duplex fashion while managing fiber in pairs;
c. Provide a method of identifying each position;
d. Allow for the addition or deletion of connections;
e. Provide a method to convert from an interconnection or splice to a

cross-connect;
f. Provide an access point for testing purposes;
g. Provide storage for non-connected fibers; and,
h. Provide adequate protection for the adapters, connectors, splices and cables.
9) Fiber Termination Units may be rack or wall mounted. Fiber termination units, including patch panels, shall:
i. Cross-connect using patch cords;
j. Interconnect premises equipment to either horizontal or backbone fiber cabling;
k. Use standard colors to identify fiber groups as per ANSI/TIA/EIA – 606;
l. Use standard colors to identify individual fibers as per ANSI/TIA/EIA - 606;
m. Provide a means to access and test fiber optic cabling and premises equipment;
n. Handle optical fibers and patch cords in a managed fashion; and,
o. Protect fiber cabling, adapters and connectors.
10) Fiber optic splices shall exhibit a loss not greater then 0.3 dB when measured as per ANSI/TIA/EIA – 455 – 34.
11) Fiber optic patch cords shall be duplex in nature and identified in such a manner that one connector is marked “A” and one connector is marked “B”. The connector at the opposite end of the patch cord will have the labeling reversed.
12) All optical fiber shall be tested end-to-end using an optical source and light meter. The test results will be documented for each individual strand with the source and meter at both ends of the strand under test. Additional testing using

an Optical Time Domain Reflectometer (OTDR) shall be available when requested.

E. Work Area Outlets

13) Provide jacks designed for 100 Ohm UTP cable terminations and are CENELEC EN 50173 compliant;
14) Provide jacks that are UL VERIFIED for TIA/EIA category 5(e) electrical performance and UL LISTED 1863 and CSA certified;
15) Ensure all jacks are compatible with EIA/TIA 606 color code labeling; and
16) Purchase only jacks that are manufactured by an ISO 9002 Registered Manufacturer. The manufacturer’s jacks shall:
p. exhibit a delay skew of less than 1.25 ns and a propagation delay of less than 5 ns.
q. be an individually constructed unit and shall snap mount in an industry standard keystone opening (.760” x 580”).
r. be independently tested by a third party to deliver proof the product will support Gigabit transmission in accordance with EIA/TIA 568–B and the IEEE 802.3AB standard. These tests must verify full component compliance set forth in the EIA/TIA 568–B specifications.
s. utilize multi-layer printed circuit board (PCB) technology and incorporated a signal cancellation/coupling design. Modular jack contact wires shall be formed flat for increased surface contact with

mated plugs. Modular jack contacts shall be constructed of Beryllium copper for maximum spring force and resilience. Contact Plating shall be a minimum of 50 micro inches of hard gold in the contact area over 50 micro-inches of nickel.
t. have a designation indicating C5e Plus on the nose that can be plainly seen from the front of the faceplate.
u. fully encase and protect printed circuit boards and IDC fields.
v. utilize a paired punch down sequence.
w. The preferred vendor is Hubbell Premise Wiring.
17) Jacks shall be installed such that cables terminated to the jacks maintain minimum bend radius of at least 4 times (1” or 25 mm.) the cable diameter into the workstation outlet. Cables shall be terminated on jacks such that there is no tension on the conductors in the termination contacts.
18) The termination pattern shall be T568A.
19) WAOs shall be mounted to or in single-gang plates, double-gang plates or type 106 frames. Additional mounting options include the use of surface mount housings when installed at the termination of surface mounted raceway.
20) All WAOs shall be flush mounted using the appropriate adapter plates on installations in modular furniture. Surface mounted boxes shall not be used with modular furniture.

F. Patch Panels

1) Panels shall be ANSI/TIA/EIA-568-B.1, B.2 and ISO/IEC 11801 category 5e compliant.
2) Panels shall be CENELEC EN 50173 compliant and UL VERIFIED for TIA/EIA category 5e performance.
3) Panels shall be UL LISTED 1863 and CSA certified.
4) Panels shall be made by an ISO 9002 Certified Manufacturer. The preferred vendor is Hubbell Premise Wiring.
5) Panels shall be made of anodized .090 inch aluminum in 16-, 24 and 48-port configurations.
6) Panels shall accommodate 16 or 24 ports for each rack mount space or "U" (1U = 44.5 mm [1.75 in.]).
7) Panels shall be manufactured with a rolled-edge at the top and bottom for stiffness.
8) Panels shall be made of 8-port adapter modules removable by detaching three screws.
9) Panels shall have modular jacks employing staggered array contacts with a flat “hairpin” design made of Beryllium copper with a minimum 50-micro-inch gold plating on contact surfaces over 50-100 micro-inch of nickel compliant with FCC part 68.
10) Panels shall utilize the T568A wiring pattern.
11) Panel circuit boards shall be fully enclosed front and rear for physical protection.
12) Panels shall have port identification numbers on both the front and rear of the panel. The port identification numbers on the panel front shall be located so as to minimize obstruction by patch cords.
13) Panels shall have optional rear cable support bar for strain relief which shall clip to the rear of the patch panel.

14) The panel front shall have two raised panel identification label fields to accept ½" label inserts.
15) Panels shall have self-adhesive, clear label holders and white designation labels provided with the panel for each 8-port adapter.
16) Panels shall provide wiring identification & color code and maintain a paired punch down sequence that does not require the overlapping of cable pairs.
17) Panels shall terminate 22-26AWG solid conductors, maximum insulated conductor outside diameter 0.050".
18) When utilized, data cable and swing cable patch panels shall be mounted on separate free-standing 84" x 19" floor mounted equipment racks. The Contractor shall maximize the use of existing equipment racks before installing a new equipment rack. Alternative mounting must be approved, in writing, by the OCTO.

19) Voice cables terminated on Cat 5(e) patch panels shall meet the same criteria as data cables for installation and testing.

20) Voice cables terminated on patch panels shall be mounted in the same rack or bracket as the swing cable.
21) When utilized, data cable and swing cable patch panels shall be mounted on separate wall-mounted swing brackets. Alternative mounting must be approved, in writing, by the OCTO.
22) The Contractor shall not install any patch panel having more than 48 ports or locations.
23) Swing cables shall be terminated on Cat 5(e) patch panels at the telecommunications closet. The patch panels may be wall or rack-mount as required.
24) Data cables shall be terminated on Cat 5(e) patch panels at the telecommunications closet. The patch panels may be wall or rack-mount as required.

G. Equipment Racks

1) The Contractor shall provide both vertical and horizontal cable management for all rack-mounted installations. The District requires a minimum of one horizontal cable management panel for both station and patch cords for each installed patch panel.
2) Racks shall be UL Listed and of aluminum construction with a black polyurethane or mil finish. They shall be 84" tall with a 15" base depth. Rack base shall be pre-drilled for securing rack to the floor. Racks shall have #10-32 or #12-24 mounting screws included in the package. Unused screws shall be bagged and attached to the rack with a tie-wrap.
3) Rack rails shall be spaced for either 19" or 23" mounting rail-to-rail and shall be of a U shaped construction with #10-32 or #12-24 pre-tapped holes in the EIA-310-D standard hole pattern providing 48 rack spaces on both the front and rear. Rails shall have a universal side drilling pattern to allow racks to be bolted together or attachment of accessories. Each rack space or "U" is 44.5 mm or 1.75" in width. Rack spaces are numbered from the bottom of the equipment

rack.
4) The vertical cable management channel shall be comprised of three components: Vertical Channels, Steadfast gates, and covers.
5) The overall depth of the cable management channels shall be 10”
6) The surface finish shall be powder coat black or metallic silver as required to match equipment racks.
7) The vertical channel shall be comprised of two half-height sections of a fabricated “Z” profile (Z-Frame).
8) The Z-Frame shall be fabricated of 14ga. cold rolled steel.
9) The Z-Frame shall have 4” diameter front to rear cable pass through holes
10) The Z-Frame shall have a minimum of twelve sets of cable tie off points along its face for securing cable bundles running vertically.
11) The Z-Frame shall have formed hooks in its side allowing the channel to be easily fastened to the vertical upright of a rack.

12) Gates shall be provided to retain cable within the envelope of the vertical channel.
13) The gates shall fasten to the channel without the use of fasteners.
14) The gates shall have rolled edges to maintain bend radius of cable.
15) The gates shall have reinforcing ribs along the forward surface.
16) The gates shall be fabricated from 14ga cold rolled steel.
17) The gates shall be powder coated and match the finish on the equipment rack.
18) Covers shall not be fabricated from a polycarbonate, acrylic, or other flammable material.

H. Cable Pathways

1) Cable pathways shall be parallel to or orthogonal from the building exterior walls and shall follow main interior building hallways. Cable must be suspended above ceilings using cable tray, ladder rack, cable runway, “J” hooks or other approved devices.
2) The Contractor shall support all cables using approved devices. Approved devices include cable tray, ladder rack and/or 2-inch [5 cm] wide “J”-shaped hooks with rolled edges. Additional support devices may be approved after submission of qualifying documentation to the OCTO. A single 2” “J”-Hook cable support shall support a maximum of forty (40) cables. Ladder rack shall be constructed with a maximum spacing of 12” [30 cm] between cross-members.
3) The Contractor shall separate Category 5(e) cables a minimum of 5’-0” from all motors and transformers.
4) For cable not installed using cable tray or ladder rack, the nominal distance between cable supports is five (5) feet [1.5 meters]. Category 5(e) cables shall be separated from fluorescent lighting, ungrounded electrical power conduits and cables by a minimum of 12” [30 cm].
5) Conduit shall have a maximum of 270 degrees of bend between intermediate pull or junction boxes. The maximum distance between intermediate pull or junction boxes is 100 linear feet (30 meters.)
6) The maximum permissible fill ratio for conduit, raceway, ladder rack, “J” hook or cable tray is 40%.
7) Wire basket style cable tray shall be a continuous, rigid, welded steel wire 2” by 4” (50 by 100 mm) mesh cable management system with a T-welded wire lip for safety.
8) Cable tray, conduit, ladder rack or other continuous device used to support or

route telecommunications cables shall be grounded in accordance with the requirements of ANSI/TIA/EIA 569, NFPA 70 NEC and District regulation.
9) The Contractor shall provide bushings or other suitable transition to protect the cable from abrasion and maintain bend radius control at the entrance and exit point of all conduits and raceways. The cable shall be protected from abrasion at all stress and transition points where the cable penetrates or enters raceway or cabinets through the use of appropriate grommet material.

10) The minimum bend radius for a single four-pair UTP cable is 1.5" [35 cm]. The minimum bend radius for cable bundles is 10 times the bundle diameter. The minimum bend radius for 25-pair or larger cables is 10 times the cable diameter.
11) Telecommunications cables that cross over electrical cable, ungrounded conduit and video cable will do so at 90° angles only.
12) The Contractor shall untwist no more than ½" [12 mm] of each cable pair in terminating a Category 5(e) cable.
13) The Contractor shall have no more than 1" [25 mm] of internal cable pair exposed from the outer cable jacket at the point of cable termination for four-pair UTP cables.

I. Fire Stopping

1) Cable penetrations through fire and/or smoke rated barriers shall not compromise the original rating of the barrier. All fire barrier penetrations shall be fire stopped with approved materials.
2) Cable penetrations into telecommunications closets shall utilize re-enterable barriers and barrier material.
3) The Contractor shall restore all wall and/or barriers used for cable penetration to their original appearance and ratings.

J. Labeling

1) Labels shall be unique and identify the Telecommunications space, patch panels, 110 / 66 blocks, fire stop devices, telecommunications grounding bus bars, cable and the cable type. The font used for all labels shall be sans serif with 10 point as the minimum font size.
2) All labels will consist of the following elements:
a. *fs* – Telecommunications Space
b. *fs-an* – Horizontal Link
c. *fs-TMGB* – Telecommunications main grounding busbar
d. *fs-TGB* – Telecommunications grounding busbar
e. *fs1/fs2-n* – intrabuilding backbone cable
f. *fs1/fs2-n.d* – intrabuilding backbone cable pair or optical fiber
g. *f-FSLn(h)* – Firestop location (h) – rating in hours
h. *b1-fs1/b2-fs2-n* – interbuilding backbone cable
i. *bs-fs1/b2/fs2-n.d* – interbuilding backbone cable pair or optical fiber
j. *b* – building
k. *c* – campus or site
l. *fs-UUU.n.d(q)* – intrabuilding backbone pathway element
m. *fs1/fs2-UUU.n.d(q)* – intrabuilding backbone pathway between two TSes or areas
n. *b1-fs1/b2-fs2-UUU.n.d(q)* – interbuilding pathway or element
3) Cable labels shall identify the floor (in multi-story installations), originating

telecommunications space; patch panel or 110 / 66 block; the destination and the intended use (voice, data or swing.) The marking 2A-1-23S identifies the Swing (White) cable on the second floor of a multi-story building. This cable is

terminated on the second floor, Closet A, patch panel 1 and terminating at WAO 23.
4) Horizontal cables (4-pair) shall be identified with a clear Mylar over-wrap label (Brady type PTL-31-427 or equivalent.) Horizontal cables shall have the cable label attached within 6" (150 mm) of the termination.
5) Cables having 25 copper pair shall use a clear Mylar over-wrap label (Brady type PTL-21-427 or equivalent.)
6) Cables having more than 25 copper pair shall use a Brady PTL-12-109 or equivalent.
7) Fiber optic cables shall use similar labels as copper cables sized to the appropriate overall cable jacket.
8) Fiber optic flexible ducting (inner duct) shall be labeled similarly to riser cable.
9) Riser cables shall have labels identifying the riser cable number, floor served, terminating space and pair count.
10) Intra-space tie cables shall be identified with a label indicating the cable number, originating and terminating space and pair count.
11) All cables shall be identified with the same labeling information required at the termination point within 12 inches (300 mm) of passing through any barrier or fire stop device. The required label shall be on both sides of the pass-through or fire stop.
12) All cables installed in conduit or ducting shall be identified with the same labeling information required at the terminations point at all intermediate pull or junction boxes.
13) Each occupied position on 110 blocks is designated showing the Work Area Outlet (WAO). 2A-1-23V identifies either termination point for the voice (Blue) cable on the second floor, Closet A, 110 block 1, and at WAO 23.
14) Each occupied port on a patch panel identifies the served WAO. 2A-1-23D identifies either termination point for the Data (Gray) cable on the second floor, closet A, panel 1 and at WAO 23.
15) Each jack has the same designation as the originating 110 block or patch panel port. The font shall be sans serif and the minimum type size is 10 point.
16) Each WAO plate is identified on the face with a machine generated label identifying the serving TC. Each plate is identified on the reverse side with the same information handwritten in permanent marker. 2A-23 identifies the WAO plate where cables A23V, A23D and A23S are terminated at the work area.
17) Firestop location identifiers shall identify each installation of firestopping material. All firestopping location identifiers within a single facility should have the same format.
18) Each firestopping location shall be labeled at each location where firestopping is installed, on each side of the penetrated fire barrier, within 12" (300 mm) of the fire stopping material.
19) Firestopping labels shall contain the following information:

a. Firestopping location identifier,

b. Location of the firestopping installation (e.g.: room number and location within room),
c. Type and manufacturer of firestopping installed,
d. Firestop material rating
e. Date of installation,
f. Name of Contractor installing the firestopping material,
g. Service record of firestopping location (e.g.: 04/22/2003 firestopping removed and replaced with same type by <Contractor Name> to add cabling runs.)

IV. MISCELLANEOUS PROVISIONS:

1. The District's Standard Terms and Conditions for contracts as defined by the Office of Contracting and Procurement shall apply.
2. Vendor shall procure and maintain, through the Term of this Agreement, at Vendor's sole cost and expense, the following types of insurance coverage:
a) Employer's Liability insurance in a minimum amount of $100,000.00 as per 27 DCMR 2712.2. Bodily injury liability insurance in the amount of $500,000.00 as per 27 DCMR 2712.3. Auto liability insurance of $200,000.00 per person, $500,000.00 per occurrence for bodily injury, and Property Damage coverage of $20,000.00 per occurrence as per 27 DCMR 2715.5;
b) Umbrella Liability Insurance in a minimum amount of $1,000,000.00;
c) The DC Government shall be named additional insured and loss payee and Vendor shall furnish insurance certificates as evidence of coverage. Vendor will provide the DC Government with 30 days written notice of any cancellation in coverage. Carriers providing coverage will be rated by A.M. Best with at least an A-rating and a financial size category of at least Class VII. If Vendor fails to pay any premium for required insurance as specified herein, or if any insurer cancels or significantly reduces any required insurance without the DC Government's consent, at the DC Government's election, the DC Government may pay such premium or procure similar insurance coverage from another carrier or carriers, and deduct the entire cost (or part hereof) from the payment(s) due to Vendor, or DC Government may elect to terminate this Agreement pursuant to this Section.
3. Follow direction of single-point District Contracting Officer's Technical Representative, unless the representative expressly assigns a designee.
4. Promptly implement directives from the District's authorized representative to make minor modifications, additions and/or deletions to any portion of this scope of work. However, immediately advise the District in writing of any cost or schedule impact that may result from such District issued directives. If Contractor determines that there is additional cost or schedule slippage resulting from the directive, Contractor shall not act upon the directive, and shall not deviate from the approved plan, until the District issues a written change order. Contractor shall not act upon any verbal directive that materially changes any aspect of this scope of work, irrespective of the source of such directive.

5. Throughout performance of the above items, coordinate with District employees, and other consultants and contractors employed by the District.
6. Contractor will follow the procedures and rules of the Government of the District of Columbia, and additional procedures that the District Representative may direct from time-to-time. Additional procedures from the District Representative shall be documented on official stationery.
7. Assign a senior manager as Contractor's chief representative for this project. This representative shall have the authority to make binding decisions between its organization and the other team members. S/He will be in charge of all members of the Contractor team assigned to the project and will be the main contact. All correspondence, conferences, meetings and questions concerning the project directed to the Contractor and its subcontractors will be through this person. This representative will be personally available at all times during working hours from the beginning of the work through its completion.
8. When proposing personnel under time-and-material work (either base contract or change orders), provide District information necessary for District to confirm that the proposed personnel are appropriate for assignment at the proposed hourly rates. Utilize the Chief Technology Officer's "Staff Nomination" form for this purpose.
9. Under time-and-material work (either base contract or change orders), (a) before any person on Contractor's staff may commence charging time to project under time-and-material terms (either base period or change orders), submit resume material to District and obtain approval for assignment of such personnel. Utilize the CTO's "Staff Nomination" form for this purpose. (b) Contractor may not invoice for more than 176 hours per month per person, unless express authorization is received for District. (c) Contractor shall submit weekly personby-person time sheet in the form requested by District, and (d) provide a report every two weeks, indicating Contractor's estimated costs to date and Contractor's estimate of the cost of the work at completion.
10. The District may direct Contractor to remove any Contractor staff that District finds unacceptable, and Contractor shall immediately remove (and replace with new individual(s) satisfactory to District, if requested) such personnel.
11. Contractor may incur reimbursable costs under this agreement, provided Contractor follows the procedures set out on attached "Staff Nomination" form. Pre-approved expenses (including subcontractors) are passed through at cost, with no mark-up.
12. Prepare detailed agenda and minutes of meeting for all meetings called or chaired by Contractor. Such agendas shall identify in detail the specific items planned for discussion, and shall be distributed to proposed attendees well in advance of affected meetings. Such minutes are to set out responsible parties for action items, particularly decisions required by the District, including deadlines therefor, and the minutes shall record decisions made and the basis for each such decision.
13. During performance of work and/or at the completion of work, provide orderly hand-over of work products and deliverables to designated District representative.

14. Provide, at no cost to the District, portable computer equipment that is compatible with OCTO LAN system for use by Contractor personnel.
15. Provide space, equipment, storage, personnel and systems in Contractor's offices as necessary to support the work hereunder.
16. Any and all Contractor-produced work products and deliverables, including all documents, graphics and software that are produced by Contractor in connection with this scope of work become the exclusive property of the Government of the District of Columbia. Contractor, by acceptance of this scope of work, provides an exclusive and indefeasible license and copyright for unlimited use, copy and distribution by the District of subject work products and deliverables, in hard coy and/or soft copy (e.g. electronic, magnetic recording, etc.) form. Contractor shall deliver to the District camera-ready hard copies and softcopies (on 3.5" diskette or CD-ROM) of all such work products and deliverables.

V. SCHEDULE (TIME OF PERFORMANCE)

This scope of work will be performed on an expedited basis, in accordance with the following timeline schedule. In addition to periodic activities and deliverables required by the above scope of work, each activity must be completed and approved by District within the following number of workdays (measured from the initial Notice to Proceed for the work as a whole).
<Try to have at least one milestone every six weeks>

Activities
Work Days
from NTP

Develop and submit plan and schedule 1
Fully complete and submit all work, except for post-contract support

A. Acceptance

Government acceptance is defined as:
1. Joint walk-through and inspection resulting in the compilation of a final punchlist;
2. Government sign-off of an acceptance letter; and,
3. Receipt of Cable Certification Reports and "as-built" drawings.

VI. COST PROPOSAL

This Scope of Work will be performed on a Firm-Fixed-Price Basis unless agreed to in writing by an District Contracting Officer. Provide an estimate for the scope of work described herein.

1. Break down cost of labor by discipline and hours and by activity.
2. If proposing firm's rates are listed in Federal GSA Schedule, provide crossreference to the appropriate Schedule and utilize rates no higher than the rates therein.
3. Provide resumes and other support information necessary to prove that proposed personnel meet the qualification requirements in the proposed GSA Schedule rates or other source document.
4. Break down other costs into subcontractors, travel expenses, reproduction services, shipping, etc.
5. Provide plan for satisfaction of District LSDBE requirements.
6. Provide a statement regarding the general approach proposed by offeror. Ensure that the approach includes an organizational chart and proposed duration

of assignment for each person involved.
7. Provide resumes for all key personnel proposed.

VII. Award Decision: The selection of the awardee of this work will be made by District staff using their best business judgment regarding which offeror has proposed the most advantageous offer, based on a balanced consideration of cost and technical factors including the following:

1. Qualifications of proposed personnel relative to the requirements of this Scope of Work.
2. Past performance of the offeror and/or its proposed team members.
3. Proposed cost estimate or fixed price proposal and support that indicate an understanding of the scope of work and the risks inherent therein.

GOVERNMENT OF THE DISTRICT OF COLUMBIA
OFFICE OF CONTRACTING AND PROCUREMENT

TITLE PAGE – SPECIFICATIONS

SOLICITATION NO.: POAM-2004-B-0048-DR

ISSUING OFFICER:

OFFICE OF CONTRACTING AND PROCUREMENT
441, 4th Street, NW, Suite 700 S
Washington, D.C. 20001

Requests for clarification or interpretation of Bid Documents prior to date of Bid Opening:

ADDRESS TO:

AHMED EYOW
CAPITAL PURCHASING
INTEGRATED PRODUCT TEAM
441, 4th Street, N.W., 7th Floor
Washington, D.C. 20001
Tel: (202) 724-4238
Fax: (202) 727-5580

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SECTION 09912 - PAINTING

PART 1 - GENERAL

1.1 SUMMARY

A. Documents referred to in SCOPES of WORK, Section C, Bid Forms, Volume I are part hereof, the same as if repeated herein.

B. This Section includes surface preparation and field painting of exposed interior items and surfaces.

1.2 SUBMITTALS

A. Product Data: For each product indicated.

B. Samples: For each type of finish-coat material indicated.

1.3 PROJECT CONDITIONS

A. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 deg F. Maintain storage containers in a clean condition, free of foreign materials and residue.

B. Apply waterborne paints only when temperatures of surfaces to be painted and surrounding air are between 50 and 90 deg F.

C. Apply solvent-thinned paints only when temperatures of surfaces to be painted and surrounding air are between 45 and 95 deg F.

D. Do not apply paint in snow, rain, fog, or mist; or when relative humidity exceeds 85 percent; or at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

1.4 EXTRA MATERIALS

A. Furnish extra paint materials from the same production run as the materials applied and in the quantities described below. Package with protective covering for storage and identify with labels describing contents. Deliver extra materials to Owner.

1. Quantity: 1 gal. of each material and color applied.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products listed in other Part 2 articles.

B. Products: Subject to compliance with requirements, provide one of the products listed in other Part 2 articles.

C. Manufacturers' Names: Shortened versions (shown in parentheses) of the following manufacturers' names are used in other Part 2 articles: Use the following or any approved equal products:

1. Benjamin Moore & Co. (Benjamin Moore).
2. Coronado Paint Company (Coronado).
3. ICI Dulux Paint Centers (ICI Dulux Paints).
4. Kelly-Moore Paint Co. (Kelly-Moore).
5. M. A. Bruder & Sons, Inc. (M. A. B. Paint).
6. PPG Industries, Inc. (Pittsburgh Paints).
7. Sherwin-Williams Co. (Sherwin-Williams).

2.2 PAINT MATERIALS, GENERAL

A. Material Compatibility: Provide block fillers, primers, and finish-coat materials that are compatible with one another and with the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.

B. Material Quality: Provide manufacturer's best-quality paint material of the various coating types specified that are factory formulated and recommended by manufacturer for application indicated. Paint-material containers not displaying manufacturer's product identification will not be acceptable.

C. Colors: See Appendix A.

2.3 PREPARATORY COATS

A. Interior Primer: Interior latex-based or alkyd primer of finish coat manufacturer and recommended in writing by manufacturer for use with finish coat and on substrate indicated.

1. Ferrous-Metal Substrates: Quick drying, rust-inhibitive metal primer.
2. Zinc-Coated Metal Substrates: Galvanized metal primer.
3. Where manufacturer does not recommend a separate primer formulation on substrate indicated, use paint specified for finish coat.

2.4 INTERIOR FINISH COATS

A. Interior Flat Acrylic Paint: Use the following or any approved equal products:

1. Benjamin Moore; Moorecraft Super Spec Latex Flat No. 275.
2. Coronado; 28 Line Super Kote 5000 Latex Flat Paint.
3. ICI Dulux Paints; 1200-XXXX Dulux Professional Velvet Matte Interior Flat Latex Wall & Trim Finish.
4. Kelly-Moore; 450 Pro-Wall Interior Flat Latex Wall Paint.
5. M. A. B. Paint; Fresh Kote Latex Flat 402 Line.
6. Pittsburgh Paints; 6-70 Line SpeedHide Interior Wall Flat-Latex Paint.
7. Sherwin-Williams; ProMar 200 Interior Latex Flat Wall Paint B30W200 Series.

B. Interior Flat Latex-Emulsion: Use the following or any approved equal products:

1. Benjamin Moore; Moorecraft Super Spec Latex Flat No. 275.
2. Coronado; 28 Line Super Kote 5000 Vinyl Latex Flat Wall.
3. ICI Dulux Paints; 1200-XXXX Dulux Professional Velvet Matte Interior Flat Latex Wall & Trim Finish.
4. Kelly-Moore; 450 Pro-Wall Interior Flat Latex Wall Paint.
5. M. A. B. Paint; Fresh Kote Latex Flat 402 Line.
6. Pittsburgh Paints; 6-70 Line SpeedHide Interior Wall Flat-Latex Paint.
7. Sherwin-Williams; ProMar 200 Interior Latex Flat Wall Paint B30W200 Series.

C. Interior Low-Luster Acrylic Enamel: Use the following or any approved equal products:

1. Benjamin Moore; Moorcraft Super Spec Latex Eggshell Enamel No. 274.
2. Coronado; 30-Line Super Kote 5000 Latex Eggshell Enamel.
3. ICI Dulux Paints; 1402-XXXX Dulux Professional Acrylic Eggshell Interior Wall & Trim Enamel.
4. Kelly-Moore; 1610 Sat-N-Sheen Interior Latex Low Sheen Wall and Trim Finish.
5. Kelly-Moore; 1686 Dura-Poxy Eggshell Acrylic Enamel.
6. M. A. B. Paint; Fresh Kote Latex Satin Eggshell Enamel 405 Line.
7. Pittsburgh Paints; 6-400 Series SpeedHide Eggshell Acrylic Latex Enamel.
8. Sherwin-Williams; ProMar 200 Interior Latex Egg-Shell Enamel B20W200 Series.

D. Interior Semigloss Acrylic Enamel: Use the following or any approved equal products:

1. Benjamin Moore; Moorcraft Super Spec Latex Semi-Gloss Enamel No. 276.
2. Coronado; 32-Line Super Kote 5000 Latex Semi-Gloss Enamel.
3. ICI Dulux Paints; 1406-XXXX Dulux Professional Acrylic Semi-Gloss Interior Wall & Trim Enamel.
4. Kelly-Moore; 1649 Acrylic-Latex Semi-Gloss Enamel.
5. Kelly-Moore; 1685 Dura-Poxy Semi-Gloss Acrylic Enamel.
6. M. A. B. Paint; Fresh Kote Latex Semi-Gloss 410 Line.
7. Pittsburgh Paints; 6-500 Series SpeedHide Interior Semi-Gloss Latex.
8. Sherwin-Williams; ProMar 200 Interior Latex Semi-Gloss Enamel B31W200 Series.

E. Interior Semigloss Alkyd Enamel: Use the following or any approved equal products:

1. Benjamin Moore; Moorcraft Super Spec Alkyd Semi-Gloss Enamel No. 271.
2. Coronado; 27-Line Super Kote 5000 Alkyd Semi-Gloss Enamel.
3. ICI Dulux Paints; 1516-XXXX Ultra-Hide Alkyd Semi-Gloss Interior Wall & Trim Enamel.
4. Kelly-Moore; 1630--Kel-Cote Interior Alkyd Semi-Gloss Enamel.
5. M. A. B. Paint; Fresh Kote Semi-Gloss 403 Line.
6. Pittsburgh Paints; 6-1110 Series SpeedHide Interior Enamel Wall & Trim Semi-Gloss Oil.
7. Sherwin-Williams; ProMar 200 Interior Alkyd Semi-Gloss Enamel B34W200 Series.

F. Interior Full-Gloss Alkyd Enamel for Gypsum Board and Plaster: Use the following or any approved equal products:

1. Benjamin Moore; Moore's IMC Urethane Alkyd Enamel No. M22.
2. Coronado; 123 Line Super Kote 5000 High Gloss Alkyd Enamel.
3. ICI Dulux Paints; 4308-XXXX Devguard Alkyd Industrial Gloss Enamel.
4. Kelly-Moore; 1700 Kel-Guard Gloss Alkyd Rust Inhibitive Enamel.
5. M. A. B. Paint; Rich Lux Architectural Bright White Enamel 026-127 Line.

6. Pittsburgh Paints; 7-814 Series Pittsburgh Paints Industrial Gloss-Oil Interior/Exterior Enamel.
7. Sherwin-Williams; ProMar 200 Alkyd Gloss Enamel B35W200 Series.

G. Paste Wax: As recommended by manufacturer.

PART 3 - EXECUTION

3.1 APPLICATION

A. Comply with procedures specified in PDCA P4 for inspection and acceptance of surfaces to be painted.

B. Coordination of Work: Review other Sections in which primers are provided to ensure compatibility of the total system for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.

C. Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and similar items already installed that are not to be painted. If removal is impractical or impossible because of size or weight of the item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations in each space or area, reinstall items removed using workers skilled in the trades involved.

D. Surface Preparation: Clean and prepare surfaces to be painted according to manufacturer's written instructions for each particular substrate condition and as specified.

1. Provide barrier coats over incompatible primers or remove and reprime.
2. Cementitious Materials: Remove efflorescence, chalk, dust, dirt, grease, oils, and release agents. Roughen as required to remove glaze. If hardeners or sealers have been used to improve curing, use mechanical methods of surface preparation.
3. Wood: Clean surfaces of dirt, oil, and other foreign substances with scrapers, mineral spirits, and sandpaper, as required. Sand surfaces exposed to view smooth and dust off.

a. Scrape and clean small, dry, seasoned knots, and apply a thin coat of white shellac or other recommended knot sealer before applying primer. After priming, fill holes and imperfections in finish surfaces with putty or plastic wood filler. Sand smooth when dried.
b. Prime, stain, or seal wood to be painted immediately on delivery. Prime edges, ends, faces, undersides, and back sides of wood, including cabinets, counters, cases, and paneling.
c. If transparent finish is required, backprime with spar varnish.
d. Backprime paneling on interior partitions where masonry, plaster, or other wet wall construction occurs on back side.
e. Seal tops, bottoms, and cutouts of unprimed wood doors with a heavy coat of varnish or sealer immediately on delivery.

4. Ferrous Metals: Clean ungalvanized ferrous-metal surfaces that have not been shop coated; remove oil, grease, dirt, loose mill scale, and other foreign substances. Use solvent or mechanical cleaning methods that comply with SSPC's recommendations.

a. Blast steel surfaces clean as recommended by paint system manufacturer and according to SSPC-SP 6/NACE No. 3.
b. Treat bare and sandblasted or pickled clean metal with a metal treatment wash coat before priming.
c. Touch up bare areas and shop-applied prime coats that have been damaged. Wire-brush, clean with solvents recommended by paint manufacturer, and touch up with same primer as the shop coat.

5. Galvanized Surfaces: Clean galvanized surfaces with nonpetroleum-based solvents so surface is free of oil and surface contaminants. Remove pretreatment from galvanized sheet metal fabricated from coil stock by mechanical methods.

E. Material Preparation:

1. Maintain containers used in mixing and applying paint in a clean condition, free of foreign materials and residue.
2. Stir material before application to produce a mixture of uniform density. Stir as required during application. Do not stir surface film into material. If necessary, remove surface film and strain material before using.

F. Exposed Surfaces: Include areas visible when permanent or built-in fixtures, grilles, convector covers, covers for finned-tube radiation, and similar components are in place. Extend coatings in these areas, as required, to maintain system integrity and provide desired protection.

1. Paint surfaces behind movable equipment and furniture the same as similar exposed surfaces. Before final installation of equipment, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
2. Paint interior surfaces of ducts with a flat, nonspecular black paint where visible through registers or grilles.
3. Paint back sides of access panels and removable or hinged covers to match exposed surfaces.
4. Finish exterior doors on tops, bottoms, and side edges the same as exterior faces.
5. Finish interior of wall and base cabinets and similar field-finished casework to match exterior.

G. Sand lightly between each succeeding enamel or varnish coat.

H. Scheduling Painting: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.

1. Omit primer over metal surfaces that have been shop primed and touchup painted.
2. If undercoats, stains, or other conditions show through final coat of paint, apply additional coats until paint film is of uniform finish, color, and appearance.

I. Application Procedures: Apply paints and coatings by brush, roller, spray, or other applicators according to manufacturer's written instructions.

J. Minimum Coating Thickness: Apply paint materials no thinner than manufacturer's recommended spreading rate. Provide total dry film thickness of the entire system as recommended by manufacturer.

K. Mechanical and Electrical Work: Painting of mechanical and electrical work is limited to items exposed in equipment rooms and occupied spaces.

L. Prime Coats: Before applying finish coats, apply a prime coat, as recommended by manufacturer, to material that is required to be painted or finished and that has not been prime coated by others. Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, to ensure a finish coat with no burn-through or other defects due to insufficient sealing.

M. Pigmented (Opaque) Finishes: Completely cover surfaces as necessary to provide a smooth, opaque surface of uniform finish, color, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections will not be acceptable.

N. Transparent (Clear) Finishes: Use multiple coats to produce a glass-smooth surface film of even luster. Provide a finish free of laps, runs, cloudiness, color irregularity, brush marks, orange peel, nail holes, or other surface imperfections.

3.2 CLEANING AND PROTECTING

A. At the end of each workday, remove empty cans, rags, rubbish, and other discarded paint materials from Project site.

B. Protect work of other trades, whether being painted or not, against damage from painting. Correct damage by cleaning, repairing or replacing, and repainting, as approved by Architect.

C. Provide "Wet Paint" signs to protect newly painted finishes. After completing painting operations, remove temporary protective wrappings provided by others to protect their work.

1. After work of other trades is complete, touch up and restore damaged or defaced painted surfaces. Comply with procedures specified in PDCA P1.

3.3 INTERIOR PAINT SCHEDULE

A. Gypsum Board:

1. Acrylic Finish: Two finish coats finish coats over a primer.

a. Primer: Interior gypsum board primer.
b. Finish Coats: Interior low-luster acrylic enamel.

2. Alkyd-Enamel Finish: Two finish coats over a primer.

a. Primer: Interior gypsum board primer.
b. Finish Coats: Interior semigloss alkyd enamel for gypsum board.

B. All-Service Jacket over Insulation:

1. Acrylic Finish**:** Two finish coats. Add fungicidal agent to render fabric mildew proof.

a. Finish Coats: Interior flat latex-emulsion size.

C. Ferrous Metal:

1. Acrylic Finish: Two finish coats over a primer.

   a. Primer: Interior ferrous-metal primer.
   b. Finish Coats: Interior semigloss acrylic enamel.

2. Alkyd-Enamel Finish: Two finish coats over a primer.

   a. Primer: Interior ferrous-metal primer.

   b. Finish Coats: Interior semigloss alkyd enamel.

END OF SECTION 09912

SECTION 09680 - CARPET

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes woven and tufted carpet.

1.2 SUBMITTALS

A. Product Data: For each product indicated.

B. Shop Drawings: Include the following:

1. Seam locations.
2. Pattern type, repeat, location, direction, and starting point.
3. Pile direction.
4. Insets and borders.
5. Transition, and other accessory strips.
6. Transition details to other flooring materials.

C. Samples: For each for each carpet and exposed accessory and for each color and pattern required.

D. LEED Submittals:

1. Credit EQ 4.3: Manufacturers' product data for carpet and installation adhesive, including printed statement of VOC content.

E. Product Schedule: Use same room and product designations indicated on Drawings and in schedules.

F. Maintenance data.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who is certified by the Floor Covering Installation Board or who can demonstrate compliance with its certification program requirements.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Comply with CRI 104, Section 5, "Storage and Handling."

1.5 PROJECT CONDITIONS

A. General: Comply with CRI 104, Section 6.1, "Site Conditions; Temperature and Humidity."

B. Environmental Limitations: Do not install carpet until wet work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

C. Do not install carpet over concrete slabs until slabs have cured and are sufficiently dry to bond with adhesive and concrete slabs have pH range recommended by manufacturer.

D. Where demountable partitions or other items are indicated for installation on top of carpet, install carpet tile before installing these items.

1.6 WARRANTY

A. Carpet Warranty: Manufacturer's standard form in which manufacturer agrees to replace carpet that does not comply with requirements or that fails within 10 years from date of Substantial Completion. Warranty does not include deterioration or failure of carpet from unusual traffic, failure of substrate, vandalism, or abuse. Failures include, but are not limited to, more than 10 percent loss of face fiber, edge raveling, snags, runs, and delamination.

B. Carpet Cushion Warranty: Manufacturer's standard form agreeing to replace carpet cushion that does not comply with requirements or that fails within **10** years from date of Substantial Completion. Warranty does not include deterioration or failure of carpet cushion from unusual traffic, failure of substrate, vandalism, or abuse. Failure includes, but is not limited to, permanent indentation or compression.

1.7 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Carpet: Full-width rolls equal to **5** percent of amount installed for each type indicated, but not less than 10 sq. yd.

PART 2 - PRODUCTS

2.1 CARPET CPT-1.

A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

B. Products: Subject to compliance with requirements, provide one of the following:

1. To match Architect’s Sample

a. Color and Pattern: As selected from manufacturer's full range.

b. For proprietary or semiproprietary specification, delete descriptive requirements below that are determined by product designations inserted above.

C. Fiber Content:

D. Surface Pile Weight: 24 oz./sq. yd. excluding weight of backings.

E. Total Weight: 30 oz./sq. yd. including weight of backings for finished carpet.

F. Primary Backing: Manufacturer's standard.

G. Width: 12'.

H. Critical Radiant Flux Classification: Class I, not less than 0.45 w/sq. cm.

I. VOC Limits: Provide carpet that complies with the following limits for VOC content when tested according to ASTM D 5116:

1. Total VOCs: 0.5 mg/sq. m x h.
2. 4-PC (4-Phenylcyclohexene): 0.05 mg/sq. m x h.
3. Formaldehyde: 0.05 mg/sq. m x h.
4. Styrene: 0.4 mg/sq. m x h.

2.2 ADHESIVES

A. Adhesives: Water-resistant, mildew-resistant, nonstaining type to suit products and subfloor conditions indicated.

1. VOC Limits: Provide adhesives that comply with the following limits for VOC content when tested according to ASTM D 5116:

a. Total VOCs: 10.00 mg/sq. m x h.
b. Formaldehyde: 0.05 mg/sq. m x h.
c. 2-Ethyl-1-Hexanol: 3.00 mg/sq. m x h.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with CRI 104, Section 8, "Direct Glue-Down.

B. Maintain uniformity of carpet direction and lay of pile. At doorways, center seams under door in closed position. Bind or seal cut edges as recommended by carpet manufacturer.

C. Install pattern parallel to walls and borders.

END OF SECTION 09680

SECTION 09653 - RESILIENT WALL BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Wall base.

1.2 SUBMITTALS

A. Product Data: For each product indicated.

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

C. LEED Submittals:

1. Credit EQ 4.1: Manufacturers' product data for adhesives, including printed statement of VOC content and material safety data sheets.

1.3 PROJECT CONDITIONS

A. Maintain temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F, in spaces to receive floor tile during the following time periods:

1. 48 hours before installation.
2. During installation.
3. 48 hours after installation.

B. After post installation period, maintain temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.

C. Install resilient products after other finishing operations, including painting, have been completed.

1.4 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Furnish not less than 10 linear feet for every 500 linear feet or fraction thereof, of each type, color, pattern, and size of resilient product installed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products listed in other Part 2 articles.

B. Products: Subject to compliance with requirements, provide one of the products listed in other Part 2 articles.

2.2 COLORS AND PATTERNS

A. Colors and Patterns: As selected from manufacturer's full range, roll goods only.

2.3 RESILIENT WALL BASE R**B-1**

A. Wall Base: ASTM F 1861. Followings or approved equal:

1. AFCO-USA, American Floor Products Company, Inc.
2. Armstrong World Industries, Inc.
3. Azrock Commercial Flooring, DOMCO.
4. Burke Mercer Flooring Products.
5. Endura.
6. Estrie, American Biltrite (Canada) Ltd.
7. Johnsonite.
8. Marley Flexco (USA), Inc.
9. Mondo Rubber International, Inc.
10. Musson, R. C. Rubber Co.
11. Nora Rubber Flooring, Freudenberg Building Systems, Inc.
12. Pirelli Rubber Flooring.
13. Roppe Corporation.
14. Stoler Industries.
15. VPI, LLC, Floor Products Division.

B. Type (Material Requirement): TV (vinyl.

C. Group (Manufacturing Method): I solid, homogeneous.

D. Style: Cove (with top-set toe) Straight (toeless) Butt-to (cove with extended square-edge toe that fits flush to floor covering.

E. Minimum Thickness: 0.080 inch.

F. Height: 4 inches.

G. Lengths: Coils in manufacturer's standard length.

H. Outside Corners: Job formed or premolded.

I. Inside Corners: Job formed or premolded.

J. Surface: Smooth.

2.4 RESILIENT MOLDING ACCESSORY

A. Description: Cap for cove carpet; Cap for cove resilient sheet floor covering Carpet bar for tackless installations; Carpet edge for glue-down applications; Nosing for resilient floor covering; Reducer strip for resilient floor covering; Joiner for tile and carpet. Products: Followings or approved equal:

1. Burke Mercer Flooring Products.
2. Johnsonite.
3. Marley Flexco (USA), Inc.
4. Roppe Corporation.
5. Stoler Industries.

B. Material: Vinyl.

C. Profile and Dimensions: As indicated.

2.5 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 manufacturers for applications indicated.

B. Adhesives: Water-resistant type recommended by manufacturer to suit resilient products and substrate conditions indicated.

1. Use adhesives that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):

a. Cove Base Adhesives: 50 g/L.
b. Rubber Floor Adhesives: 60 g/L.

C. Stair-Tread-Nose Filler: Two-part epoxy compound recommended by resilient tread manufacturer to fill nosing substrates that do not conform to tread contours.

PART 3 - EXECUTION

3.1 PREPARATION

A. Prepare substrates according to manufacturer's written recommendations to ensure adhesion of resilient products.

B. Concrete Substrates for Stair Accessories: Prepare according to ASTM F 710.

1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
2. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.
3. Moisture Testing:

a. Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.

b. Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.

C. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.

D. Use trowelable leveling and patching compound to fill cracks, holes, and depressions in substrates.

E. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.

1. Do not install resilient products until they are the same temperature as the space where they are to be installed.

F. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation. After cleaning, examine substrates for moisture, alkaline salts, carbonation, and dust. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 RESILIENT WALL BASE INSTALLATION

A. Apply wall base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.

B. Install wall base in lengths as long as practicable without gaps at seams and with tops of adjacent pieces aligned.

C. Tightly adhere wall base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.

D. Do not stretch wall base during installation.

E. On masonry surfaces or other similar irregular substrates, fill voids along top edge of wall base with manufacturer's recommended adhesive filler material.

F. Premolded Corners: Install premolded corners before installing straight pieces.

G. Job-Formed Corners:

1. Outside Corners: Use straight pieces of maximum lengths possible. Form without producing discoloration (whitening) at bends. Shave back of base at points where bends occur and remove strips perpendicular to length of base that are only deep enough to produce a snug fit without removing more than half the wall base thickness.
2. Inside Corners: Use straight pieces of maximum lengths possible. Form by cutting an inverted V-shaped notch in toe of wall base at the point where corner is formed. Shave back of base where necessary to produce a snug fit to substrate.

3.3 RESILIENT ACCESSORY INSTALLATION

A. Resilient Stair Accessories:

1. Use stair-tread-nose filler to fill nosing substrates that do not conform to tread contours.

2. Tightly adhere to substrates throughout length of each piece.
3. For treads installed as separate, equal-length units, install to produce a flush joint between units.

B. Resilient Molding Accessories: Butt to adjacent materials and tightly adhere to substrates throughout length of each piece. Install reducer strips at edges of floor coverings that would otherwise be exposed.

3.4 CLEANING AND PROTECTION

A. Perform the following operations immediately after completing resilient product installation:

1. Remove adhesive and other blemishes from exposed surfaces.
2. Sweep and vacuum surfaces thoroughly.
3. Damp-mop surfaces to remove marks and soil.

a. Do not wash surfaces until after time period recommended by manufacturer.

B. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period. Use protection methods recommended in writing by manufacturer.

END OF SECTION 09653

SECTION 09512 - ACOUSTICAL TILE CEILINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Documents referred to in SCOPES of WORK, Section C, Bid Forms, Volume I are part hereof, the same as if repeated herein.

B. This Section includes acoustical tiles and suspension systems for ceilings.

1.2 SUBMITTALS

A. Product Data: For each product indicated.

B. Coordination Drawings: Drawn to scale and coordinating penetrations and ceiling-mounted items. Show the following:

1. Ceiling suspension assembly members.
2. Method of attaching hangers to building structure.
3. Size and location of initial access modules for acoustical tile.
4. Ceiling-mounted items including lighting fixtures, diffusers, grilles, speakers, sprinklers, access panels, and special moldings.

C. Samples: For each acoustical tile, for each concealed suspension system member and for each color and texture required.

D. Product test reports.

E. Research/evaluation reports.

F. Maintenance data.

1.3 QUALITY ASSURANCE

A. Acoustical Testing Agency Qualifications: An independent testing laboratory or an NVLAP-accredited laboratory.

B. Fire-Test-Response Characteristics:

1. Fire-Resistance Ratings: Where indicated, provide acoustical tile ceilings identical to those of assemblies tested for fire resistance per ASTM E 119 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Ratings are indicated by design designations from UL's "Fire Resistance Directory" or from the listings of another testing and inspecting agency.

   a. Identify materials with appropriate markings of applicable testing and inspecting agency.

2. Surface-Burning Characteristics: Acoustical tiles complying with ASTM E 1264 for Class A materials, when tested per ASTM E 84.

a. Smoke-Developed Index: 450 or less.

C. Seismic Standard: Comply with the following:

1. ASTM E 580.
2. CISCA's "Recommendations for Direct-Hung Acoustical Tile and Lay-in Panel Ceilings--Seismic Zones 0-2."
3. CISCA's "Guidelines for Seismic Restraint of Direct-Hung Suspended Ceiling Assemblies--Seismic Zones 3 & 4."
4. UBC Standard 25-2.

1.4 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Acoustical Ceiling Units: Full-size units equal to 10.0 percent of quantity installed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Ecophon Certain Teed, Inc. or approved equal.

2.2 GENERAL

A. Acoustical Tile Standard: Comply with ASTM E 1264.

B. Metal Suspension System Standard: Comply with ASTM C 635.

C. Attachment Devices: Size for five times the design load indicated in ASTM C 635, Table 1, "Direct Hung," unless otherwise indicated.

1. Anchors in Concrete: Expansion anchors fabricated from corrosion-resistant materials, with holes or loops for attaching hangers of type indicated and with capability to sustain, without failure, a load equal to five times that imposed by ceiling construction, as determined by testing per ASTM E 488 or ASTM E 1512 as applicable, conducted by a qualified testing and inspecting agency.
2. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hangers of type indicated, and with capability to sustain, without failure, a load equal to 10 times that imposed by ceiling construction, as determined by testing per ASTM E 1190, conducted by a qualified testing and inspecting agency.

D. Wire Hangers, Braces, and Ties: Zinc-coated carbon-steel wire; ASTM A 641/A 641M, Class 1 zinc coating, soft temper.

1. Size: Select wire diameter so its stress at three times hanger design load (ASTM C 635, Table 1, "Direct Hung") will be less than yield stress of wire, but provide not less than 0.106-inch- diameter wire.

E. Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that fit acoustical tile edge details and suspension systems indicated; formed from sheet metal of same material and finish as that used for exposed flanges of suspension system runners.

2.3 ACOUSTICAL TILES

A. Products: Followings or approved equal:

1. Ecophon , Focus D

B. Classification: glasswool with painted finish

C. Color: White

D. LR: Not less than 84%.

E. NRC: Not less than NRC - value 0.80

F. CAC: Not less than 25.

G. Edge Detail: shiplap

H. Thickness: ¾" thickness.

I. Size: 24 by 48 inches

2.4 METAL SUSPENSION SYSTEM

A. Products: Followings or approved equal:

1. Ecophon**;** Connect Focus D Suspension System

B. Direct-Hung Suspension System: Intermediate duty structural classification.

C. Access: Upward, with each access unit identified by manufacturer's standard unobtrusive markers.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Install acoustical tile ceilings to comply with ASTM C 636 and seismic requirements indicated, per manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."

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.

C. Suspend ceiling hangers from building's structural members, plumb and free from contact with insulation or other objects within ceiling plenum. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers, use trapezes or equivalent devices.

1. Do not support ceilings directly from permanent metal forms or floor deck; anchor into concrete slabs.

D. Install edge moldings and trim at perimeter of acoustical tile ceiling area and where necessary to conceal edges of acoustical units. Screw attach moldings to substrate with concealed fasteners at intervals not more than 16 inches o.c. and not more than 3 inches from ends, leveling with ceiling suspension system to a tolerance of 1/8 inch in 12 feet. Miter corners accurately and connect securely.

E. Install suspension system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.

F. Install acoustical tiles in coordination with suspension system and exposed moldings and trim. Place splines or suspension system flanges into kerfed edges so tile-to-tile joints are closed by double lap of material. Fit adjoining tile to form flush, tight joints. Scribe and cut tile for accurate fit at borders and around penetrations through tile. Hold tile field in compression by inserting leaf-type, spring-steel spacers between tile and moldings, spaced 12 inches o.c.

END OF SECTION 09512

SECTION 09260 - GYPSUM BOARD ASSEMBLIES

PART 1 - GENERAL

1.1 SUMMARY

A. Documents referred to in SCOPES of WORK, Section C, Bid Forms, Volume I are part hereof, the same as if repeated herein.

B. This Section includes the following:

1. Interior gypsum wallboard.
2. Non-load-bearing steel framing.

1.2 SUBMITTALS

A. Product Data: For each product indicated.

B. Samples: For each textured finish indicated and on same backing indicated for Work.

1.3 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: For gypsum board assemblies with fire-resistance ratings, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.

B. Sound Transmission Characteristics: For gypsum board assemblies with STC ratings, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by a qualified independent testing agency.

C. Mockups: Before finishing gypsum board assemblies, install mockups of at least 100 sq. ft. in surface area to demonstrate aesthetic effects and qualities of materials and execution.

1. Install mockups for the following applications:

   a. Surfaces with texture finishes.
   b. Surfaces indicated to receive nontextured paint finishes.
   c. Surfaces indicated to receive textured paint finishes.

2. Simulate finished lighting conditions for review of mockups.
3. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the products specified.
2. Products: Subject to compliance with requirements, provide one of the products specified.
3. Product: Subject to compliance with requirements, provide the product specified.

2.2 STEEL FRAMING

A. Steel Framing, General: Comply with ASTM C 754 for conditions indicated.

1. Steel Sheet Components: Metal complying with ASTM C 645 requirements.

a. Protective Coating:

1) Interior Applications: manufacturer's standard corrosion-resistant zinc coating.

B. Suspended Ceiling Framing:

1. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.0625-inch- diameter wire, or double strand of 0.0475-inch- diameter wire.
2. Hanger Attachments to Concrete:

a. Anchors: Fabricated from corrosion-resistant materials with holes or loops for attaching hanger wires and capable of sustaining, without failure, a load equal to **5** times that imposed by construction as determined by testing according to ASTM E 488 by a qualified independent testing agency.

1) Type: Postinstalled, expansion anchor.

b. Powder-Actuated Fasteners: Suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other devices for attaching hangers of type indicated, and capable of sustaining, without failure, a load equal to 10 times that imposed by construction as determined by testing according to ASTM E 1190 by a qualified independent testing agency.

3. Wire Hangers: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.162-inch diameter.
4. Carrying Channels: Cold-rolled, commercial-steel sheet with a base metal thickness of 0.0538 inch, a minimum 1/2-inch- wide flange, and in depth indicated.
5. Furring Channels (Furring Members):

a. Cold Rolled Channels: 0.0538-inch bare steel thickness, with minimum 1/2-inch-wide flange, 3/4 inch deep.
b. Steel Studs: ASTM C 645, in depth indicated.

1) Minimum Base Metal Thickness: 0.0179 inch

c. Hat-Shaped, Rigid Furring Channels: ASTM C 645, 7/8 inch deep.

1) Minimum Base Metal Thickness: 0.0179 inch

C. Grid Suspension System for Interior Ceilings: ASTM C 645, direct-hung system composed of main beams and cross-furring members that interlock.

1. Products: Followings or approved equal:

a. Armstrong World Industries, Inc.; Furring Systems/Drywall.
b. Chicago Metallic Corporation; Fire Front 630 Drywall System.
c. USG Interiors, Inc.; Drywall Suspension System.

D. Partition and Soffit Framing:

1. Steel Studs and Runners: ASTM C 645, in depth indicated.

a. Minimum Base Metal Thickness: 0.0179 inch.

2. Deep-Leg Deflection Track: ASTM C 645 top runner with 2-inch- deep flanges.
3. Proprietary Deflection Track: Steel sheet top runner manufactured to prevent cracking of gypsum board applied to interior partitions resulting from deflection of structure above; in thickness indicated for studs and in width to accommodate depth of studs.

a. Products: Followings or approved equal:

1) Delta Star, Inc., Superior Metal Trim; Superior Flex Track System (SFT).
2) Metal-Lite, Inc.; Slotted Track.

4. Proprietary Firestop Track: Top runner manufactured to allow partition heads to expand and contract with movement of the structure while maintaining continuity of fire-resistance-rated assembly indicated; in thickness not less than indicated for studs and in width to accommodate depth of studs.

a. Products: Followings or approved equal:

1) Fire Trak Corp.; Fire Trak attached to studs with Fire Trak Slip Clip.
2) Metal-Lite, Inc.; The System.

5. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.

a. Minimum Base Metal Thickness: 0.027 inch

6. Cold-Rolled Channel Bridging: 0.0538-inch bare steel thickness, with minimum 1/2-inch-wide flange, and in depth indicated.

a. Clip Angle: 1-1/2 by 1-1/2 inch, 0.068-inch- thick, galvanized steel.

7. Hat-Shaped, Rigid Furring Channels: ASTM C 645, in depth indicated.

a. Minimum Base Metal Thickness: 0.0179 inch

8. Resilient Furring Channels: 1/2-inch- deep, steel sheet members designed to reduce sound transmission. Asymmetrical or hat shaped, with face attached to single flange by a slotted leg (web) or attached to two flanges by slotted or expanded metal legs.
9. Cold-Rolled Furring Channels: 0.0538-inch bare steel thickness, with minimum 1/2-inch-wide flange, and in depth indicated.

a. Furring Brackets: Adjustable, corrugated-edge type of steel sheet with minimum bare steel thickness of 0.0312 inch.
b. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.0625-inch-diameter wire, or double strand of 0.0475-inch- diameter wire.

10. Z-Shaped Furring: With slotted or nonslotted web, face flange of 1-1/4 inches, wall attachment flange of 7/8 inch, minimum bare metal thickness of 0.0179 inch, and depth required to fit insulation thickness indicated.
11. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

2.3 PANEL PRODUCTS

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

B. Gypsum Wallboard: ASTM C 36.

1. Regular Type: In thickness indicated and with long tapered and featured (rounded or beveled).

C. Flexible Gypsum Wallboard: ASTM C 36, manufactured to bend to fit tight radii and to be more flexible than standard regular-type panels of the same thickness, 1/4 inch thick, and with long edges tapered. Apply in double layer at curved assemblies.

D. Sag-Resistant Gypsum Wallboard: ASTM C 36, manufactured to have more sag resistance than regular-type gypsum board, 1/2 inch thick, and with long edges tapered. Apply on ceiling surfaces.

2.4 TRIM ACCESSORIES

A. Interior Trim: ASTM C 1047.

1. Cornerbead: Use at outside corners.

B. Aluminum Trim: Extruded accessories of profiles and dimensions indicated.
1. Products: Followings or approved equal:

a. Fry Reglet Corp.; As indicated by designation on Drawings.
b. Pittcon Industries; As indicated by designation on Drawings.

2. Aluminum: Alloy and temper with not less than the strength and durability properties of ASTM B 221, alloy 6063-T5.
3. Finish: Factory-painted, baked-enamel finishes.

2.5 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C 475.

B. Joint Tape:

1. Interior Gypsum Wallboard: Paper.

2. Exterior Gypsum Soffit Board: Paper.
3. Glass-Mat Gypsum Sheathing Board: 10-by-10 glass mesh.
4. Tile Backing Panels: As recommended by panel manufacturer.

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

1. Prefilling: At open joints, rounded 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, flanges of trim accessories, and fasteners, 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.

2.6 AUXILIARY MATERIALS

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

B. Acoustical Sealant for Exposed and Concealed Joints: Nonsag, paintable, nonstaining, latex sealant complying with ASTM C 834 that effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.

1. Products: Followings or approved equal:

a. Pecora Corp.; AC-20 FTR Acoustical and Insulation Sealant.
b. United States Gypsum Co.; SHEETROCK Acoustical Sealant.

C. Acoustical Sealant for Concealed Joints: Nondrying, nonhardening, nonskinning, nonstaining, gunnable, synthetic-rubber sealant recommended for sealing interior concealed joints to reduce airborne sound transmission.
1. Products: Followings or approved equal:

a. Ohio Sealants, Inc.; Pro-Series SC-170 Rubber Base Sound Sealant.
b. Pecora Corp.; BA-98.
c. Tremco, Inc.; Tremco Acoustical Sealant.

D. 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.

E. Sound Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.

1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.

PART 3 - EXECUTION

3.1 NON-LOAD-BEARING STEEL FRAMING INSTALLATION

A. General: Comply with ASTM C 754, and ASTM C 840 requirements that apply to framing installation.

B. Suspended Ceiling and Soffit Framing:

1. Suspend ceiling hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or ceiling suspension system. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with the location of hangers required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards.
3. Attach hangers to structural members. Do not support ceilings from or attach hangers to permanent metal forms, steel deck tabs, steel roof decks, ducts, pipes, or conduit.
4. Screw furring to wood framing.
5. Wire-tie or clip furring channels to supports**,** as required to comply with requirements for assemblies indicated.
6. Grid Suspension System: Attach perimeter wall track or angle where grid suspension system meets vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.

C. Partition Framing:

1. Where studs are installed directly against exterior walls, install isolation strip between studs and wall.
2. Extend partition framing full height to structural supports or substrates above suspended ceilings, except where partitions are indicated to terminate at suspended ceilings. Continue framing over frames for doors and openings and frame around ducts penetrating partitions above ceiling to provide support for gypsum board.
3. Frame door openings to comply with GA-600 and with gypsum board manufacturer's applicable written recommendations, unless otherwise indicated. Screw vertical studs at jambs to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.

    a. Install two studs at each jamb, unless otherwise indicated.
    b. Extend jamb studs through suspended ceilings and attach to underside of floor or roof structure above.

4. Frame openings other than door openings the same as required for door openings, unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.

D. Z-Furring Members: Erect insulation vertically and hold in place with Z-furring members.

1. Until gypsum board is installed, hold insulation in place with 10-inch staples fabricated from 0.0625-inch- diameter, tie wire and inserted through slot in web of member.

3.2 PANEL PRODUCT INSTALLATION

A. Gypsum Board: Comply with ASTM C 840 and GA-216.

1. Space screws a maximum of 12 inches o.c. for vertical applications.
2. Space fasteners in panels that are tile substrates a maximum of 8 inches o.c.
3. On ceilings, apply gypsum panels before wall/partition board application to the greatest extent possible and at right angles to framing, unless otherwise indicated.
4. On partitions/walls, apply gypsum panels vertically (parallel 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 board.
    b. At stairwells and other high walls, install panels horizontally, unless otherwise indicated or required by fire-resistance-rated assembly.

5. On Z-furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.
6. Single-Layer Fastening Methods: Apply gypsum panels to supports with steel drill screws.
7. Laminating to Substrate: Comply with gypsum board manufacturer's written recommendations and temporarily brace or fasten gypsum panels until fastening adhesive has set.

3.3 FINISHING

A. Installing Trim Accessories: 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. Finishing Gypsum Board Panels: 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.

1. Prefill open joints, beveled edges, and damaged surface areas.
2. Apply joint tape over gypsum board joints, except those with trim having flanges not intended for tape.
3. Glass-Mat Gypsum Sheathing Board: Finish according to manufacturer's written instructions for use as exposed soffit board.
4. Glass-Mat, Water-Resistant Backing Panels: Finish according to manufacturer's written instructions.

C. Cementitious Backer Units: Finish according to manufacturer's written instructions.

D. Gypsum Board Finish Levels: Finish panels to levels indicated below, according to ASTM C 840, for locations indicated:

1. Level 4: Embed tape and apply separate first, fill, and finish coats of joint compound to tape, fasteners, and trim flanges.

END OF SECTION 09260

SECTION 08814 - MIRRORED GLASS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Silvered mirrored glass.
2. Pyrolytic mirrored glass.
3. Safety (tempered) mirrored glass.
4. Safety (laminated) mirrored glass.
5. Safety (vinyl-backed) mirrored glass.

1.2 SUBMITTALS

A. Product Data: For each product indicated.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other Work.

C. Samples: As follows:

1. Mirrored Glass: Dimensions as indicated on drawings.
2. Mirror clips.
3. Mirror Trim: As indicated on drawings.

D. Product certificates.

E. Product Test Report: For mirror mastic compatibility.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs glass installers for this Project who are certified under the National Glass Association's Glazier Certification Program as Level 2 (Senior Glaziers) or Level 3 (Master Glaziers).

B. Glazing Publications: Comply with published recommendations in GABA's "Glazing Manual," unless more stringent requirements are indicated.

C. NAAMM's Publication: For silvered mirrored glass, comply with recommendations in NAAMM's "Mirrors, Handle with Extreme Care, Tips for the Professional on the Care and Handling of Mirrors."

D. Safety Glass: Category II materials complying with testing requirements in 16 CAR 1201 and ANSI Z97.1.

E. Preconstruction Compatibility Test: Submit mirror mastic products to organic protective coating manufacturer for testing to determine compatibility of adhesive with mirrored glass coating.

1.4 DELIVERY, STORAGE, AND HANDLING

A. For silvered mirrored glass, comply with mirrored glass manufacturer's written instructions for shipping, storing, and handling mirrored glass as needed to prevent deterioration of shivering, damage to edges, and abrasion of glass surfaces and applied coatings. Store indoors, protected from moisture including condensation.

1.5 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to replace mirrored glass units that deteriorate f.o.b. the nearest shipping point to Project site, within 10 years from date of Substantial Completion.

1. Deterioration of Silvered Mirrored Glass: Defects developed from normal use not caused by maintaining and cleaning mirrored glass contrary to manufacturer's written instructions. Defects include discoloration, black spots, and clouding of the silver film.
2. Deterioration of Pyrolytic Mirrored Glass: Defects developed from normal use and not caused by maintaining and cleaning mirrored glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in pyrolytic coating.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the products specified.
2. Products: Subject to compliance with requirements, provide one of the products specified.
3. Product: Subject to compliance with requirements, provide the product specified.
4. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the manufacturers specified.
   a. Manufacturers: Subject to compliance with requirements, provide products by the

2.2 MIRRORED GLASS

A. Silvered Mirrored Glass:

1. Manufacturers: Any of the followings or approved equal:

   a. American Mirror Company, Inc.
   b. Carolina Mirror Company.
   c. Donisi Mirror Company.
   d. Gardner Glass Products.
   e. Gilded Mirrors, Inc.
   f. Lenoir Mirror Company.
   g. Stroupe Mirror Co., Inc.
   h. Sunshine Mirror.
   i. Virginia Mirror Co., Inc.

j. VVP America, Inc.; Binswanger Mirror Products.
k. Walker Glass Co., Ltd.

2. Tempered Float Glass: Clear
3. Shivering: Successive layers of chemically deposited silver, electrically or chemically deposited copper, and manufacturer's standard organic protective coating applied to second glass surface to produce coating system complying with FS DD-M-411.

B. Fabrication:

1. Cutouts: Fabricate cutouts for notches and holes in mirrored glass without marring visible surfaces. Locate and size cutouts so they fit closely around penetrations in mirrored glass.
2. Mirrored Glass Edge Treatment: Flat polished.

a. Silvered Mirror Glass: Seal edges after edge treatment to prevent chemical or atmospheric penetration of glass coating.
b. Factory Fabricate: Perform edge treatment and sealing in factory immediately after cutting to final sizes.

2.3 MISCELLANEOUS MATERIALS

A. Setting Blocks: Neoprene, 70 to 90 Shore A hardness. Manufacturers mentioned below can be substituted for any materials approved as equal by Engineer.

B. Edge Sealer: Coating compatible with glass coating and approved by mirrored glass manufacturer for use in protecting against silver deterioration at mirrored glass edges.

C. Mirror Mastic: An adhesive setting compound, produced specifically for setting mirrored glass by spot application.

D. Extruded-Aluminum Top and Bottom Trim: J-channels with return that produces glazing channel to accommodate mirrored glass thickness indicated.

1. Bottom Trim: J-channels formed with front leg and back leg not less than 3/8 and 7/8 inch in height, respectively, and a thickness of not less than 0.05 inch.

a. Products:

1) C. R. Laurence Co., Inc.; CRL Standard "J" Channel.
2) Sommer & Maca Industries, Inc.; Heavy Gauge Aluminum Shallow Nose "J" Moulding Lower Bar.

2. Top Trim: J-channels formed with front leg and back leg not less than 5/8 and 1 inch in height, respectively, and a thickness of not less than 0.062 inch.

a. Products:

1) C. R. Laurence Co., Inc.; CRL Deep "J" Channel.
2) Sommer & Maca Industries, Inc.; Heavy Gauge Aluminum Deep Nose "J" Moulding Lower Bar.

E. Mirror Bottom Clips: As indicated.

F. Mirror Top Clips: As indicated.

G. Plated Steel Hardware: Formed-steel shapes with plated finish.

1. Profile: As indicated.
2. Finish: As indicated.

H. Fasteners: Fabricated of same basic metal and alloy as fastened metal and matching it in finished color and texture where fasteners are exposed.

I. Anchors and Inserts: Provide devices as required for mirror hardware installation. Provide toothed or lead-shield expansion-bolt devices for drilled-in-place anchors. Provide galvanized anchors and inserts for applications on inside face of exterior walls and where indicated.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Verify compatibility with and suitability of substrates, including compatibility of mirror mastic with existing finishes or primers.

B. Install mirrored glass units to comply with written instructions of mirrored glass manufacturer and with referenced GABA and NAAMM publications. Mount mirrored glass accurately in place in a manner that avoids distorting reflected images.

C. Provide space for air circulation between back of mirrored glass units and face of mounting surface.

D. Mastic Spot Installation System:

1. Apply barrier coat to mirrored glass backing where approved in writing by manufacturers of mirrored glass and backing material.
2. Apply mastic in spots to comply with mastic manufacturer's written instructions for coverage and to allow air circulation between back of mirrored glass units and face of mounting surface.
3. After mastic is applied, align mirrored glass units and press into place while maintaining a minimum air space of 1/8 inch between back of mirrored glass and mounting surface.

E. For wall-mounted mirrored glass units, install permanent means of support at bottom and top edges with bottom support designed to withstand mirrored glass weight and top support designed to prevent mirrored glass from coming away from wall along top edges.

1. Attach mirror hardware securely to mounting surfaces with mechanical fasteners installed with anchors or inserts as applicable. Install fasteners so heads do not impose point loads on backs of mirrored glass units.
2. For continuous bottom supports, provide setting blocks 1/8 inch thick by 4 inches long at quarter points. For channels or other continuous supports in which water could be trapped, provide, between setting blocks, two slotted weeps not less than 1/4 inch wide by 3/8 inch long.
3. For metal or plastic clips, place a felt or plastic pad between mirrored glass and each clip to prevent spalling of mirrored glass edges.

4. Where indicated, install bottom and top trim. Fabricate trim in single lengths to fit and cover top and bottom edges of mirrored glass units.
5. Where indicated, install bottom trim and top clips. Fabricate bottom trim in single lengths to fit and cover bottom edge of mirrored glass units. Locate top clips so they are symmetrically placed and evenly spaced.
6. Where indicated, install bottom and top clips symmetrically placed and evenly spaced.

F. Protect mirrored glass from breakage and contaminating substances resulting from construction operations.

1. Do not permit edges of silvered mirrored glass to be exposed to standing water.
2. Maintain environmental conditions that will prevent silvered mirrored glass from being exposed to moisture from condensation or other sources for continuous periods of time.

END OF SECTION 08814

SECTION 08800 - GLAZING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes glazing for the following products and applications, including those specified in other Sections where glazing requirements are specified by reference to this Section:

1. Windows.
2. Doors.
3. Glazed curtain walls.
4. Glazed entrances.
5. Interior borrowed lites.
6. Storefront framing.
7. Skylights.
8. Sloped glazing.

1.2 DEFINITIONS

A. Interspace: Space between lites of an insulating-glass unit that contains dehydrated air or a specified gas.

B. Deterioration of Coated Glass: Defects developed from normal use that are attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in metallic coating.

C. Deterioration of Insulating Glass: Failure of hermetic seal under normal use that is attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.

D. Deterioration of Laminated Glass: Defects developed from normal use that are attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.

1.3 PERFORMANCE REQUIREMENTS

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

B. Glass Design: Glass thickness designations indicated are minimums and are for detailing only. Confirm glass thicknesses by analyzing Project loads and in-service conditions. Provide glass

lites in the thickness designations indicated for various size openings, but not less than thicknesses and in strengths (annealed or heat treated) required to meet or exceed the following criteria:

1. Glass Thicknesses: Select minimum glass thicknesses to comply with ASTM E 1300, according to the following requirements:
   a. Probability of Breakage for Vertical Glazing: 8 lites per 1000 for lites set vertically or not more than 15 degrees off vertical and under wind action.

      1) Load Duration: 60 seconds or less.

C. Thermal Movements: Provide glazing that allows for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures acting on glass framing members and glazing components. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F, ambient;.

D. Thermal and Optical Performance Properties: Provide glass with performance properties specified based on manufacturer's published test data, as determined according to procedures indicated below:

1. For monolithic-glass lites, properties are based on units with lites one half inch.
2. For laminated-glass lites, properties are based on products of construction indicated.
3. For insulating-glass units, properties are based on units of thickness indicated for overall unit and for each lite **1/2-inch**.

1.4 SUBMITTALS

A. Product Data: For each glass product and glazing material indicated.

B. Samples: 12-inch- square, for each type of glass product indicated, other than monolithic clear float glass.

C. Glazing Schedule: Use same designations indicated on Drawings.

D. Preconstruction Adhesion and Compatibility Test Report: From glazing sealant manufacturer.

1.5 QUALITY ASSURANCE

A. Preconstruction Adhesion and Compatibility Testing: Submit to elastomeric glazing sealant manufacturers, for testing according to ASTM C 1087, samples of each glazing material type, tape sealant, gasket, glazing accessory, and glass-framing member that will contact or affect elastomeric glazing sealants:

B. Glazing for Fire-Rated **Door** Assemblies: Glazing for assemblies that comply with NFPA 80 and that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 257.

C. Safety Glazing Products: Comply with testing requirements in 16 CFR 1201.

D. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below, unless more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.

1. GANA Publications: [**GANA Laminated Division's "Laminated Glass Design Guide" and**]GANA's "Glazing Manual."
2. AAMA Publications: AAMA GDSG-1, "Glass Design for Sloped Glazing," and AAMA TIR-A7, "Sloped Glazing Guidelines."
3. IGMA Publication for Sloped Glazing: IGMA TB-3001, "Sloped Glazing Guidelines."
4. IGMA Publication for Insulating Glass: SIGMA TM-3000, "Glazing Guidelines for Sealed Insulating Glass Units."

E. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of the Associated Laboratories**,** Inc.

1.6 WARRANTY

A. Manufacturer's Special Warranty for Coated-Glass Products: Manufacturer's standard form, made out to Owner and signed by coated-glass manufacturer agreeing to replace coated-glass units that deteriorate as defined in "Definitions" Article, f.o.b. the nearest shipping point to Project site, within specified warranty period indicated below.

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

B. Manufacturer's Special Warranty on Laminated Glass: Manufacturer's standard form, made out to Owner and signed by laminated-glass manufacturer agreeing to replace laminated-glass units that deteriorate as defined in "Definitions" Article, f.o.b. the nearest shipping point to Project site, within specified warranty period indicated below.

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

C. Manufacturer's Special Warranty on Insulating Glass: Manufacturer's standard form, made out to Owner and signed by insulating-glass manufacturer agreeing to replace insulating-glass units that deteriorate as defined in "Definitions" Article, f.o.b. the nearest shipping point to Project site, within specified warranty period indicated below.

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

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products specified.
2. Products: Subject to compliance with requirements, provide one of the products specified.
3. Product: Subject to compliance with requirements, provide product specified.

4. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.
5. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 GLASS PRODUCTS

A. Annealed Float Glass: ASTM C 1036, Type I (transparent flat glass), Quality-Q3; of class indicated.

1. Ultra-Clear (Low-Iron) Float Glass: Class I (clear); with a minimum 91 percent visible light transmission and a minimum solar heat gain coefficient of 0.87.

a. Products:

1) AFG Industries Inc.; Krystal Klear.
2) Pilkington Building Products North America; Optiwhite.
3) PPG Industries, Inc.; Starphire.
4) Schott Corporation; Amiran.
5) Or Approved equal.

B. Heat-Treated Float Glass: ASTM C 1048; Type I (transparent flat glass); Quality-Q3; of class, kind, and condition indicated.

1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed, unless otherwise indicated.
2. Provide Kind HS (heat-strengthened) float glass in place of annealed float glass where needed to resist thermal stresses induced by differential shading of individual glass lites and to comply with glass design requirements specified in Part 1 "Performance Requirements" Article.
3. For uncoated glass, comply with requirements for Condition A.
4. For coated vision glass, comply with requirements for Condition C (other uncoated glass).
5. Provide Kind FT (fully tempered) float glass in place of annealed or Kind HS (heat-strengthened) float glass where safety glass is indicated.

C. Tempered Patterned Glass: ASTM C 1048, Kind FT (fully tempered), Type II (patterned flat glass), Class 1 (clear), Form 3 (patterned); and of quality, finish, and pattern specified.

D. Laminated Glass: ASTM C 1172, and complying with other requirements specified and with the following:

1. Interlayer: [**Polyvinyl butyral**] [**or**] [**cured resin**] of thickness indicated with a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after laminating glass lites and installation.

E. Insulating-Glass Units, General: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, and complying with ASTM E 774 for Class CBA units and with requirements specified in this Article and in Part 2 "Insulating-Glass Units" Article.

1. Provide Kind HS (heat-strengthened) float glass in place of annealed glass where needed to resist thermal stresses induced by differential shading of individual glass lites and to comply with glass design requirements specified in Part 1 "Performance Requirements" Article.

2. Overall Unit Thickness and Thickness of Each Lite: Dimensions indicated for insulating-glass units are nominal and the overall thicknesses of units are measured perpendicularly from outer surfaces of glass lites at unit's edge.
3. Sealing System: Dual seal.
4. Spacer Specifications: Manufacturer's standard spacer material and construction.
5. Spacer Specifications: Manufacturer's standard spacer material and construction complying with the following requirements:

    a. Spacer Material**: Aluminum with mill or clear anodic finish**.
    b. Corner Construction: Manufacturer's standard corner construction.

2.3 GLAZING GASKETS

A. Dense Compression Gaskets: Molded or extruded gaskets of material indicated below, complying with standards referenced with name of elastomer indicated below, and of profile and hardness required to maintain watertight seal:

1. Neoprene, ASTM C 864.
2. EPDM, ASTM C 864.
3. Silicone, ASTM C 1115.
4. Thermoplastic polyolefin rubber, ASTM C 1115.
5. Any material indicated above.

B. Soft Compression Gaskets: Extruded or molded, closed-cell, integral-skinned gaskets of material indicated below; complying with ASTM C 509, Type II, black; and of profile and hardness required to maintain watertight seal:

1. Neoprene.
2. EPDM.
3. Silicone.
4. Thermoplastic polyolefin rubber.
5. Any material indicated above.

2.4 GLAZING SEALANTS

A. General: Provide products of type indicated, complying with the following requirements:

1. Compatibility: Select glazing sealants that are compatible with one another and with other materials they will contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
3. Colors of Exposed Glazing Sealants: **As selected by Architect from manufacturer's full range**.

B. Elastomeric Glazing Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied chemically curing sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.

1. Single-Component **Neutral- and Basic-Curing** Silicone Glazing Sealants GS-<#>:

a. Products:

1) As decided by Engineer and Architect

b. Type and Grade: S (single component) and NS (nonsag).
c. Class: [**50**] [**100/50**].
d. Use Related to Exposure: NT (nontraffic).
e. Uses Related to Glazing Substrates: M, G, A, and, as applicable to glazing substrates indicated, O.
f. Applications: See the Architectural drawings

2. Neutral-Curing Silicone Glazing Sealants:

a. Products:

1) See the Architectural drawings

b. Type and Grade: S (single component) and NS (nonsag).
c. Class: [**25**] [**50**].
d. Use Related to Exposure: NT (nontraffic).
e. Uses Related to Glazing Substrates: [**M**], G, A, and, as applicable to glazing substrates indicated, O.
f. Applications: As directed by Architects

2.5 GLAZING TAPES

A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based elastomeric tape with a solids content of 100 percent; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; packaged on rolls with a release paper backing; and complying with ASTM C 1281 and AAMA 800 for products indicated below:

1. AAMA 804.3 tape, where indicated.
2. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
3. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.

B. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; packaged on rolls with release liner protecting adhesive; and complying with AAMA 800 for the following types:

1. Type 1, for glazing applications in which tape acts as the primary sealant.
2. Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

2.6 MISCELLANEOUS GLAZING MATERIALS

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

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

C. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.

D. Spacers: Elastomeric blocks or continuous extrusions with a Shore, Type A durometer hardness required by glass manufacturer to maintain glass lites in place for installation indicated.

E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).

F. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

G. Perimeter Insulation for Fire-Resistive Glazing: Identical to product used in test assembly to obtain fire-resistance rating.

2.7 FABRICATION OF GLAZING UNITS

A. Fabricate glazing units in sizes required to glaze openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.

2.8 MONOLITHIC FLOAT-GLASS UNITS

A. Uncoated Clear Float-Glass Units MG: See the notes in the drawing

1. Thickness: **6.0**
2. Self-Cleaning, Low-Maintenance Coating: Pyrolytic coating on first surface.

2.9 MONOLITHIC CERAMIC-COATED VISION-GLASS UNITS

A. Ceramic-Coated Vision-Glass Units CVG: See the notes in the drawing

B. Products:

a. See the architectural drawing notes
b. Tint Color: As directed by Engineer

2. Thickness: **6.0 mm**
3. Ceramic Coating Color and Pattern: **Match manufacturer's color and pattern designation if matching is required; otherwise, insert color and pattern designation for each product named above**.

a. Coating Location: Second surface.

4. Self-Cleaning, Low-Maintenance Coating: Pyrolytic coating on first surface.

2.10 LAMINATED-GLASS UNITS

1. Laminated-Glass Units LG: Architectural drawings/as directed by Engineer

PART 3 - EXECUTION

3.1 GLAZING

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

1. Glazing channel dimensions, as indicated on Drawings, provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances. Adjust as required by Project conditions during installation.
2. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.
3. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction sealant-substrate testing.
4. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
5. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
6. Provide spacers for glass lites where length plus width is larger than 50 inches.
7. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.

B. Tape Glazing: Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.

1. Cover vertical framing joints by applying tapes to heads and sills first and then to jambs. Cover horizontal framing joints by applying tapes to jambs and then to heads and sills.
2. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.
3. Apply heel bead of elastomeric sealant.
4. Center glass lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.
5. Apply cap bead of elastomeric sealant over exposed edge of tape.

C. Gasket Glazing (Dry): Fabricate compression gaskets in lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.

1. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.
2. Center glass lites in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
3. Install gaskets so they protrude past face of glazing stops.

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

1. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.
2. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

3.2 CLEANING AND PROTECTION

A. Protect exterior glass from damage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels, and clean surfaces. Protect glass from contact with contaminating substances resulting from construction operations, including weld splatter. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended by glass manufacturer.

B. Remove and replace glass that is broken, chipped, cracked, or abraded or that is damaged from natural causes, accidents, and vandalism, during construction period.

END OF SECTION 08800

SECTION 08711 - DOOR HARDWARE

PART 1 - GENERAL

1.1 SUMMARY

A. Documents referred to in SCOPE of WORK, Section C, Bid Forms, Volume I are part hereof, the same as if repeated herein.

B. This Section includes the following:

1. Commercial door hardware.
2. Cylinders for doors specified in other Sections.

1.2 SUBMITTALS

A. Product Data: For each product indicated.

B. Shop Drawings: Include details of electrified door hardware and wiring diagrams.

C. Samples: For each exposed finish.

D. Door Hardware Schedule: Organized into door hardware sets indicating type, style, function, size, label, hand, manufacturer, fasteners, location, and finish of each door hardware item. Include description of each electrified door hardware function, including sequence of operation.

E. Keying Schedule: Detail Owner's final keying instructions for locks.

F. Product certificates.

1.3 QUALITY ASSURANCE

A. Supplier Qualifications: Person who is or employs a qualified DHI Architectural Hardware Consultant.

B. Source Limitations: Obtain electrified door hardware from same manufacturer as mechanical door hardware, unless otherwise indicated. Manufacturers that are listed to perform electrical modifications, by a testing and inspecting agency acceptable to authorities having jurisdiction, are acceptable.

C. Keying Conference: Conduct conference at Project site. Incorporate keying conference decisions into final keying schedule.

D. Preinstallation Conference: Conduct conference UDC Building 41.

E. Keys: Deliver keys to Owner (UDC) by registered mail.

F. Templates: Obtain and distribute templates for doors, frames, and other work specified to be factory prepared for installing door hardware.

G. Standards: Comply with BHMA A156 series standards, Grade 1.

H. Certified Products: Provide door hardware that is listed in BHMA directory of certified products.

1.4 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within warranty period.

1. Warranty Period for Manual Closers: 10 years from date of Substantial Completion.
2. Warranty Period for Concealed Floor Closers: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Product: Subject to compliance with requirements, provide the product named for each door hardware item indicated in Door Hardware Sets.

B. Basis-of-Design Product: Product named for each door hardware item indicated in Door Hardware Sets establishes the basis of design. Provide either the named product or a comparable product by one of the manufacturers specified for each type of hardware item.

2.2 DOOR HARDWARE

A. Scheduled Door Hardware: Provide door hardware according to door hardware schedule indicated in door and frame schedule.

2.3 PIVOTS AND HINGES

A. Manufacturers: From followings or from any other manufacturers which products are approved as equal by Engineer

1. Hinges:

a. Baldwin Hardware Corporation (BH).
b. Bommer Industries, Inc. (BI).
c. Cal-Royal Products, Inc. (CRP).
d. Hager Companies (HAG).
e. Lawrence Brothers, Inc. (LB).
f. McKinney Products Company; Div. of ESSEX Industries, Inc. (MCK).
g. Mont-Hard Corporation; Div. of Fanal, SA (MH).
h. PBB, Inc. (PBB).
i. Sargent Manufacturing Company; Div. of ESSEX Industries, Inc. (SGT).
j. Stanley Commercial Hardware; Div. of The Stanley Works (STH).
k.

2. Pivots and Pivot Hinges:

a. DORMA Door Controls Inc.; Member of The DORMA Group (DC).
b. Hager Companies (HAG).
c. Lawrence Brothers, Inc. (LB).
d. LCN Closers; an Ingersoll-Rand Company (LCN).
e. Markar Products, Inc. (MP).
f. McKinney Products Company; Div. of ESSEX Industries, Inc. (MCK).
g. NT Dor-O-Matic Hardware Div.; an Ingersoll-Rand Company (NTD).
h. Rixson-Firemark, Inc.; Div. of Yale Security Inc. (RIX).
i. Sargent Manufacturing Company; Div. of ESSEX Industries, Inc. (SGT).
j. Stanley Commercial Hardware; Div. of The Stanley Works (STH).

3. Continuous Geared Hinges:

a. Hager Companies (HAG).
b. Markar Products, Inc. (MP).
c. McKinney Products Company; Div. of ESSEX Industries, Inc. (MCK).
d. Pemko Manufacturing Co., Inc. (PEM).
e. Select Products Limited (SPL).
f. Zero International, Inc. (ZRO).

B. General: Except for hinges and pivots to be installed entirely (both leaves) into wood doors and frames, provide only template-produced units.

C. Hinge Base Metal: Unless otherwise indicated, provide the following:
1. Interior Hinges: Stainless steel, with stainless-steel pin.

D. Nonremovable Pins: Provide set screw in hinge barrel that prevents removal of pin while door is closed; outswinging corridor doors with locks.

E. Screws: Phillips flat-head screws; screw heads finished to match surface of hinges.
1. Wood Doors and Frames: Wood screws.

2.4 MECHANICAL LOCKS AND LATCHES

A. Manufacturers:

1. Accurate Lock and Hardware Co. (ALH).
2. Adams Rite Manufacturing Co. (ARM).
3. Architectural Builders Hardware Mfg., Inc. (ABH).
4. Arrow Architectural Hardware; Div. of ESSEX Industries, Inc. (AAH).
5. Best Lock Corporation (BLC).
6. Brink, R. R. Locking Systems, Inc. (RRB).
7. Cal-Royal Products, Inc. (CRP).
8. Corbin Russwin Architectural Hardware; Div. of Yale Security Inc. (CR).
9. Door Controls International (DCI).
10. Folger Adam Security Inc. (FAS).
11. Glynn-Johnson; an Ingersoll-Rand Company (GJ).
12. Hager Companies (HAG).
13. Ives, H. B. (IVS).
14. Lockwood Architectural Hardware; Div. of Lloyd Matheson Inc. (LAH).
15. Marks USA (MKS).
16. McKinney Products Company; Div. of ESSEX Industries, Inc. (MCK).

17. Medeco High Security Locks, Inc. (MED).
18. NT Falcon Lock Co.; an Ingersoll-Rand Company (NTF).
19. PDQ Manufacturing Co. (PDQ).
20. Rockwood Manufacturing Company (RM).
21. Sargent Manufacturing Company; Div. of ESSEX Industries, Inc. (SGT).
22. Schlage Lock Company; an Ingersoll-Rand Company (SCH).
23. Security Door Controls (SDC).
24. Simplex; Div. of UNICAN (SIM).
25. Southern Steel Co.; Div. of Phelps-Tointon Inc. (SS).
26. Triangle Brass Manufacturing Company, Inc. (TBM).
27. Weiser Lock; Div. of Masco Building Products Corporation (WEI).
28. Yale Security Inc.; Div. of Williams Holdings (YAL).

B. Bored Lockset Design: [As scheduled] <Insert name(s) of manufacturer(s) and product name(s) designating lockset design(s) that other manufacturers must match>.

C. Backset: 2-3/4 inches (70 mm), unless otherwise indicated.

2.5 CLOSERS

A. Surface-Mounted Closers:

1. Manufacturers:

a. Arrow Architectural Hardware; Div. of ESSEX Industries, Inc. (AAH).
b. Cal-Royal Products, Inc. (CRP).
c. Corbin Russwin Architectural Hardware; Div. of Yale Security Inc. (CR).
d. DORMA Door Controls Inc.; Member of The DORMA Group (DC).
e. LCN Closers; an Ingersoll-Rand Company (LCN).
f. Norton Door Controls; Div. of Yale Security Inc. (NDC).
g. Rixson-Firemark, Inc.; Div. of Yale Security Inc. (RIX).
h. Sargent Manufacturing Company; Div. of ESSEX Industries, Inc. (SGT).
i. Yale Security Inc.; Div. of Williams Holdings (YAL).

B. Concealed Closers:

1. Manufacturers:

a. DORMA Door Controls Inc.; Member of The DORMA Group (DC).
b. LCN Closers; an Ingersoll-Rand Company (LCN).
c. Norton Door Controls; Div. of Yale Security Inc. (NDC).
d. NT Dor-O-Matic Hardware Div.; an Ingersoll-Rand Company (NTD).
e. Rixson-Firemark, Inc.; Div. of Yale Security Inc. (RIX).
f. Sargent Manufacturing Company; Div. of ESSEX Industries, Inc. (SGT).
g. Yale Security Inc.; Div. of Williams Holdings (YAL).

C. Closer Holder Release Devices: BHMA A156.15.

1. Manufacturers:

a. Corbin Russwin Architectural Hardware; Div. of Yale Security Inc. (CR).
b. DORMA Door Controls Inc.; Member of The DORMA Group (DC).

c. LCN Closers; an Ingersoll-Rand Company (LCN).
d. Norton Door Controls; Div. of Yale Security Inc. (NDC).
e. Rixson-Firemark, Inc.; Div. of Yale Security Inc. (RIX).
f. Sargent Manufacturing Company; Div. of ESSEX Industries, Inc. (SGT).
g. Yale Security Inc.; Div. of Williams Holdings (YAL).

2.6 STOPS AND HOLDERS

A. Stops and Holders: Provide floor stops for doors, unless wall or other type stops are scheduled or indicated. Do not mount floor stops where they will impede traffic. Where floor or wall stops are not appropriate, provide overhead holders.

1. Manufacturers:

a. Architectural Builders Hardware Mfg., Inc. (ABH).
b. Baldwin Hardware Corporation (BH).
c. Burns Manufacturing Incorporated (BM).
d. Door Controls International (DCI).
e. DORMA Door Controls Inc.; Member of The DORMA Group (DC).
f. Glynn-Johnson; an Ingersoll-Rand Company (GJ).
g. Hager Companies (HAG).
h. Hanchett Entry Systems, Inc. (HES).
i. Hiawatha, Inc. (HIA).
j. Ives, H. B. (IVS).
k. LCN Closers; an Ingersoll-Rand Company (LCN).
l. Norton Door Controls; Div. of Yale Security Inc. (NDC).
m. NT Dor-O-Matic Hardware Div.; an Ingersoll-Rand Company (NTD).
n. NT Quality Hardware; an Ingersoll-Rand Company (NTQ).
o. Rixson-Firemark, Inc.; Div. of Yale Security Inc. (RIX).
p. Rockwood Manufacturing Company (RM).
q. Sargent Manufacturing Company; Div. of ESSEX Industries, Inc. (SGT).
r. Triangle Brass Manufacturing Company, Inc. (TBM).
s. Yale Security Inc.; Div. of Williams Holdings (YAL).

B. Silencers for Door Frames: Neoprene or rubber; fabricated for drilled-in application to frame.

2.7 THRESHOLDS

A. Thresholds: Of type scheduled or indicated.

1. Manufacturers:

a. Hager Companies (HAG).
b. National Guard Products, Inc. (NGP).
c. NT Dor-O-Matic Hardware Div.; an Ingersoll-Rand Company (NTD).
d. Pemko Manufacturing Co., Inc. (PEM).
e. Reese Enterprises, Inc. (RE).
f. Rixson-Firemark, Inc.; Div. of Yale Security Inc. (RIX).
g. Ultra Industries; a Macklanburg-Duncan Company (ULT).
h. Zero International, Inc. (ZRO).

2.8 CYLINDERS, KEYING, AND STRIKES

A. Cylinders: Tumbler type, constructed from brass or bronze, stainless steel, or nickel silver.

1. Manufacturers:

a. Same manufacturer as for locks and latches.
b. ABLOY High Security Locks; Div. of ASSA ABLOY, Inc. (ABL).
c. Arrow Architectural Hardware; Div. of ESSEX Industries, Inc. (AAH).
d. ASSA High Security Locks; Div. of ASSA ABLOY, Inc. (ASA).
e. Best Lock Corporation (BLC).
f. Corbin Russwin Architectural Hardware; Div. of Yale Security Inc. (CR).
g. Lockwood Architectural Hardware; Div. of Lloyd Matheson Inc. (LAH).
h. Marks USA (MKS).
i. Medeco High Security Locks, Inc. (MED).
j. NT Falcon Lock Co.; an Ingersoll-Rand Company (NTF).
k. Sargent Manufacturing Company; Div. of ESSEX Industries, Inc. (SGT).
l. Schlage Lock Company; an Ingersoll-Rand Company (SCH).
m. Weiser Lock; a Masco Building Products Corporation (WEI).
n. Yale Security Inc.; Div. of Williams Holdings (YAL).

2. Number of Pins: Seven.
3. High-Security Grade: BHMA Grade 1A, listed and labeled as complying with UL 437 (Suffix A).
4. Permanent Cores: Manufacturer's standard; finish face to match lockset; interchangeablecores.
5. Construction Master Keys: Provide cylinders with feature that permits voiding of construction keys without cylinder removal. Provide 10 construction master keys.
6. Construction Cores: Provide construction cores that are replaceable by permanent cores. Provide 10 construction master keys.

a. Replace construction cores with permanent cores, as directed by UDC.
b. Furnish permanent cores to Owner for installation.

B. Keying System: Factory-registered keying system; grand master key system.

1. Keys: Provide nickel-silver keys permanently inscribed with a visual key control number and "DO NOT DUPLICATE" notation. In addition to one extra blank key for each lock, provide three change keys and five grand master keys.

C. Strikes: Manufacturer's standard strike with strike box for each latch or lock bolt, with curved lip extended to protect frame, finished to match door hardware set.

2.9 FABRICATION

A. Base Metals: Furnish metals of a quality equal to or greater than that of specified door hardware units and BHMA A156.18 for finishes. Do not furnish manufacturer's standard materials if different from specified standard.

B. Fasteners: Phillips flat-head screws with finished heads to match surface of door hardware, unless otherwise indicated. Provide steel machine or wood screws or steel through bolts for fire-rated applications.

C. Spacers or Sex Bolts: For through bolting of hollow metal doors.

D. Fasteners for Wood Doors: Comply with requirements of DHI WDHS.2, "Recommended Fasteners for Wood Doors."

E. Finishes: Comply with BHMA A156.18.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Examine doors and frames for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.

B. Steel Door and Frame Preparation: Comply with DHI A115 series. Drill and tap doors and frames for surface-applied hardware according to SDI 107.

C. Wood Door Preparation: Comply with DHI A115-W series.

D. Mounting Heights: Comply with the following requirements, unless otherwise indicated:

1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
2. Custom Steel Doors and Frames: DHI's "Recommended Locations for Builders' Hardware for Custom Steel Doors and Frames."
3. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."

E. Adjust and reinforce attachment substrates as necessary for proper installation and operation. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.

F. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with accessibility requirements.

1. Door Closers: Adjust sweep period so that from an open position of 70 degrees, the door will take at least three seconds to move to a point 3 inches (75 mm) from the latch, measured to the leading edge of the door.

3.2 FIELD QUALITY CONTROL

A. Inspections: Owner will engage a qualified independent Architectural Hardware Consultant to perform inspections and to prepare inspection reports.

3.3 DOOR HARDWARE SETS

A. See Door Schedule on Drawings.

END OF SECTION 08711

SECTION 08411 - ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Interior aluminum-framed storefronts.

   a. Glazing is retained mechanically with gaskets on four sides.

2. Interior manual-swing aluminum doors.
3. Interior aluminum door frames.

1.2 PERFORMANCE REQUIREMENTS

A. General: Provide aluminum-framed systems, including anchorage, capable of withstanding, without failure, the effects of the following:

1. Structural loads.
2. Thermal movements.
3. Movements of supporting structure indicated on Drawings including, but not limited to, story drift and deflection from uniformly distributed and concentrated live loads.
4. Dimensional tolerances of building frame and other adjacent construction.
5. Failure includes the following:

   a. Deflection exceeding specified limits.
   b. Thermal stresses transferred to building structure.
   c. Framing members transferring stresses, including those caused by thermal and structural movements, to glazing.
   d. Glazing-to-glazing contact.
   e. Noise or vibration created by wind and thermal and structural movements.
   f. Loosening or weakening of fasteners, attachments, and other components.
   g. Sealant failure.
   h. Failure of operating units to function properly.

B. Structural-Sealant Joints: Designed to produce tensile or shear stress in structural-sealant joints of less than 20 psi.

C. Deflection of Framing Members Normal to Wall Plane: Limited to **1/175 of clear span for spans up to 13 feet 6 inches and to 1/240 of clear span plus 1/4 inch for spans greater than 13 feet 6 inches (4.1 m)]** **<Insert deflection limit>** or an amount that restricts edge deflection of individual glazing lites to 3/4 inch (19 mm), whichever is less.

D. Structural-Test Performance: Systems tested according to ASTM E 330 as follows:

1. When tested at positive and negative wind-load design pressures, systems do not evidence deflection exceeding specified limits.
2. When tested at [**150**] **<Insert number>** percent of positive and negative wind-load design pressures, systems, including anchorage, do not evidence material failures, structural

distress, and permanent deformation of main framing members exceeding [**0.2**] <**Insert number**> percent of span.

3. Test Durations: As required by design wind velocity but not less than 10 seconds.

E. Windborne-Debris-Impact-Resistance-Test Performance: <**Insert testing requirements**>.

F. Temperature Change (Range): Systems accommodate 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

G. Air Infiltration: Maximum air leakage through fixed glazing and framing areas of systems of [**0.06 cfm/sq. ft. (0.03 L/s per sq. m)**] <**Insert rate**> of fixed wall area when tested according to ASTM E 283 at a minimum static-air-pressure difference of [**1.57 lbf/sq. ft. (75 Pa)**] [**6.24 lbf/sq. ft. (300 Pa)**] <**Insert pressure**>.

H. Water Penetration Under Static Pressure: Systems do not evidence water penetration through fixed glazing and framing areas when tested according to ASTM E 331 at a minimum static-air-pressure difference of [**20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft. (300 Pa)**] <**Insert pressure**>.

I. Condensation Resistance: Fixed glazing and framing areas of systems have condensation-resistance factor (CRF) of not less than [**53**] <**Insert CRF**> when tested according to AAMA 1503.

J. Average Thermal Conductance: Fixed glazing and framing areas of systems have average U-factor of not more than [**0.69 Btu/sq. ft. x h x deg F (3.92 W/sq. m x K)**] <**Insert U-factor**> when tested according to AAMA 1503.

1.3 SUBMITTALS

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

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

1. Include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
2. For entrances, include hardware schedule and indicate operating hardware types, functions, quantities, and locations.

C. Samples: For each exposed finish.

D. Preconstruction Sealant Test Reports: For structural-sealant-glazed systems.

E. Product test reports.

F. Field quality-control test and inspection reports.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Acceptable to manufacturer and capable of preparation of data for aluminum-framed systems including Shop Drawings based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.

B. Testing Agency Qualifications: An independent agency qualified according to ASTM E 699 for testing indicated.

C. Preconstruction Sealant Testing: For structural-sealant-glazed systems, perform sealant manufacturer's standard tests for compatibility and adhesion of sealants with each material that will come in contact with sealants and each condition required by aluminum-framed systems.

1. Determine corrective measures required to prepare each material to ensure compatibility with and adhesion of sealants, including, but not limited to, specially formulated primers.

D. Structural-Sealant Glazing: Comply with recommendations in ASTM C 1401, "Guide for Structural Sealant Glazing."

E. Mockups: Build mockups to demonstrate aesthetic effects and set quality standards for fabrication and installation.

1. Build mockups [**as shown on Drawings**] <**Insert requirements**>.
2. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.5 WARRANTY

A. Special Assembly Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of aluminum-framed systems that do not comply with requirements or that deteriorate as defined in this Section within specified warranty period.

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

a. Structural failures including, but not limited to, excessive deflection.
b. Noise or vibration caused by thermal movements.
c. Deterioration of metals and other materials beyond normal weathering.
d. Adhesive or cohesive sealant failures.
e. Water leakage through fixed glazing and framing areas.
f. Failure of operating components to function properly.

2. Warranty Period: **10** years from date of Substantial Completion.

B. Special Finish Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components on which finishes fail within specified warranty period. Warranty does not include normal weathering.

1. Warranty Period: **20** years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

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

Basis-of-Design Product: The design for aluminum-framed systems is based on engineering drawings. Subject to compliance with requirements, provide the named product or a comparable product by one of the following or any other manufacturers which are approved as equivalent by the Engineer.

1. Arch Aluminum & Glass Co., Inc.
2. CMI Architectural Products, Inc.
3. Commercial Architectural Products, Inc.
4. EFCO Corporation.
5. Kawneer.
6. Pittco Architectural Metals, Inc.
7. Tubelite Inc.
8. United States Aluminum.
9. Vistawall Architectural Products.
10. YKK AP America Inc.

2.2 MATERIALS

A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.

1. Sheet and Plate: ASTM B 209.
2. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221.
3. Extruded Structural Pipe and Tubes: ASTM B 429.
4. Structural Profiles: ASTM B 308/B 308M.

B. Steel Reinforcement: With manufacturer's standard corrosion-resistant primer.

1. Structural Shapes, Plates, and Bars: ASTM A 36/A 36M.
2. Cold-Rolled Sheet and Strip: ASTM A 1008/A 1008M.
3. Hot-Rolled Sheet and Strip: ASTM A 1011/A 1011M.

2.3 FRAMING SYSTEMS

A. Framing Members: Manufacturer's standard extruded-aluminum framing members of thickness required and reinforced as required to support imposed loads.

1. Construction: Framing members are composite assemblies of two separate extruded-aluminum components permanently bonded by an elastomeric material of low thermal conductance. Framing members are one-piece members that are internally slotted at regular intervals.

B. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.

C. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.

1. Where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration, use self-locking devices.
2. Reinforce members as required to receive fastener threads.
3. Use exposed fasteners with countersunk Phillips screw heads, finished to match framing system.

D. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts complying with ASTM A 123/A 123M or ASTM A 153/A 153M requirements.

E. Flashing: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding flashing compatible with adjacent materials. Form exposed flashing from sheet aluminum finished to match framing and of sufficient thickness to maintain a flat appearance without visible deflection.

F. Framing System Gaskets and Sealants: Manufacturer's standard recommended by manufacturer for joint type.

2.4 GLAZING SYSTEMS

A. Glazing: As specified in Division 8 Section "Glazing."

B. Glazing Gaskets: Manufacturer's standard compression types, replaceable, molded or extruded, that maintain uniform pressure and watertight seal.

C. Spacers and Setting Blocks: Manufacturer's standard elastomeric types.

D. Bond-Breaker Tape: Manufacturer's standard TFE-fluorocarbon or polyethylene material to which sealants will not develop adhesion.

E. Glazing Sealants: For structural-sealant-glazed systems, as recommended by manufacturer for joint type and as follows:

1. Structural Sealant: ASTM C 1184, neutral-curing silicone formulation compatible with system components with which it comes in contact.

   a. Color: As selected by Architect from manufacturer's full range of colors.

2. Weatherseal Sealant: ASTM C 920 for Type S, Grade NS, Class 25, Uses NT, G, A, and O; neutral-curing silicone formulation compatible with structural sealant and other system components with which it comes in contact.

   a. Color: Matching structural sealant.

2.5 DOORS

A. Doors: Manufacturer's standard glazed doors, for manual swing operation.

1. Door Construction: 1-3/4-inch overall thickness**,** thick, extruded-aluminum tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deep penetration and fillet welded or that incorporate concealed tie rods.

2. Door Design: Narrow stile; 2-1/8-inch nominal width.

   a. Accessible Doors: Smooth surfaced for width of door in area within 10 inches above floor or ground plane.

3. Glazing Stops and Gaskets: Beveled, snap-on, extruded-aluminum stops and preformed gaskets.

a. Provide nonremovable glazing stops on outside of door.

B. Door Hardware: As specified in Division 8 Section "Door Hardware."

2.6 DOOR HARDWARE

A. General: Provide heavy-duty units in sizes and types recommended by entrance system and hardware manufacturers for entrances and uses indicated.

B. Scheduled Door Hardware: Provide door hardware according to the Door Hardware Schedule at the end of Part 3.

1. Named Manufacturer's Products: Product designation and hardware manufacturer are listed in the Door Hardware Schedule at the end of Part 3 to establish minimum requirements for design, grade, function, finish, size, and other distinctive qualities of each type of door hardware.

   a. Provide named hardware manufacturer's products.
   b. Named products are basis-of-design products. Provide named hardware manufacturer's products or comparable products that are equivalent in function and quality and that are recommended and supplied by entrance system manufacturer.

C. Cylinders: As specified in Division 8 Section "Door Hardware."

D. Cylinder Keying: Master key system. Permanently inscribe each key with a visual key control number and include notation "DO NOT DUPLICATE" to be furnished by Owner.

E. Strikes: Provide strike with black-plastic dust box for each latch or lock bolt; fabricated for aluminum framing.

F. Weather Stripping: Manufacturer's standard replaceable components.

1. Compression Type: Made of ASTM D 2000, molded neoprene, or ASTM D 2287, molded PVC.
2. Sliding Type: AAMA 701, made of wool, polypropylene, or nylon woven pile with nylon-fabric or aluminum-strip backing.

G. Weather Sweeps: Manufacturer's standard exterior-door bottom sweep with concealed fasteners on mounting strip.

H. Silencers: BHMA A156.16, Grade 1.

2.7 ACCESSORY MATERIALS

A. Insulating Materials: As specified in Division 7 Section "Building Insulation."

B. Joint Sealants: For installation at perimeter of aluminum-framed systems, as specified in Division 7 Section "Joint Sealants."

C. Bituminous Paint: Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos, formulated for 30-mil thickness per coat.

2.8 FABRICATION

A. Form aluminum shapes before finishing.

B. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.

C. Framing Members, General: Fabricate components that, when assembled, have the following characteristics:

1. Profiles that are sharp, straight, and free of defects or deformations.
2. Accurately fitted joints with ends coped or mitered.
3. Means to drain water passing joints, condensation occurring within framing members, and moisture migrating within the system to exterior.
4. Physical and thermal isolation of glazing from framing members.
5. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
6. Provisions for field replacement of glazing from interior.
7. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.

D. Mechanically Glazed Framing Members: Fabricate for flush glazing (without projecting stops).

E. Structural-Sealant-Glazed Framing Members: Include accommodations for using temporary support device (dutchman) to retain glazing in place while structural sealant cures.

F. Door Frames: Reinforce as required to support loads imposed by door operation and for installing hardware.

1. At exterior doors, provide compression weather stripping at fixed stops.
2. At interior doors, provide silencers at stops to prevent metal-to-metal contact. Install three silencers on strike jamb of single-door frames and two silencers on head of frames for pairs of doors.

G. Doors: Reinforce doors as required for installing hardware.

1. At pairs of exterior doors, provide sliding weather stripping retained in adjustable strip mortised into door edge.
2. At exterior doors, provide weather sweeps applied to door bottoms.

H. Hardware Installation: Factory install hardware to the greatest extent possible. Cut, drill, and tap for factory-installed hardware before applying finishes.

I. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

2.9 ALUMINUM FINISHES

A. Clear Anodic Finish: Class I, clear anodic coating complying with AAMA 611.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General:

1. Fit joints to produce hairline joints free of burrs and distortion.
2. Rigidly secure nonmovement joints.
3. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration.
4. Seal joints watertight, unless otherwise indicated.

B. Metal Protection:

1. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape or installing nonconductive spacers as recommended by manufacturer for this purpose.
2. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

C. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within the system to exterior.

D. Set continuous sill members and flashing in full sealant bed as specified in Division 7 Section "Joint Sealants" and to produce weathertight installation.

E. Install components plumb and true in alignment with established lines and grades, without warp or rack.

F. Install glazing as specified in Division 8 Section "Glazing."

1. Structural-Sealant Glazing:

a. Prepare surfaces that will contact structural sealant according to sealant manufacturer's written instructions to ensure compatibility and adhesion. Preparation includes, but is not limited to, cleaning and priming surfaces.
b. Install weatherseal sealant according to Division 7 Section "Joint Sealants" and according to sealant manufacturer's written instructions to produce weatherproof joints. Install joint filler behind sealant as recommended by sealant manufacturer.

G. Entrances: Install to produce smooth operation and tight fit at contact points.

1. Exterior Entrances: Install to produce tight fit at weather stripping and weathertight closure.
2. Field-Installed Hardware: Install surface-mounted hardware according to hardware manufacturers' written instructions using concealed fasteners to greatest extent possible.

H. Install insulation materials as specified in Division 7 Section "Building Insulation."

I. Install perimeter joint sealants as specified in Division 7 Section "Joint Sealants" and to produce weathertight installation.

J. Erection Tolerances: Install aluminum-framed systems to comply with the following maximum tolerances:

1. Location and Plane: Limit variation from true location and plane to 1/8 inch in 12 feet; 1/4 inch over total length.
2. Alignment:

    a. Where surfaces abut in line, limit offset from true alignment to 1/16 inch.
    b. Where surfaces meet at corners, limit offset from true alignment to 1/32 inch.

3. Diagonal Measurements: Limit difference between diagonal measurement to 1/8 inch.

3.2 FIELD QUALITY CONTROL

A. Structural-Sealant Compatibility and Adhesion: Structural sealant shall be tested according to recommendations in ASTM C 1401.

    1. Destructive test method, Method A, Hand Pull Tab (Destructive) in ASTM C 1401, Appendix X2 shall be used.

B. Structural-Sealant Glazing Inspection: After installation of aluminum-framed systems is complete, structural-sealant glazing shall be inspected and evaluated according to ASTM C 1401 recommendations.

C. Repair or remove work where test results and inspections indicate that it does not comply with specified requirements.

D. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.3 DOOR HARDWARE SCHEDULE

Hardware: Product numbers are Kawneer or equal, unless otherwise indicated

a. Pivots: Offset pivot set
b. Closer: Heavy Duty Concealed Overhead with hold-open
    i) Backstop: 105°
    ii) Swing: Single acting
c. Pull Bars: CHMI TDP600
    i) Diameter: 1 1/2"
    ii) Finish: US28
    iii) Mounting: Single
d. Push Bars:
    i) Diameter: 1”
    ii) Finish: US28
    iii) Mounting: SIngle
e. Deadlock: Adams-Rite MS-1850A
f. Flush Bolts: FB-14
g. Threshold: TH-4

END OF SECTION 08411

SECTION 06100 - ROUGH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

A. Documents referred to in SCOPES of WORK, Section C, Bid Forms, Volume I are part hereof, the same as if repeated herein.

B. This Section includes the following:

1. Wood framing.
2. Wood supports.
3. Wood blocking.
4. Wood nailers.
5. Wood furring.
6. Wood sheathing.
7. Plywood backing panels.

1.2 SUBMITTALS

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

1. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that materials comply with requirements.

B. Material Certificates: For dimension lumber specified to comply with minimum allowable unit stresses.

C. Research/Evaluation Reports: For the following:

1. Treated wood.
2. Engineered wood products.
3. Foam-plastic sheathing.
4. Power-driven fasteners.
5. Powder-actuated fasteners.
6. Expansion anchors.
7. Metal framing anchors.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the manufacturers specified.

2. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

2.2 WOOD PRODUCTS, GENERAL

A. Lumber: DOC PS 20 and applicable rules of lumber grading agencies certified by the American Lumber Standards Committee Board of Review.

1. Factory mark each piece of lumber with grade stamp of grading agency.
2. For exposed lumber indicated to receive stained or natural finish, mark grade stamp on end or back of each piece.
3. Provide dressed lumber, S4S, unless otherwise indicated.
4. Provide dry lumber with 19 percent maximum moisture content at time of dressing for 2-inch nominal thickness or less, unless otherwise indicated.

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

1. Allowable Design Stresses: Meet or exceed those indicated per manufacturer's published values determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

C. Wood Structural Panels:

1. Plywood: DOC PS 1
2. Oriented Strand Board: DOC PS 2.
3. Comply with "Code Plus" provisions in APA Form No. E30K, "APA Design/Construction Guide: Residential & Commercial."

2.3 WOOD-PRESERVATIVE-TREATED MATERIALS

A. Preservative Treatment by Pressure Process**:** AWPA C2 (lumber) and AWPA C9 (plywood), except that lumber that is not in contact with the ground and is continuously protected from liquid water may be treated according to AWPA C31 with inorganic boron (SBX).

B. Kiln-dry material after treatment to a maximum moisture content of 19 percent for lumber and 15 percent for plywood.

C. Mark each treated item with treatment quality mark of an inspection agency approved by the American Lumber Standards Committee Board of Review.

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

1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
2. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.
3. Wood framing members less than 18 inches above grade.
4. Wood floor plates that are installed over concrete slabs directly in contact with earth.

2.4 FIRE-RETARDANT-TREATED MATERIALS

A. General: Where fire-retardant-treated materials are indicated, provide materials that comply with performance requirements in AWPA C20 lumber and AWPA C27 plywood. Identify fire-retardant-treated wood with appropriate classification marking of UL, U.S. Testing, Timber Products Inspection, or another testing and inspecting agency acceptable to authorities having jurisdiction.

1. Use treatment for which chemical manufacturer publishes physical properties of treated wood after exposure to elevated temperatures, when tested by a qualified independent testing agency according to ASTM D 5664, for lumber and ASTM D 5516, for plywood.
2. Use treatment that does not promote corrosion of metal fasteners.
3. Use Exterior type for exterior locations and where indicated.
4. Use Interior Type A High Temperature (HT), unless otherwise indicated.

2.5 DIMENSION LUMBER

A. General: Of grades indicated according to the American Lumber Standards Committee National Grading Rule provisions of the grading agency indicated.

2.6 MISCELLANEOUS LUMBER

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

1. Rooftop equipment bases and support curbs.
2. Blocking.
3. Cants.
4. Nailers.
5. Furring.
6. Grounds.

B. For items of dimension lumber size, provide Construction, Stud grade lumber with 15 percent maximum moisture content of any species.

C. For concealed boards, provide lumber with 15 percent maximum moisture content and any of the following species and grades:

1. Mixed southern pine, No. 2 grade; SPIB.
2. Eastern softwoods, No. 2 Common grade; NELMA.
3. Northern species, No. 2 Common grade; NLGA.

2.7 PLYWOOD BACKING PANELS

A. Telephone and Electrical Equipment Backing Panels: DOC PS 1, Exposure 1, C-D Plugged, fire-retardant treated, in thickness indicated or, if not indicated, not less than 1/2 inch thick.

2.8 MISCELLANEOUS MATERIALS

A. Fasteners:

1. Where rough carpentry is exposed to weather, in ground contact, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.
2. Power-Driven Fasteners: CABO NER-272.
3. Bolts: Steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry to other construction; scribe and cope as needed for accurate fit. Locate furring**,** nailers, blocking and similar supports to comply with requirements for attaching other construction.

B. Apply field treatment complying with AWPA M4 to cut surfaces of preservative-treated lumber and plywood.

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

1. CABO NER-272 for power-driven fasteners.
2. Published requirements of metal framing anchor manufacturer.
3. Table 23-II-B-1, "Nailing Schedule," and Table 23-II-B-2, "Wood Structural Panel Roof Sheathing Nailing Schedule," in the Uniform Building Code.
4. Table 2305.2, "Fastening Schedule," in the BOCA National Building Code.
5. Table 2306.1, "Fastening Schedule," in the Standard Building Code.
6. Table 602.3(1), "Fastener Schedule for Structural Members," and Table 602.3(2), "Alternate Attachments," in the International One- and Two-Family Dwelling Code.

D. Use finishing nails for exposed work, unless otherwise indicated. Countersink nail heads and fill holes with wood filler.

E. Indicate locations of other fasteners, such as wood screws, bolts, and lag screws, on Drawings.

F. Fastening Methods
1. Plywood Backing Panels: Nail or screw to supports.

END OF SECTION 06100

SECTION 08211 - FLUSH WOOD DOORS

PART 1 - GENERAL

1.1 SUMMARY

A. Documents referred to in SCOPE of WORK, Section C, Bid Forms, Volume I are part hereof, the same as if repeated herein.

B. This Section includes solid core doors as follows:

1. Doors with wood-veneer faces and factory finishing.
2. Doors with hardboard faces.
3. Factory fitting wood doors to frames and factory machining for hardware.

1.2 SUBMITTALS

A. Product Data: For each type of door. Include factory-finishing specifications.

B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details; location and extent of hardware blocking; mortises, holes, and cutouts; requirements for veneer matching; factory finishing; and other pertinent data.

C. Samples: For each face material and finish.

1.3 QUALITY ASSURANCE

A. Quality Standard: Comply with NWWDA I.S.1-A, "Architectural Wood Flush Doors." AWI's "Architectural Woodwork Quality Standards Illustrated." WIC's "Manual of Millwork."

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following or any manufacturers items which are approved as equal by Engineer:

1. Algoma Hardwoods Inc.
2. Ampco Products, Inc.
3. Buell Door Company.
4. Chappell Door Co.
5. Eagle Plywood & Door Manufacturing, Inc.
6. Eggers Industries; Architectural Door Division.
7. GRAHAM Manufacturing Corp.
8. Haley Brothers, Inc.
9. Ideal Wood Products, Inc.

10. IPIK Door Company.
11. Lambton Doors.
12. Marlite.
13. Mohawk Flush Doors, Inc.
14. Oshkosh Architectural Door Co.
15. Poncraft Door Co.
16. Southwood Door Co.
17. Vancouver Door Company, Inc.
18. VT Industries Inc.
19. Weyerhaeuser Company.

2.2 DOOR CONSTRUCTION

A. Doors for Transparent Finish:

1. Grade: Premium, with Grade A faces. Options in subparagraph below are examples only; revise or insert another species and cut.
2. Species and Cut: To match existing building standard doors.

B. Interior Veneer-Faced Solid-Core Doors:

1. Core: Particleboard.
2. Construction: Seven plies with stiles and rails bonded to core, then entire unit abrasive planed before veneering.
3. Construction: Seven plies, either bonded or nonbonded construction.

2.3 FABRICATION

A. Fabricate doors in sizes indicated for Project-site fitting.

B. Factory fit doors to suit frame-opening sizes indicated. Comply with clearance requirements of referenced quality standard for fitting. Comply with requirements in NFPA 80 for fire-rated doors.

C. Factory machine doors for hardware that is not surface applied.

2.4 SHOP PRIMING

A. Doors for Opaque Finish: Shop prime faces and edges of doors, including cutouts, with one coat of wood primer specified in Division 9 Section "Painting."

2.5 FACTORY FINISHING

A. General: Finish doors at factory that are indicated to receive transparent finish. Field finish doors indicated to receive opaque finish].

B. Grade: Premium.

C. Finish: NWWDA I.S.1-A System TR-4 conversion varnish.

D. Finish: AWI System TR-4 conversion varnish.

E. Finish: WIC System #1c. varnish.

F. Finish: Manufacturer's standard finish with performance comparable to AWI System TR-4 conversion varnish.

G. Staining: Match sample.

H. Effect: Open-grain finish.

I. Sheen: Semigloss.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install doors to comply with manufacturer's written instructions, referenced quality standard, and as indicated.

B. Job-Fitted Doors: Align and fit doors in frames with uniform clearances and bevels; do not trim stiles and rails in excess of limits set by manufacturer or permitted for fire-rated doors. Machine doors for hardware. Seal cut surfaces after fitting and machining.

C. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.

D. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

END OF SECTION 08211

SECTION 08110 - STEEL FRAMES

PART 1 - GENERAL

1.1 SUMMARY

A. Documents referred to in SCOPES of WORK, Section C, Bid Forms, Volume I are part hereof, the same as if repeated herein.

B. This Section includes steel frames.

1.2 SUBMITTALS

A. Product Data: For each product indicated. Include door designation, type, level and model, material description, label compliance, fire-resistance ratings, and finishes.

1.3 QUALITY ASSURANCE

A. Steel Frame Standard: Comply with ANSI A 250.8, unless more stringent requirements are indicated.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

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

1. Amweld Building Products, Inc.
2. Benchmark Commercial Doors; a division of General Products Co., Inc.
3. Ceco Door Products; a United Dominion Company.
4. Copco Door Co.
5. Curries Company.
6. Deansteel Manufacturing, Inc.
7. Kewanee Corporation (The).
8. Mesker Door, Inc.
9. Pioneer Industries Inc.
10. Republic Builders Products.
11. Steelcraft; a division of Ingersoll-Rand.

2.2 MATERIALS

A. Hot-Rolled Steel Sheets: ASTM A 569/A 569M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.

B. Cold-Rolled Steel Sheets: ASTM A 366/A 366M, Commercial Steel (CS), or ASTM A 620/A 620M, Drawing Steel (DS), Type B; stretcher-leveled standard of flatness.

C. Metallic-Coated Steel Sheets: ASTM A 653/A 653M, Commercial Steel (CS), Type B, with an A40 zinc-iron-alloy (galvannealed) coating; stretcher-leveled standard of flatness.

D. Electrolytic Zinc-Coated Steel Sheet: ASTM A 591/A 591M, Commercial Steel (CS), Class B coating; mill phosphatized; suitable for unexposed applications; stretcher-leveled standard of flatness where used for face sheets.

2.3 FRAMES

A. General: ANSI A250.8; conceal fastenings, unless otherwise indicated.

B. Frame Steel Sheet Thickness:

1. 0.053-inch- for level 2 steel doors.

C. Door Silencers: Three silencers on single-door frames and two silencers on double-door frames.

D. Supports and Anchors: Not less than 0.042-inch- thick zinc-coated steel sheet.

1. Masonry Wall Anchors: 0.177-inch- diameter, steel wire complying with ASTM A 510 may be used in place of steel sheet.

E. Inserts, Bolts, and Fasteners: Manufacturer's standard units. Zinc-coat items that are to be built into exterior walls according to ASTM A 153/A 153M, Class C or D as applicable.

2.4 FABRICATION

A. General: Fabricate steel door and frame units to comply with ANSI A250.8 free from defects including warp and buckle. Where practical, fit and assemble units in manufacturer's plant.

B. Clearances for Non-Fire-Rated Doors: Not more than 1/8 inch at jambs and heads, except not more than 1/4 inch between pairs of doors. Not more than 3/4 inch at bottom.

C. Clearances for Fire-Rated Doors: As required by NFPA 80.

D. Door-Edge Profile: Square edge, unless beveled edge is indicated.

E. Tolerances: Comply with SDI 117.

F. Prepare doors and frames to receive mortised and concealed hardware according to final door hardware schedule and templates provided by hardware supplier. Comply with applicable requirements in ANSI A250.6 and ANSI A115 Series specifications for door and frame preparation for hardware.

G. Frame Construction:

1. Fabricate frames with mitered or coped and continuously welded corners and seamless face joints. Provide temporary spreader bars.
2. Fabricate knock-down frames with mitered or coped corners, for field assembly.
3. Fabricate knock-down, drywall slip-on frames for in-place gypsum board partitions.
4. Provide terminated stops where indicated.

H. Reinforce doors and frames to receive surface-applied hardware. Drilling and tapping for surface-applied hardware may be done at Project site.

I. Locate hardware as indicated or, if not indicated, according to ANSI A250.8.

2.5 FINISHES

A. Prime Finish: Manufacturer's standard, factory-applied coat of rust-inhibiting primer complying with ANSI A250.10 for acceptance criteria.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Placing Frames: Comply with provisions in SDI 105, unless otherwise indicated. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is completed, remove temporary braces and spreaders, leaving surfaces smooth and undamaged.

1. Wall Anchors: Provide at least three anchors per jamb. For openings 90 inches or more in height, install an additional anchor at hinge and strike jambs.
2. Gypsum Board Partitions: For in-place partitions, install knock-down, drywall slip-on frames.

B. After installation, remove protective wrappings from frames and touch up prime coat with compatible air-drying primer.

END OF SECTION 08110

SECTION 07920 - JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

A. Documents referred to in SCOPES of WORK, Section C, Bid Forms, Volume I are part hereof, the same as if repeated herein.

B. This Section includes sealants for the following:

1. Exterior joints in vertical surfaces and nontraffic horizontal surfaces.
2. Interior joints in vertical surfaces and horizontal nontraffic surfaces.

1.2 SUBMITTALS

A. Product Data: For each joint sealant product indicated.

B. Samples: For each joint sealant product indicated.

C. Sealant compatibility and adhesion test reports.

1.3 QUALITY ASSURANCE

A. Sealant Compatibility and Adhesion Testing: Use sealant manufacturer's standard test methods to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.

B. Preconstruction Field-Adhesion Testing: Before installing elastomeric sealants, field test their adhesion to joint substrates using test method indicated in Part 3 "Field Quality Control" Article.

C. Mockups: Before installing joint sealants, apply elastomeric sealants to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution.

1. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.4 WARRANTY

A. Special Installer's Warranty: Written warranty in which Installer agrees to repair or replace elastomeric joint sealants that do not meet requirements specified in this Section or fail in adhesion within specified warranty period two years from date of Substantial Completion.

B. Special Manufacturer's Warranty: Manufacturer's standard form in which manufacturer agrees to furnish elastomeric joint sealants to repair or replace those that do not comply with requirements specified in this Section within 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the products specified.
2. Products: Subject to compliance with requirements, provide one of the products specified.

2.2 MATERIALS, GENERAL

A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.

B. Colors of Exposed Joint Sealants: Custom colors to match adjacent surfaces.

2.3 ELASTOMERIC JOINT SEALANTS

A. Multicomponent Pourable Polysulfide Sealant:

1. Products:

a. Meadows, W. R., Inc.; Deck-O-Seal 125

2. Type and Grade: M (multicomponent) and P (pourable).
3. Class: 25.
4. Exposure: Use NT (nontraffic).
5. Substrates: Uses M, G, A, and, as applicable to joint substrates indicated, O.

B. Single-Component Nonsag Polysulfide Sealant:

1. Products:

a. Meadows, W. R., Inc.; Deck-O-Seal One Step.
b. Morton International, Inc.; Thiokol 1P.
c. Pecora Corporation; GC-9 Synthacalk.
d. Polymeric Systems, Inc.; PSI-7000.

2. Type and Grade: S (single component) and NS (nonsag).
3. Class: 25.
4. Exposure: Use NT (nontraffic).
5. Substrates: Uses M, G, A, and, as applicable to joint substrates indicated, O.

C. Low-Modulus Nonacid-Curing Silicone Sealant:

1. Products:

a. Dow Corning; 790.

b. GE Silicones; Silpruf.
c. NUCO Industries, Inc.; HiFlex 331.
d. Ohio Sealants, Inc.; VP 275.
e. Pecora Corporation; 864.
f. Polymeric Systems, Inc.; PSI-641.
g. Sonneborn Building Products Div., ChemRex Inc.; Omniseal.
h. Tremco; Spectrem 1.

2. Type and Grade: S (single component) and NS (nonsag).
3. Class: 25.
4. Additional Movement Capability: Capable of 50 percent movement in extension and 50 percent movement in compression when tested for adhesion and cohesion under maximum cyclic movement per ASTM C 719.
5. Exposure: Use NT (nontraffic).
6. Substrates: Uses M, G, A, and, as applicable to joint substrates indicated, O.
7. Nonstaining to porous substrates when testing per ASTM C 1248 for substrates indicated.

D. Medium-Modulus Neutral-Curing Silicone Sealant:

1. Products:

a. Dow Corning; 791.
b. NUCO Industries, Inc.; HiFlex 393.
c. Polymeric Systems, Inc.; PSI-631.
d. Schnee-Morehead, Inc.; SM5731Poly-Glaze.
e. Tremco; Spectrem 2.

2. Type and Grade: S (single component) and NS (nonsag).
3. Class: 25.
4. Exposure: Use NT (nontraffic).
5. Substrates: Uses M, G, A, and, as applicable to joint substrates indicated, O.
6. Nonstaining to porous substrates when testing per ASTM C 1248 for substrates indicated.

E. Mildew-Resistant Silicone Sealant:

1. Products:

a. Dow Corning; 786 Mildew Resistant.
b. GE Silicones; Sanitary 1700.
c. NUCO Industries, Inc.; NuFlex 302.
d. Pecora Corporation; 898 Silicone Sanitary Sealant.
e. Polymeric Systems, Inc.; PSI-611.
f. Tremco; Tremsil 600 White.

2. Type and Grade: S (single component) and NS (nonsag).
3. Class: 25.
4. Exposure: Use NT (nontraffic).
5. Substrates: Uses G, A, and, as applicable to joint substrates indicated, O.

6. For joints not subject to traffic:

a. Products:

1) Bostik Inc.; Chem-Calk 500.
2) Polymeric Systems, Inc.; PSI-501/RC-2.
3) Tremco; DYmeric.

b. Type and Grade: M (multicomponent) and NS (nonsag).
c. Class: 25.
d. Exposure: Use NT (nontraffic).
e. Substrates: Uses M, G**,** A, and, as applicable to joint substrates indicated, O.

F. Multicomponent Pourable Urethane Sealant:

1. Products:

a. Bostik Inc.; Chem-Calk 550.
b. Mameco International; Vulkem 245.
c. Meadows, W. R., Inc.; Pourthane.
d. Pacific Polymers, Inc.; Elasto-Thane 920 Pourable.
e. Pecora Corporation; NR-200 Urexpan.
f. Polymeric Systems, Inc.; PSI-270SL.
g. Sika Corporation; Sikaflex - 2c SL.
h. Sonneborn Building Products Div., ChemRex Inc.; SL 2.
i. Tremco; THC-900.

2. Type and Grade: M (multicomponent) and P (pourable).
3. Class: 25.
4. Exposure: Use NT (nontraffic)T.
5. Substrates: Uses M, G**,** A, and, as applicable to joint substrates indicated, O.

G. Single-Component Nonsag Urethane Sealant:

1. For joints not subject to traffic, provide the following:

a. Products:

1) Mameco International; Vulkem 116
2) Sika Corporation; Sikaflex - 1a.
3) Sonneborn Building Products Div., ChemRex Inc.; NP 1.

b. Type and Grade: S (single component) and NS (nonsag).
c. Class: 12-1/2.

2. Exposure: Use NT (nontraffic).
3. Substrates: Uses M, G**,** A, and, as applicable to joint substrates indicated, O.
4. For joints not subject to traffic, provide the following:

a. Products:

1) Bostik Inc.; Chem-Chalk 900.
2) Mameco International; Vulkem 921.
3) Ohio Sealants, Inc.; PR-255.
4) Pecora Corporation; Dynatrol I.
5) Polymeric Systems, Inc.; Flexiprene 1000.
6) Schnee-Morehead, Inc.; SM7100 Permathane.
7) Tremco; DyMonic.

b. Type and Grade: S (single component) and NS (nonsag).
c. Class: 12-1/2.
d. Exposure: Use NT (nontraffic).
e. Substrates: Uses M, G, A, and, as applicable to joint substrates indicated, O.

H. Single-Component Pourable Urethane Sealant:

1. Products:

a. Bostik Inc.; Chem-Calk 950.
b. Mameco International; Vulkem 45.
c. Pecora Corporation; NR-201.
d. Polymeric Systems, Inc.; Flexiprene PSI-951.
e. Sonneborn Building Products Div., ChemRex Inc.; SL 1.

2. Type and Grade: S (single component) and P (pourable).
3. Class: 25.
4. Exposure: Use NT (nontraffic).
5. Substrates: Uses M, G, A, and, as applicable to joint substrates indicated, O.

2.4 SOLVENT-RELEASE JOINT SEALANTS

A. Butyl-Rubber-Based Solvent-Release Joint Sealant: ASTM C 1085.

1. Products:

a. Bostik Inc.; Bostik 300.
b. H.B. Fuller Company; PTI 707.
c. NUCO Industries, Inc.; NuFlex 232.
d. Pecora Corporation; BC-158.
e. Polymeric Systems, Inc.; PSI-301.
f. Sonneborn Building Products Div., ChemRex, Inc.; Sonneborn Multi-Purpose Sealant.
g. Tremco; Tremco Butyl Sealant.
h.

2.5 LATEX JOINT SEALANTS

A. Latex Sealant: ASTM C 834.

1. Products:

a. Bostik Inc.; Chem-Calk 600.
b. NUCO Industries, Inc.; NuFlex 330.
c. Ohio Sealants, Inc.; LC 160 All Purpose Acrylic Caulk.
d. Pecora Corporation; AC-20.
e. Polymeric Systems, Inc.; PSI-701.
f. Sonneborn Building Products Div., ChemRex, Inc.; Sonolac.
g. Tremco; Tremflex 834.

2.6 ACOUSTICAL JOINT SEALANTS

A. Acoustical Sealant for Exposed and Concealed Joints: Nonsag, paintable, nonstaining latex sealant complying with ASTM C 834 that effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.

1. Products:

a. Pecora Corporation; AC-20 FTR Acoustical and Insulation Sealant.
b. USG Corp., United States Gypsum Co.; SHEETROCK Acoustical Sealant.

B. Acoustical Sealant for Concealed Joints: Nondrying, nonhardening, nonskinning, nonstaining, gunnable, synthetic-rubber sealant recommended for sealing interior concealed joints to reduce airborne sound transmission.

1. Products:

a. Ohio Sealants, Inc.; Pro-Series SC-170 Rubber Base Sound Sealant.
b. Pecora Corporation; BA-98.
c. Tremco; Tremco Acoustical Sealant.

2.7 PREFORMED JOINT SEALANTS

A. Preformed Silicone-Sealant System: Precured low-modulus silicone extrusion, in sizes to fit joint widths indicated, combined with a neutral-curing silicone sealant for bonding extrusions to substrates.

1. Products:

a. Dow Corning; 123 Silicone Seal.
b. Pecora Corporation; Sil-Span.

2.8 JOINT-SEALANT BACKING

A. General: Provide sealant backings of material and type that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

B. Cylindrical Sealant Backings: ASTM C 1330, of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance:

1. Type: O (open-cell material).

C. Elastomeric Tubing Sealant Backings: Neoprene, butyl, EPDM, or silicone tubing complying with ASTM D 1056, nonabsorbent to water and gas, and capable of remaining resilient at temperatures down to minus 26 deg F. Provide products with low compression set and of size and shape to provide a secondary seal, to control sealant depth, and otherwise contribute to optimum sealant performance.

D. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

2.9 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by joint sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants with joint substrates.

C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants.

1. Remove foreign material from joint substrates that could interfere with adhesion of joint sealant.
2. Clean porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air.
3. Remove laitance and form-release agents from concrete.
4. Clean nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues could interfere with adhesion of joint sealants.

B. Joint Priming: Prime joint substrates where recommended in writing by joint sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

D. Sealant Installation: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

E. Acoustical Sealant Installation: Comply with recommendations in ASTM C 919 for use of joint sealants in acoustical applications as applicable to materials, applications, and conditions indicated.

F. Install sealant backings to support sealants during application and at position required to produce optimum sealant movement capability.

1. Do not leave gaps between ends of sealant backings.
2. Do not stretch, twist, puncture, or tear sealant backings.
3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.

G. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and back of joints.

H. Place sealants so they directly contact and fully wet joint substrates.

1. Completely fill recesses provided for each joint configuration.
2. Produce uniform, cross-sectional shapes and depths that allow optimum sealant movement capability.

I. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants to form smooth, uniform beads, to eliminate air pockets, and to ensure contact and adhesion of sealant with sides of joint.

1. Remove excess sealants from surfaces adjacent to joint.
2. Use tooling agents that are approved by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
3. Joint Configuration: Concave joint configuration per Figure 5A in ASTM C 1193, unless otherwise indicated.

J. Installation of Preformed Silicone-Sealant System:

1. Apply masking tape to each side of joint, outside of area to be covered by sealant system.
2. Complete installation of horizontal joints before installing vertical joints. Lap vertical joints over horizontal joints. At end of joints, cut silicone extrusion with a razor knife.

K. Clean excess sealants or sealant smears adjacent to joints as installation progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

END OF SECTION 07920