SPECIFICATIONS

SOLICITATION ISSUE

SHOPPING CENTER

IMAGE UPDATE

Wright-Patterson AFB, Ohio
AAFES Project Number 2090-16-001

EXCHANGE
ARMY & AIR FORCE EXCHANGE SERVICE

The Jenkins Group
ARCHITECTURE | INTERIORS | PLANNING

25 JUL 2017
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1.1.1. Section Includes

   a. Copies of the hazardous material surveys conducted at the project.
   b. The reports identify asbestos containing tile and mastic locations, lead and PCB containing items along with recommendations.
   c. The recommendations described shall not be construed as a requirement of this Contract, unless specifically referenced in the Contract Documents and Division 02 for Removal and Disposal of Hazardous Containing Materials.

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END OF SECTION
Report of

Limited Pre-Renovation Asbestos Survey for

Wright Patterson Air Force Base
Army Air Force Exchange Services (AAFES)
Wright Avenue
Dayton, Ohio 45433

Prepared for

The Jenkins Group
300 Park Boulevard
Suite 250
Itasca, Illinois 60143

Prepared by

Intertek-PSI
4960 Vulcan Avenue
Columbus, Ohio 43228

April 19, 2017

PSI Project # 06551709
April 19, 2017

The Jenkins Group
300 Park Boulevard
Itasca, Illinois 60143

Attention: Mr. Norman Bochenek
Vice President

Subject: Limited Pre-Renovation Asbestos Assessment Report
Wright Patterson Air Force Base, (AAFES)
Wright Avenue
Dayton, Ohio 45433
PSI Project # 06551709

Dear Mr. Bochenek:

Intertek-PSI performed the Limited Pre-Renovation Asbestos Assessment of the above-referenced property that you requested. Intertek-PSI provided its services in general accordance with our agreement dated March 13, 2017. Intertek-PSI transmits one digital copy with this letter.

Intertek-PSI thanks you for choosing us as your consultant for this project. Please contact us at 614-876-8000 if you have any questions or we may be of further service.

Respectfully Submitted,

PROFESSIONAL SERVICE INDUSTRIES, INC.

Gary Johnson
Asbestos Hazard Evaluation Specialist
ES34791

Jeff Chapman
Principal Consultant

Terry McCallister
Asbestos Hazard Evaluation Specialist
ES35896
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APPENDIX D – INSPECTOR & LABORATORY CERTIFICATIONS
1 EXECUTIVE SUMMARY

Intertek-PSI was retained by The Jenkins Group to conduct a limited pre-renovation assessment for asbestos-containing materials (ACM) in the Army Air Force Exchange Services (AAFES), located at Wright Patterson Air Force Base on Wright Avenue in Dayton, Ohio 45433.

The subject building is a mini mall constructed of slab-on-grade, brick and concrete building. The subject structure was occupied during the inspection.

The purpose of the investigation and sampling was to provide information regarding the presence, condition, and estimated quantity of accessible ACMs located at the facility that may be impacted by the planned renovation. As directed by the Client, Roof Systems were not included in the scope of this survey (due to existing warranties). The scope-of-work, and materials sampled, were solely driven by the Client-defined planned renovation activities and their previous inspection data.

The asbestos inspection and sampling was conducted on April 04-05, 2017. A total of forty-nine samples were collected from twenty-five suspect asbestos-containing homogeneous materials during the survey. The samples were analyzed by polarized light microscopy (PLM).

The following 3 ACMs (>1% asbestos) were identified during this investigation:

- Tan Floor Tile
- Beige Floor Tile (GNC Closet)
- Black Mastic Associated with all Floor Tile

The following materials with low concentrations of asbestos (trace to 1%) were identified in the subject facility(s):

- Yellow Mastic Associated with HA3 and HA10

The following surfacing materials were sampled and found not to contain asbestos:

- Gray Leveling Compound (>1,000 SF)

The identified flooring ACMs were observed to be in fair to good condition at the time of the field investigation.

ACMs should be maintained in a good non-damaged condition through use of an Operations and Maintenance (O&M) program. Regulated ACM (RACM) must be properly removed by a licensed asbestos abatement contractor prior to renovations or demolition that would disturb the material. Federal, State and Local regulations and guidelines should be strictly adhered to when removing ACM.
In many areas, EPA Category I & II non-friable ACMs in good condition do not need to be removed prior to demolition. However, if demolition practices will cause these materials to be cut, sanded, ground or abraded, or otherwise made friable, they should be treated as RACM and removed prior to demolition. If non-friable ACM’s are not removed prior to demolition, the generated debris cannot be recycled or used as clean-fill. Alternatively, these materials must be removed prior to renovation activities that may impact them.

In addition, prior to any future maintenance, renovation or demolition activities, any assumed ACMs should be tested, and any areas noted as inaccessible during this project, or any concealed areas, such as behind walls, where suspect ACMs are discovered, will require a survey for ACM.

All Floor Tile identified in this survey should be removed by an asbestos abatement contractor prior to renovation. Additionally, if floors are to undergo cutting, sanding, burning, or grinding or replacement flooring materials are not immediately installed then the ACM mastic must also be removed prior to such activities.

This summary does not contain all the information presented in the full report. The report should be read in its entirety to obtain a more complete understanding of the information provided and to aid in any decisions made or actions taken based on this information.
2 INTRODUCTION

2.1 SCOPE OF SERVICES

The scope of services for this project consisted of conducting a limited pre-renovation asbestos assessment, including inspection, sampling and analysis of accessible and exposed interior areas at the subject facility. The inspection was conducted in response to planned renovation activities for an Image Upgrade.

1. The subject area(s) of the facility for this investigation included: The Admin Offices in the rear corner have been tested in 3 of the spaces in 2015. Multiple VCT layers. Mastic in bottom layer is Chrysotile. Test all remaining spaces which are a mix of VCT or carpet over VCT. All finishes are being replaced with carpet or VET.
2. Warehouse: No work, No testing.
3. Main Sales Area is a combination of VCT multiple layers and carpet over VCT or concrete. Floors will be polished concrete.
4. Mall, Entry's and Food Court are CT installed in 2012. Floors will be polished concrete. No testing required.
5. Bank. No work. No testing.
6. GNC, Optical Shop, Barber Shop, Beauty Shop, Gift Shop are combinations of VCT multiple layers with carpet over some spaces. All finishes are being replaced with carpet or VET.
7. Wall and ceiling materials in areas, revealed by the Client over the telephone, where renovation activities may impact them.

At the Client’s request, no roof sampling was conducted due to existing warranties.

The investigation included a review of client-provided records or documents (if available), visual inspection of the subject area(s), sample collection, polarized light microscopy (PLM) sample analysis, quantification of ACMs, and report preparation & review.

2.2 PURPOSE

The purpose of this survey was to provide general information for the subject building(s) regarding the presence, condition, and quantity of accessible and/or exposed friable and non-friable ACM building materials that may be impacted by planned renovation activities.

2.3 AUTHORIZATION

Authorization to perform this work was given on March 13, 2017 by The Jenkins Group. The project was conducted in accordance with the scope, terms and conditions of Intertek-PSI Proposal No. 0655-201791, dated February 22, 2017.
2.4 LIMITATIONS

This limited asbestos assessment was intended to meet the requirements of the National Emissions Standard for Hazardous Air Pollutants (NESHAP) for Asbestos demolition or renovation. The assessment included a thorough inspection of all Client-defined areas of renovation. Roof Systems were not included in the scope of this survey.

Destructive sampling, such as behind finished surfaces (plaster/drywall walls, above hard ceilings, etc.); inside mechanical chases, behind mirrored walls, under carpet or tiled floors, etc., was not conducted to try to assess inaccessible or concealed materials. Void spaces not inspected included locations of suspected pipe or HVAC chases, wall cavities, above finished ceiling systems, within pipe trenches or within concealed locations. Although Intertek-PSI made an attempt to identify all areas of ACM in the Client-defined renovation areas, there may exist conditions which were unable to be identified within the scope of this survey.

Inaccessible is defined as areas of the building that were locked, or where admittance was not permitted. It also includes areas/materials that could not be tested (sampled) without destruction of the structure or a portion of the structure, and areas/materials that could not be safely reached by the inspector or inspection team. In the event that access to a portion of the building was not obtained (which otherwise would have been tested), such limitations specifically are identified in the Findings Section of this report.

Intertek-PSI did not sample any system which presented a hazard to the inspection team such as energized electrical systems or within confined spaces.

Intertek-PSI did not collect samples from building elements where the intended use would be compromised by testing, such as fire rated doors, vapor barriers, mirror mastics, etc.

2.5 WARRANTY

The field and laboratory results reported herein are considered sufficient in detail and scope to determine the presence of accessible and/or exposed suspect ACM for the building structure. Intertek-PSI warrants that the findings contained herein have been prepared in general accordance with accepted professional practices at the time of its preparation as applied by professionals in the community. Changes in the state of the art or in applicable regulations cannot be anticipated and have not been addressed in this report.

The survey and analytical methods have been used to provide the client with information regarding the presence of accessible and/or exposed suspect ACM existing at the time of the inspection. Test results are valid only for the material(s) tested. There is a distinct possibility that conditions may exist which could not be identified within the scope of the study or which were not apparent during the site visit. This inspection covered only those
areas that were exposed and/or physically accessible to the Inspector. The study is also limited to the information available from the client at the time it was conducted.

As directed by the client, Intertek-PSI did not provide any service to investigate or detect the presence of moisture, mold or other biological contaminants in or around any structure, or any service that was designed or intended to prevent or lower the risk of the occurrence of the amplification of the same. Client acknowledges that mold is ubiquitous to the environment with mold amplification occurring when building materials are impacted by moisture. Client further acknowledges that site conditions are outside of Intertek-PSI’s control, and that mold amplification will likely occur, or continue to occur, in the presence of moisture. As such, Intertek-PSI cannot and shall not be held responsible for the occurrence or recurrence of mold amplification.

No other warranties are implied or expressed.
3 GENERAL BUILDING AND SURVEY INFORMATION

3.1 BUILDING INFORMATION

Subject Property: Army Air Force Exchange Services
               Wright Avenue
               Dayton, Ohio 45433

Facility Construction Date: Unknown

Previous Renovation Dates: 2009

Number of Floors: One

Renovation Est Square Footage: ~20,000 sq. ft.

Construction Type: Steel frame, concrete, brick, metal siding, and glass

Building Occupant(s): Merchants, General Public

Additional Information: N/A

3.2 INSPECTION INFORMATION

Name of PSI Inspector(s): Terry McCallister
                         Ohio License # ES35896

Date(s) of Inspection: April 4-5, 2017

Escort: Unescorted
4 METHODOLOGY

Inspection and sampling procedures were performed in general accordance with the guidelines published by the Environmental Protection Agency (EPA). The inspection and survey described below was performed by an EPA accredited Inspector and State of Ohio licensed Asbestos Hazard Evaluation Specialist.

4.1 RECORD DOCUMENT REVIEW

Prior to conducting the visual inspection, Intertek-PSI reviewed documents provided by the client, including: drawings, floor plans, historical data, maintenance records, previous survey reports, laboratory reports, etc. for information regarding construction history and building materials.

The following documents were reviewed as a part of this Asbestos Survey:

- Drawings/Floor Plans

This data along with Client defined renovation information was used to focus the walk through and scope of work to be followed over the course of our visual inspection and sampling. Information obtained from the references is included in the findings section of the report.

4.2 VISUAL INSPECTION PROCEDURES

An initial individual building structure walkthrough was conducted to determine the presence of suspect asbestos-containing materials that were accessible and/or exposed. Exterior areas, including the roof systems, were included in the scope of this investigation.

Destructive sampling, such as behind finished surfaces (plaster/drywall walls, above hard ceilings, etc.), inside mechanical chases, behind mirrored walls, under carpet or tiled floors, etc., was not conducted to try to assess inaccessible or concealed materials. Void spaces not inspected included locations of suspected pipe or HVAC chases, wall cavities, above finished ceiling systems, within pipe trenches or within concealed locations. Although Intertek-PSI made an attempt to identify all areas of ACM in the Client-defined renovation areas, there may exist conditions which were unable to be identified within the scope of this survey.

Materials which were similar in color, texture, general appearance and which appear to have been installed at the same time were grouped in Homogeneous Sampling Areas. Such materials are termed "homogeneous materials" by the EPA. During this walkthrough, the approximate locations of these homogeneous materials were also noted.
The inspector evaluated the overall condition of the material and determined whether the materials were friable or non-friable by touching the material, where practical. A friable material is defined as any material able to be crushed, crumbled, pulverized or reduced to a powder by hand pressure when dry.

Each material was further assessed for overall condition. Conditions were rated as good, damaged or significantly damaged. Intertek-PSI’s inspector also identified the EPA classification of the material: Regulated ACM (RACM), Category I non-friable ACM, and Category II non-friable ACM, based on the materials current condition. Intertek-PSI’s inspector provided estimated quantities of the materials identified as ACM, based only on materials that were accessible and exposed.

4.3 **ASBESTOS SAMPLING PROCEDURES**

Following the walkthrough, the Inspector collected samples of suspect materials.

EPA guidelines were used to determine the sampling protocol. Sampling locations were chosen to be representative of the homogeneous sampling area. While an effort was made to collect samples randomly, samples were taken preferentially from areas already damaged or areas which were the least visible to minimize disturbance of the material.

Each sample location was sprayed with amended water and was kept wet during the entire sampling process. Samples were collected by coring through the material from the surface down to the base substrate. All layers of the material were extracted and placed into a sample container for transport to the laboratory. Sample containers were sealed and labeled with a unique sample identification number. Where appropriate, sampled materials were sealed with an encapsulant or covered with tape after sampling. Intertek-PSI is not responsible for restoring the sampled areas to their pre-sampled condition.

In accordance with the agreement between Intertek-PSI and the client, roofing materials were not sampled as part of this survey.

4.4 **ASBESTOS ANALYSIS PROCEDURES**

All samples were analyzed at Intertek-PSI located at 850 Poplar Street, Pittsburgh, Pennsylvania 15220. The PSI Pittsburgh Asbestos Laboratory is a National Voluntary Laboratory Accreditation Program (NVLAP) Accredited (#101350-0) and an American Industrial Hygiene Association (AIHA) Accredited (#8222) Laboratory. A copy of the Laboratory’s Accreditation Certificate is included in the Appendix.

All samples were analyzed for asbestos by polarized light microscopy (PLM) in accordance with the “EPA Method for the Determination of Asbestos in Bulk Building Materials” (EPA/600/R-93/116 July 1993). Analysis was performed by using bulk samples for visual observation and slide preparation(s) for microscopic examination and identification. The samples were mounted on slides and then analyzed for asbestos.
(chrysotile, amosite, crocidolite, anthophyllite, actinolite/tremolite), and fibrous non-asbestos constituents (mineral wool, fiberglass, cellulose, etc.). Asbestos was identified by refractive indices, morphology, color, pleochroism, birefringence, extinction characteristics, and signs of elongation. The same characteristics were used to identify the non-asbestos constituents.

The microscopist visually estimated relative amounts of each constituent by determining the volume of each constituent in proportion to the total volume of the sample, using a stereoscope.

The EPA method allows samples which are visually determined to have 10% or less asbestos to be quantified using a Point Count procedure. An ocular reticule (cross hair or point array) is used to visually superimpose a point or points on the microscope field of view. A total of 400 points superimposed on either asbestos fibers or non-asbestos matrix material must be counted over at least eight different preparations of representative subsamples. If an asbestos fiber and matrix particle overlap so that a point is superimposed on their visual intersection, a point is scored for both categories. Point counting provides a quantification of the area percent asbestos. Point counted results supersede the results of the visual estimation. No samples were point counted for this survey.

It should be noted that some ACM might not be accurately identified or quantified by PLM. As an example, the original fabrication of vinyl floor tiles routinely involved milling of asbestos fibers to extremely small sizes. As a result, these fibers may go undetected under the standard PLM method. Transmission Electron Microscopy (TEM) is recommended for a more definitive analysis of these materials.

4.4.1 LABORATORY QUALITY CONTROL PROGRAM

The Intertek-PSI Laboratory in Pittsburgh, Pennsylvania, maintains an in-house quality control program. This program involves blind reanalysis of 10% of all samples, precision and accuracy controls, and use of standard bulk reference materials. In addition, the Intertek-PSI Laboratory is accredited by NVLAP, which also has quality control procedures inherent in its program.
5 FINDINGS

5.1 ASBESTOS RESULTS

A total of forty-nine samples were collected from twenty-five suspect homogenous materials during the asbestos survey.

The “Report of Bulk Sample Analysis for Asbestos,” the “Asbestos Bulk Sample Log,” and Sample Location diagram are included in the Appendices. The Tables attached to this report list the confirmed ACMs throughout the building and confirmed non-ACM surfacing materials. Table 1 lists the materials that were sampled, along with the results of the inspection and laboratory analysis. Table 2 lists the suspect surfacing materials that were sampled and found not to be ACM.

5.1.1 INACCESSIBLE AREAS

The following areas were inaccessible during the survey and therefore were not included in the scope of the survey.

- None

Such areas would require an asbestos inspection prior to any demolition or renovation activities within the areas.

5.1.2 NON-SUSPECT MATERIALS

The following materials were observed but are considered ‘non-suspect’ ACM due to their composition (fiberglass, rubber, etc.) and were not sampled.

- wood wall panels

5.1.3 REGULATORY GUIDELINES:

ACM Definition –

The EPA and OSHA consider a material to be asbestos-containing if at least one sample from the homogeneous area shows asbestos in an amount greater than 1%.

Point Count Quantification –

If a material is found to contain 10% or less asbestos via visual estimation, it can be treated as non-asbestos-containing per EPA Regulations, if verified to contain 1% or less asbestos by the Point Count Quantification Procedure. If not point counted, a sample in which asbestos was visually detected and estimated (including trace to ≤1%) must be assumed to be greater than 1% and treated as ACM. Please refer to the laboratory analyses for a more detailed description of the microscopic analysis of individual samples. No samples were quantified by the Point Count Procedure in this Asbestos Survey.
EPA NESHAP Category –

EPA classifies ACM into several categories. A regulated asbestos-containing material (RACM) as defined by the Asbestos National Emissions Standard for Hazardous Air Pollutants (NESHAP) is any (a) Friable asbestos material, (b) Category I non-friable ACM that has become friable, (c) Category I non-friable ACM that will be or has been subjected to sanding, grinding, cutting, or abrading, or (d) Category II non-friable ACM that has a high probability of becoming or has become crumbled, pulverized, or reduced to powder by the forces expected to act on the material in the course of demolition or renovation operations. A Category I Non-friable ACM includes packings, gaskets, resilient floor covering, and asphalt roofing products which contain more than one percent asbestos. A Category II Non-friable ACM includes any material, except for a Category I non-friable ACM, which contains more than one-percent asbestos and cannot be reduced to a powder by hand pressure when dry.

The Occupational Safety and Health Administration (OSHA) –

OSHA requires all suspect materials to be analyzed by layer, even materials such as drywall/joint compound, which may sometimes be composited per the EPA. If any layer contains asbestos in a concentration >1%, the material is considered an ACM.

OSHA has a classification system (I thru IV) for ACM depending on the type of material and the disturbance. Briefly, ‘Class I’ work is defined as activities involving the removal of ACM or presumed ACM (PACM) that is thermal system insulation (TSI) and surfacing materials. ‘Class II’ activities involve removal of ACM/PACM other than TSI or surfacing material. ‘Class III’ work includes repair and maintenance operations which are likely to disturb ACM/PACM, and ‘Class IV’ work includes maintenance and custodial activities during which employees contact but do not disturb ACM/PACM.

Materials where asbestos is detected, but where point counting is conducted and determined that the concentration is ≤1% asbestos, are not considered to be ACM by OSHA. However, these materials are considered unclassified asbestos work per OSHA. Some OSHA work control practices and prohibitions will still apply, with the extent depending on whether the worker’s exposure to airborne asbestos exceeds the OSHA permissible exposure limit (PEL).

Additional details of the OSHA asbestos regulations related to the construction industry can be found in 29 CFR part 1926.1101.

The State of Ohio

Ohio Administrative Codes OAC 3745-20 and OAC 3701-34 apply to asbestos work being conducted in the State of Ohio.
5.1.4 QUANTIFICATION

Quantification of suspect ACMs was conducted using visual estimation by a licensed asbestos inspector. This visual estimation was performed in accordance with generally accepted practices in the asbestos industry based on materials that were accessible and exposed. These values are sufficiently accurate for the purpose of documenting the presence of asbestos within its space for the purpose of identifying abatement control conditions or for general policy considerations. Actual quantities may differ between visually estimated values and physical measurements. If a licensed asbestos abatement contractor is engaged to remove asbestos containing materials, the abatement contractor is responsible for verifying reported quantities of ACM.

5.1.5 ABATEMENT COST ESTIMATION

Intertek-PSI used recognized standard engineering principles in developing the unit cost budgetary estimate for removal of the listed asbestos-containing materials (ACM) contained in this facility. This is an estimate for removal only, intended for general policy decisions regarding program development and planning. The figures are as of the date of the report and cover only the removal contractor's fees. Not included are items such as indirect or hidden costs, such as employee relocation during the project, lost revenues, replacement costs, project design or monitoring, etc. These items are considered during the development of an engineering cost estimate, which is beyond the scope of this study. Other variables included in an engineering cost estimate are the project schedule and phasing, size of the project, and other factors that can affect project cost.
6 CONCLUSIONS & RECOMMENDATIONS

6.1 CONCLUSIONS

Asbestos-containing materials (ACMs) were found in the Army Air Force Exchange Services.

Assumed ACMs were not found.

Materials with low concentrations of asbestos (trace to 1%) were identified in the subject facility(s).

The identified flooring ACMs were observed to be in fair to good condition at the time of the field investigation.

6.2 RECOMMENDATIONS

ACMs should be maintained in a good non-damaged condition and periodically inspected through use of an Operations and Maintenance (O&M) program. Damaged or significantly damaged ACMs should be repaired, encapsulated, enclosed or removed.

Regulated ACM (RACM) must be properly removed by a licensed asbestos abatement contractor prior to renovations or demolition that would disturb the material. Federal, State and Local regulations and guidelines should be strictly adhered to when removing the ACM.

Category I & II Non-Friable asbestos containing material that is in good condition may often be left in place during demolition if not made friable by cutting, grinding or sanding. If left in place, these materials cannot be recycled or used as clean fill.

Materials verified to contain low concentrations of asbestos (trace to 1%) are not considered ACM, and are not regulated by the EPA; however, some OSHA regulations will still apply based on the employee’s airborne exposure.

In addition, prior to any future maintenance, renovation or demolition activities, any assumed ACMs should be tested. Any areas that were noted as being inaccessible during this project, or any concealed areas, such as behind walls, where suspect ACMs are discovered, will require a survey for ACM.

Since the planned renovation calls for replacing all flooring finishes, all flooring identified in this survey should be removed by an asbestos abatement contractor prior to the planned renovation. Additionally, if floors are to undergo cutting, sanding, burning, or grinding or replacement flooring materials are not immediately installed then the ACM mastic must also be removed prior to such activities.
Prior to the initiation of a project that would involve abatement, a detailed engineering cost estimate and project design is recommended. The engineering cost estimate will incorporate such variables as scheduling and phasing of the project, the size and extent of the project, seasonal factors, operational factors and other restrictions, respiratory protection, alternate abatement options, and type of replacement material. An engineering cost estimate would also include professional fees, such as for project design and management, and other expenses, such as on-site air monitoring, post-abatement air clearance, and construction supervision.
TABLES
# TABLE 1 – CONFIRMED ACMS

<table>
<thead>
<tr>
<th>Material # &amp; (Sample #)</th>
<th>Material Description</th>
<th>Material Location</th>
<th>F / NF</th>
<th>Cond.</th>
<th>% ACM &amp; type</th>
<th>EPA NESHAP Cat</th>
<th>Est. Qty.</th>
<th>Est. Removal Cost ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>01 (001, 002)</td>
<td>Tan Floor Tile</td>
<td>Throughout (under other layers of flooring)</td>
<td>NF</td>
<td>Good</td>
<td>2%Ch</td>
<td>Cat I NF</td>
<td>18,000 SF</td>
<td>$72,000.00 (Includes Mastic)</td>
</tr>
<tr>
<td>08 (016, 017)</td>
<td>Beige Floor Tile</td>
<td>GNC Closet</td>
<td>NF</td>
<td>Good</td>
<td>2%Ch</td>
<td>Cat I NF</td>
<td>20 SF</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>Black Mastic</td>
<td>Throughout</td>
<td>NF</td>
<td>Good</td>
<td>3-5%Ch</td>
<td>Cat I NF</td>
<td>18,000 SF</td>
<td>N/A</td>
</tr>
</tbody>
</table>

1  F = Friable; NF = Non-friable  
2  Cond. = Condition Of Materials  
   Either good, dam = damaged, sig. dam. = significant damage  
3  NAD = No Asbestos Detected, Ch = Chrysotile, Am = Amosite, PT = Point Count Analysis  
4  NESHAP Category - Regulated ACM (RACM), Cat I NF=Category I Non-Friable ACBM, Cat II NF= Category II Non-Friable ACBM
# TABLE 2 – CONFIRMED NON-ACM SURFACING MATERIALS

<table>
<thead>
<tr>
<th>Material # &amp; (Sample #)</th>
<th>Material Description</th>
<th>Material Location</th>
<th>F / NF ¹</th>
<th>Cond.²</th>
<th>% ACM &amp; type³</th>
<th>Est. Qty.</th>
<th>Est. Removal Cost ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>011 (022-023)</td>
<td>Gray Leveling Compound</td>
<td>Various Areas</td>
<td>NF</td>
<td>Good</td>
<td>NAD</td>
<td>&gt;1,000 SF</td>
<td>N/A</td>
</tr>
</tbody>
</table>

¹ **F** = Friable; **NF** = Non-friable

² **Cond.** = Condition Of Materials

³ **NAD** = No Asbestos Detected, **Ch** = Chrysotile, **Am** = Amosite, **PT** = Point Count Analysis

⁴ NESHAP Category - Regulated ACM (RACM), Cat I NF = Category I Non-Friable ACBM, Cat II NF = Category II Non-Friable ACBM
APPENDIX A – REPORT OF BULK SAMPLE ANALYSIS FOR ASBESTOS
# REPORT OF BULK SAMPLE ANALYSIS FOR ASBESTOS

**TESTED FOR:** PSI, Inc  
**Address:** 4960 Vulcan Avenue, Suite C, Columbus, OH 43228  
**Project ID:** 06551709  
**Pre-Renovation Asbestos Survey**  
**Attn:** Terry McCallister

**Date Received:** 4/5/2017  
**Date Completed:** 4/10/2017  
**Date Reported:** 4/10/2017

**Work Order:** 1704087  
**Page:** 1 of 4

---

<table>
<thead>
<tr>
<th>Client ID</th>
<th>Lab ID (Layer)</th>
<th>Sample Description (Color, Texture, Etc.)</th>
<th>Analyst's Comment</th>
<th>Asbestos Content (Percent and Type)</th>
<th>Non-asbestos Fibers (Percent and Type)</th>
</tr>
</thead>
<tbody>
<tr>
<td>001A</td>
<td>(1) White, Floor Tile, Homogeneous</td>
<td>NO ASBESTOS DETECTED</td>
<td>None Reported</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>(2) Yellow, Mastic, Homogeneous</td>
<td>NO ASBESTOS DETECTED</td>
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<td></td>
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<tr>
<td>002A</td>
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<td>NO ASBESTOS DETECTED</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>(2) Yellow, Mastic, Homogeneous</td>
<td>NO ASBESTOS DETECTED</td>
<td>None Reported</td>
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<td></td>
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<tr>
<td></td>
<td>(3) White, Floor Tile, Homogeneous</td>
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<td></td>
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<tr>
<td></td>
<td>(4) Yellow, Mastic, Homogeneous</td>
<td>NO ASBESTOS DETECTED</td>
<td>None Reported</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>(5) Beige, Floor Tile, Homogeneous</td>
<td>2% Chrysotile</td>
<td>None Reported</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(6) Black, Mastic, Homogeneous</td>
<td>5% Chrysotile</td>
<td>None Reported</td>
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</tr>
<tr>
<td>003A</td>
<td>(1) Gray, Covebase, Homogeneous</td>
<td>NO ASBESTOS DETECTED</td>
<td>None Reported</td>
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<tr>
<td>005A</td>
<td>(1) Blue, Carpet, Homogeneous</td>
<td>NO ASBESTOS DETECTED</td>
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<tr>
<td></td>
<td>(2) Yellow, Mastic, Homogeneous</td>
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<tr>
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<td>(1) Blue, Carpet, Homogeneous</td>
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<td>100% Synthetic Fiber</td>
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<tr>
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<td>(2) Yellow, Mastic, Homogeneous</td>
<td>&lt; 1% Chrysotile</td>
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<tr>
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<td>Inseparable Yellow and Black Mastics</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>007A</td>
<td>(1) White, Ceiling Tile, Homogeneous</td>
<td>NO ASBESTOS DETECTED</td>
<td>30% Fibrous Glass</td>
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<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>40% Cellulose Fiber</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

Quantitation is based on a visual estimation of the relative area of bulk sample components, unless otherwise noted in the “Comments” section of this report. The results are valid only for the item tested. This report may not be used to claim product endorsement by NVLAP or any agency of the U.S. Government. Method used: E.P.A. Method for the Determination of Asbestos in Bulk Building Materials (EPA / 600/R-93/116 July 1993). Polarized Light Microscopy is not consistently reliable in detecting asbestos in floor coverings and similar non-friable organically bound materials. Quantitative Transmission Electron Microscopy is currently the only method that can be used to determine if the material can be considered or treated as non-asbestos containing. Samples will be disposed of within 30 days unless notified in writing by the client. No part of this report may reproduced, except in full, without written permission of the laboratory. The reporting limit is 1% by weight. NVLAP Lab Code 101350-0.

Respectfully submitted,  
PSI, Inc.

Approved Signatory  
Melanie Smith

---

Professional Service Industries, Inc.  850 Poplar Street, Pittsburgh, PA 15220  Phone 412/922-4010  Fax 412/922-4014
<table>
<thead>
<tr>
<th>Client ID</th>
<th>Lab ID (Layer)</th>
<th>Sample Description <em>(Color, Texture, Etc.)</em></th>
<th>Non-asbestos Fibers <em>(Percent and Type)</em></th>
<th>Asbestos Content <em>(Percent and Type)</em></th>
<th>Analyst's Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>008</td>
<td>008A</td>
<td>White, Ceiling Tile, Homogeneous</td>
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<td>009A</td>
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<td>NO ASBESTOS DETECTED</td>
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</tr>
<tr>
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<td>010A</td>
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<td>None Reported</td>
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<td>011A</td>
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<td>5% Chrysotile</td>
</tr>
</tbody>
</table>

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Respectfully submitted,
PSI, Inc.

[Signature]

Approved Signatory
Melanie Smith

Professional Service Industries, Inc. 850 Poplar Street, Pittsburgh, PA 15220 Phone 412/922-4010 Fax 412/922-4014
<table>
<thead>
<tr>
<th>Client ID</th>
<th>Lab ID (Layer)</th>
<th>Sample Description (Color, Texture, Etc.)</th>
<th>Asbestos Content (Percent and Type)</th>
<th>Non-asbestos Fibers (Percent and Type)</th>
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<tbody>
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<td>021</td>
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<td></td>
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<td>None Reported</td>
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<td>3% Chrysotile</td>
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</tr>
<tr>
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</table>

Quantitation is based on a visual estimation of the relative area of bulk sample components, unless otherwise noted in the "Comments" section of this report. The results are valid only for the item tested. This report may not be used to claim product endorsement by NVLAP or any agency of the U.S. Government. Method used: E.P.A. Method for the Determination of Asbestos in Bulk Building Materials (EPA / 600/R-93/116 July 1993). Polarized Light Microscopy is not consistently reliable in detecting asbestos in floor coverings and similar non-friable organically bound materials. Quantitative Transmission Electron Microscopy is currently the only method that can be used to determine if the material can be considered or treated as non-asbestos containing. Samples will be disposed of within 30 days unless notified in writing by the client. No part of this report may reproduced, except in full, without written permission of the laboratory. The reporting limit is 1% by weight. NVLAP Lab Code 101350-0.

Respectfully submitted,

PSI, Inc.

Approved Signatory

Melanie Smith

Professional Service Industries, Inc. 850 Poplar Street, Pittsburgh, PA 15220 Phone 412/922-4010 Fax 412/922-4014
<table>
<thead>
<tr>
<th>Client ID</th>
<th>Lab ID (Layer)</th>
<th>Sample Description (Color, Texture, Etc.)</th>
<th>Asbestos Content (Percent and Type)</th>
<th>Non-asbestos Fibers (Percent and Type)</th>
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<td>Gray, Not Provided, Homogeneous</td>
<td>NO ASBESTOS DETECTED</td>
<td>None Reported</td>
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</tbody>
</table>

Report Notes: (PT) Point Count Results

Quantitation is based on a visual estimation of the relative area of bulk sample components, unless otherwise noted in the "Comments" section of this report. The results are valid only for the item tested. This report may not be used to claim product endorsement by NVLAP or any agency of the U.S. Government. Method used: E.P.A. Method for the Determination of Asbestos in Bulk Building Materials (EPA / 600/R-93/116 July 1993). Polarized Light Microscopy is not consistently reliable in detecting asbestos in floor coverings and similar non-friable organically bound materials. Quantitative Transmission Electron Microscopy is currently the only method that can be used to determine if the material can be considered or treated as non-asbestos containing. Samples will be disposed of within 30 days unless notified in writing by the client. No part of this report may reproduced, except in full, without written permission of the laboratory. The reporting limit is 1% by weight. NVLAP Lab Code 101350-0.

Respectfully submitted,
PSI, Inc.

Approved Signatory
Melanie Smith

Professional Service Industries, Inc. 850 Poplar Street, Pittsburgh, PA 15220 Phone 412/922-4010 Fax 412/922-4014
## REPORT OF BULK SAMPLE ANALYSIS FOR ASBESTOS

**TESTED FOR:** PSI, Inc  
4960 Vulcan Avenue, Suite C  
Columbus, OH 43228  
Attn: Terry McCallister  

**Project ID:** 06551709  
Pre-Renovation Asbestos Survey  

**Date Received:** 4/7/2017  
**Date Completed:** 4/13/2017  
**Date Reported:** 4/13/2017  

**Analyst:** Lori Huss  
**Work Order:** 1704161  
**Page:** 1 of 1  

<table>
<thead>
<tr>
<th>Client ID</th>
<th>Lab ID (Layer)</th>
<th>Sample Description (Color, Texture, Etc.)</th>
<th>Asbestos Content (Percent and Type)</th>
<th>Non-asbestos Fibers (Percent and Type)</th>
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<tbody>
<tr>
<td>002A</td>
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<td>Black, Carpet, Homogeneous</td>
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<td>100% Synthetic Fiber</td>
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</table>

**Report Notes:**  
(PT) Point Count Results

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Respectfully submitted,  
PSI, Inc.

Approved Signatory  
George Skarupa
APPENDIX B – ASBESTOS BULK SAMPLE LOG / CHAIN OF CUSTODY
**CHAIN OF CUSTODY - ASB/LEAD/IH**

**Project Information**
- **Project Name:** Pre-Renovation Asbestos Survey
- **Project No:** 06551709
- **PO Number:**
- **Sample Date:** 04/06/2017

**Send Results To:**
- **Company:** PSI
- **Attn:** Terry McCallister
- **Address:** 4960 Vulcan Ave. Columbus OH 43228
- **Telephone:** 614/876-8000
- **Email:** terry.mccallister@psiusa.com; gary.johnson@psiusa.com

**Send Invoice To:**
- **Company:** PSI
- **Attn:** Terry McCallister
- **Address:** 4960 Vulcan Ave. Columbus OH 43228
- **Telephone:** 614/876-8000
- **Email:** terry.mccallister@psiusa.com; gary.johnson@psiusa.com

**Requested Turnaround Time:**
- **Same Day**
- **1-2 Day**
- **3-5 Day**
- **Requested Date:**
  - [ ]
  - [ ]
  - [ ]

**Stop at First Positive**
- **Y**
- **N**

**Y N**

**Laboratory Use Only**
- **All Samples in Acceptable Condition:** [ ] [ ]
- **Comments:**
- **Shipping Charges Apply:** [ ] [ ]

**Parameter**

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<th>Point Count (600)</th>
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<th>Lead Air</th>
<th>Lead Soil</th>
<th>Lead Paint Chip</th>
<th>Lead TCLP</th>
<th>PCM</th>
<th>PCM &quot;B Rules&quot;</th>
<th>TEM AHERA</th>
<th>TEM 7402</th>
<th>TEM Chafield</th>
<th>TEM Vacuum</th>
<th>TEM Wipe</th>
<th>NY PLM Friable/NOB</th>
<th>NY TEM NOB</th>
<th>NY SOF-V</th>
<th>Total Nuisance Dust</th>
<th>Respirable Dust</th>
<th>Cadmium</th>
<th>Zinc</th>
<th>Total Chromium</th>
<th>Other</th>
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</tbody>
</table>

**Relinquished by:**
- **Terry McCallister**
**Date/Time:** 04/06/2017
**Received by:** [Signature]
**Date/Time:** 04/07/2017 9:00AM

**Analyst Name:** [Signature]

**Special Instructions / Comments:**

---

**IH Laboratory**
850 Poplar Street
Pittsburgh, PA 15220
412-922-4001 ext. 228/425
**Project Information**

- **Project Name:** Pre-Renovation Asbestos Survey
- **Project No.:** 06551709
- **PO Number:** 04/04/2017

**Send Results To:**

- **Company:** PSI
- **Attn.:** Terry McCallister
- **Address:** 4950 Vulcan Ave. Columbus OH 43228
- **Telephone:** 614/876-8000
- **Email:** terry.mccallister@psiusa.com; gary.johnson@psiusa.com

**Requested Turnaround Time:**

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<th>1-2 Day</th>
<th>3-5 Day</th>
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**Stop at First Positive**

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<th>N</th>
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<td></td>
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**Laboratory Use Only**

- **All Samples In Acceptable Condition:** [ ]
- **Comments:**
- **Shipping Charges Apply:** [ ]

**Parameter**

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<tr>
<th>Sample ID:</th>
<th>Number of Samples</th>
<th>PLM Bulk</th>
<th>Point Count (400)</th>
<th>Point Count (1000)</th>
<th>Lead Wipe</th>
<th>Lead Air</th>
<th>Lead Soil</th>
<th>Lead Paint Chip</th>
<th>Lead TCLP</th>
<th>PCM</th>
<th>PCM &quot;8 Rules&quot;</th>
<th>TEM-AHERA</th>
<th>TEM-JAO2</th>
<th>TEM-Chafield</th>
<th>TEM-Vacuum</th>
<th>TEM-Wipe</th>
<th>NY-PLM-Friable/ROB</th>
<th>NY-PLM-NOB</th>
<th>NY-SOF-V</th>
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<th>Respirable Dust</th>
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</table>

**Reinforced by:**

- **Terry McCallister**

**Date/Time:** 04/04/2017

**Received By:**

- **[Signature]**

**Date/Time:** 04/04/2017

**Analyst Name:** Preston Hunt

**Analyst Signature:**

**Special Instructions / Comments:**
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<th>HOMO AREA</th>
<th>SAMPLE #</th>
<th>MATERIAL DESCRIPTION</th>
<th>SAMPLE LOCATION</th>
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<td>12”x12” Floor tile, white w/blue specs-multiple layers w/black mastic</td>
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<tr>
<td>02</td>
<td>003,004</td>
<td>Light grey cove base and mastic</td>
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<tr>
<td>03</td>
<td>005,006</td>
<td>Blue carpet w/glue</td>
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<td>007,008</td>
<td>2’x4’ ceiling tiles</td>
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<td>009,010</td>
<td>Dark grey cove base</td>
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<td>011,012</td>
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<tr>
<td>07</td>
<td>013,014, 015</td>
<td>Dry wall w/joint compound</td>
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<td>016,017</td>
<td>12”x12” floor tile (GNC Closet)</td>
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<tr>
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<td>018,019</td>
<td>Blue carpet w/glue</td>
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</tr>
<tr>
<td>10</td>
<td>020,021</td>
<td>12”x12” Floor tile with grey specs with black mastic</td>
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<tr>
<td>11</td>
<td>022,023</td>
<td>Floor leveling compound</td>
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<td>12”x12” tan floor tile-layered with black mastic</td>
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<td>026,027</td>
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<td>12”x12” white floor tile with grey specs-layered with black mastic</td>
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<td>034,035</td>
<td>Tan tile with yellow mastic</td>
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<tr>
<td>HOMO AREA</td>
<td>SAMPLE #</td>
<td>MATERIAL DESCRIPTION</td>
<td>SAMPLE LOCATION</td>
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<tr>
<td>18</td>
<td>036,037</td>
<td>Grey grout (Mall Men’s RR)</td>
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<tr>
<td>19</td>
<td>038</td>
<td>Grey grout (Mall Family RR)</td>
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<td>Grey grout (Admin Men’s RR)</td>
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<td>Grey grout (Admin Women’s RR)</td>
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<td>22</td>
<td>042,043</td>
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<td>23</td>
<td>044,045</td>
<td>Black cove base</td>
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<td>24</td>
<td>046,047</td>
<td>Tan-white floor tile-Multiple layers w/black mastic</td>
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<tr>
<td>25</td>
<td>048,049</td>
<td>Grey floor tile w/yellow mastic</td>
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</tr>
</tbody>
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F – Friable
NF – Non Friable
NAD – No Asbestos Detected
SNA – Sample Not Analyzed
APPENDIX C – SITE LAYOUT AND SAMPLE LOCATION DRAWING(S)
APPENDIX D – INSPECTOR & LABORATORY CERTIFICATIONS
Certificate of Accreditation to ISO/IEC 17025:2005

NVLAP LAB CODE: 101350-0

PSI
Pittsburgh, PA

Asbestos Fiber Analysis

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to Joint ISO/IEC-IAF Communiqué dated January 2009).

Effective Dates
2016-07-01 through 2017-06-30

For the National Voluntary Laboratory Accreditation Program

[Signature]
ASBESTOS FIBER ANALYSIS

Bulk Asbestos Analysis

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>18/A01</td>
<td>EPA 600/M4-82-020: Interim Method for the Determination of Asbestos in Bulk Insulation Samples</td>
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Airborne Asbestos Analysis

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<td>U.S. EPA's &quot;Interim Transmission Electron Microscopy Analytical Methods-Mandatory and Nonmandatory—and Mandatory Section to Determine Completion of Response Actions&quot; as found in 40 CFR, Part 763, Subpart E, Appendix A.</td>
</tr>
</tbody>
</table>

NVLAP LAB CODE 101350-0

For the National Voluntary Laboratory Accreditation Program

Effective 2016-07-01 through 2017-06-30
### PLM ANALYTICAL REPORT

**CLIENT:** Army Air Force Exchange Services (AAFES)  
Building 253, Wright Avenue  
Wright Patterson AFB  
Dayton, Ohio 45433  

**PROJECT:** BULK SAMPLE ANALYSIS  
THE EXCHANGE (SHOPPING CENTER)  
BUILDING 1250 - MAIN OFFICES  
WRIGHT PATTERSON AFB  
DAYTON, OHIO

<table>
<thead>
<tr>
<th>Lab ID#</th>
<th>Field Sample Number</th>
<th>Sample Location</th>
<th>Sample Description</th>
<th>Non-Asbestos Components</th>
<th>Total Asbestos</th>
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<tbody>
<tr>
<td>B428</td>
<td>WPE-04A</td>
<td>Main Offices, Break room, NW corner, top layer, 12” white w/blue floor tile/adhesive</td>
<td>White/blue floor tile/adhesive</td>
<td>98% non-fibrous; 2% cellulose adhesive</td>
<td>NAD NAD</td>
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<tr>
<td>B429</td>
<td>WPE-04B</td>
<td>Main Offices, Break Room, NW corner, bottom layer, cream floor tile/mastic</td>
<td>Cream floor tile/mastic</td>
<td>97% non-fibrous; 3% cellulose mastic</td>
<td>NAD 8% Chrysotile</td>
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<tr>
<td>Lab ID#</td>
<td>Field Sample Number</td>
<td>Sample Location</td>
<td>Sample Description</td>
<td>Non-Asbestos Components</td>
<td>Total Asbestos</td>
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<tr>
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</tr>
<tr>
<td>B430</td>
<td>WPE-05A</td>
<td>Main Offices, Men’s RR, south of lockers, top layer, 12” white w/blue floor tile/adhesive</td>
<td>White/blue floor tile/adhesive</td>
<td>98% non-fibrous; 2% cellulose adhesive</td>
<td>NAD NAD</td>
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<tr>
<td>B431</td>
<td>WPE-05B</td>
<td>Main Offices, Men’s RR, south of lockers, bottom layer, cream floor tile/mastic</td>
<td>Cream floor tile/mastic</td>
<td>98% non-fibrous; 2% cellulose mastic</td>
<td>NAD 5% Chrysotile</td>
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<tr>
<td>B432</td>
<td>WPE-06A</td>
<td>Main Offices, Janitors Closet, center of room, top layer, 12” white w/blue floor tile and adhesive</td>
<td>White/blue floor tile/adhesive</td>
<td>98% non-fibrous; 2% cellulose adhesive</td>
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<tr>
<td>B433</td>
<td>WPE-06B</td>
<td>Main Offices, Janitor Closet, center of room, bottom layer, cream floor tile/mastic</td>
<td>Cream floor tile/mastic</td>
<td>97% non-fibrous; 3% cellulose mastic</td>
<td>NAD 10% Chrysotile</td>
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</tbody>
</table>

NAD = No Asbestos Detected  
Trace=<1% Asbestos Content  
SCF=Suspected Ceramic Fiber  
SYN=Synthetic
<table>
<thead>
<tr>
<th>No.</th>
<th>Sample I.D.</th>
<th>Date Sampled</th>
<th>Time Sampled</th>
<th>Type</th>
<th>Matrix</th>
<th>Location</th>
<th>Total No. of Containers</th>
<th>Preserved Y/N</th>
<th>PLM (NIOSH 9002)</th>
<th>PCM (NIOSH 7400)</th>
<th>TEM (NIOSH 7402)</th>
<th>Remarks</th>
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<tbody>
<tr>
<td>1</td>
<td>WPE - 04A</td>
<td>1/28/2015</td>
<td>AM</td>
<td>Bulk</td>
<td>ACM</td>
<td>Main Offices, Break room, NW corner, Top layer, 12&quot; White w/ blue Floor Tile</td>
<td>1</td>
<td>N</td>
<td>X</td>
<td></td>
<td></td>
<td>3 428</td>
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<td>2</td>
<td>WPE - 04B</td>
<td>1/28/2015</td>
<td>AM</td>
<td>Bulk</td>
<td>ACM</td>
<td>Main Offices, Break room, NW corner, Bottom layer, cream floor tile / mastic</td>
<td>1</td>
<td>N</td>
<td>X</td>
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<td>4 29</td>
</tr>
<tr>
<td>3</td>
<td>WPE - 05A</td>
<td>1/28/2015</td>
<td>AM</td>
<td>Bulk</td>
<td>ACM</td>
<td>Main Offices, Men's RR, South of Lockers, Top Layer, 12&quot; White w/ Blue Floor Tile</td>
<td>1</td>
<td>N</td>
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</tr>
<tr>
<td>4</td>
<td>WPE - 05B</td>
<td>1/28/2015</td>
<td>AM</td>
<td>Bulk</td>
<td>ACM</td>
<td>Main Offices, Men's RR, South of Lockers, Bottom Layer, Cream floor tile / mastic</td>
<td>1</td>
<td>N</td>
<td>X</td>
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<td>5</td>
<td>WPE - 06A</td>
<td>1/28/2015</td>
<td>AM</td>
<td>Bulk</td>
<td>ACM</td>
<td>Main Offices, Janitor Closet, Center of Room, Top Layer, 12&quot; White w/ Blue FT</td>
<td>1</td>
<td>N</td>
<td>X</td>
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<td></td>
<td>4 32</td>
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<tr>
<td>6</td>
<td>WPE - 06B</td>
<td>1/28/2015</td>
<td>AM</td>
<td>Bulk</td>
<td>ACM</td>
<td>Main Offices, Janitor Closet, Center of Room, Bottom Layer, Cream Floor Tile / mastic</td>
<td>1</td>
<td>N</td>
<td>X</td>
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<td>4 93</td>
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**LAB USE ONLY**

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<th>Date/Time Received</th>
<th>TAT</th>
<th>Were samples delivered</th>
<th>in person</th>
<th>by courier</th>
<th>Were samples preserved</th>
<th>in field</th>
<th>in lab</th>
<th>N/A</th>
<th>Temp inside cooler</th>
<th>C</th>
<th>Did samples arrive intact and sealed?</th>
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<th>no</th>
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</tbody>
</table>

**Comments:**
LIMITED LEAD PAINT & HAZARDOUS MATERIALS SURVEY

at

ARMY AIR FORCE EXCHANGE SERVICES (AAFES) WRIGHT-PATTERSON AIR FORCE BASE WRIGHT AVENUE, DAYTON, OHIO 45433

Prepared for

THE JENKINS GROUP
300 PARK BOULEVARD, SUITE 250
ITASCA, IL 60143

Prepared by

Intertek-PSI
4960 Vulcan Avenue
Columbus OH 43228
Telephone (614) 876-8000

INTERTEK-PSI PROJECT NO. 06551780

June 30, 2017

Terry McCallister
Environmental Technician II

Gary Johnson
Principal Consultant
June 30, 2017

The Jenkins Group
300 Park Boulevard, Suite 250
Itasca, IL 60143

Attn:  Mr. Norman Bochenek

Re:  Pre-Renovation Limited Hazardous Materials Assessment
     Portion of Army Air Force Exchange Services (AAFES)
     Wright-Patterson Air Force Base
     Wright Avenue
     Dayton, Greene County, Ohio 45433

     Intertek-PSI Project No. 06551780

Dear Mr. Bochenek:

In accordance with our agreement dated June 8, 2017, Intertek-PSI has conducted a Limited Lead Paint & Hazardous Materials Survey at the above referenced location. Enclosed please find one electronic of the report. The survey was conducted by Intertek-PSI’s Terry McCallister on June 14, 2017.

We appreciate the opportunity to provide our services to you on this project and would be pleased to continue our role as your consultant. If we can be of further assistance to you, or if you have any questions regarding this report, please feel free to contact us at (614) 876-8000.

Sincerely,

PROFESSIONAL SERVICE INDUSTRIES, INC.

Terry McCallister  Gary Johnson
Environmental Technician II  Principal Consultant
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Appendices  
   A. XRF Analysis Field Logs  
   B. Hazardous Material Field Tally Forms  
   C. Inspector Certifications
1.0 EXECUTIVE SUMMARY

Intertek-PSI has conducted a Limited Lead Paint & Hazardous Materials Survey in a portion of the Army Air Force Exchange Services (AAFES) building located at Wright Avenue in Dayton, Ohio 45433. The surveyed spaces were limited to client-defined renovation areas at the Exchange building. The subject building is a mini mall constructed of slab-on-grade, brick and concrete. The client-defined assessment area totaled approximately ~20,000 square feet of space.

The purpose of this survey was to provide general information on the presence of client-defined suspect hazardous materials, including a visual analysis and documentation for mercury-containing equipment, PCB-containing equipment, CFC-containing equipment, fluorescent bulbs and ballasts, batteries, hydraulic oils, petroleum containers, and limited x-ray fluorescence (XRF) sampling for lead-containing paint. The requested sampling is for informational purposes only and is not intended to satisfy specific Regulatory requirements.

1.1 Limited Lead Paint Survey

According to U.S. Housing and Urban Development (HUD) Guidelines, a paint is considered to be “lead-based” if its lead concentration is 1.0 mg/cm² or 0.5% by weight or higher. The Occupational Safety & Health Administration (OSHA) regulates worker’s exposure to lead paint concentrations in any amount. Therefore, in order to satisfy OSHA requirements, worker protection and monitoring may be required for work activities that disturb paints that contain lead in any amount. In accordance with the OSHA Construction Standard for Lead (29 CFR 1926.62), it is the contractors’ responsibility to protect their workers when an employee may be occupationally exposed to lead. Fifty-five x-ray fluorescence (XRF) readings were taken from various painted surfaces as a part of this limited lead-based paint (LBP) assessment.

- Eight (8) XRF readings had detectable levels of lead. The samples indicated levels of lead below 1.0 mg/cm² (LBP) however, OSHA regulates work practices with paint that contains any amount of lead.

1.2 Limited Visual Hazardous Material Survey

The results of the visual survey for the client-defined suspect hazardous materials are summarized below. A more detailed description of the observations can be found in Section 4 of this report and a complete tally sheet can be found in the appendix titled, “Hazardous Material Field Tally Forms”. If the following materials should be removed from the structure, they should be properly removed and disposed of in accordance with applicable regulations.

- Fluorescent light tubes and ballasts
- Fluorescent light bulbs
- Exit sign back-up batteries
- Emergency lighting and fire alarm lights
- CFCs - Refrigerant & A/C Equipment

Most light tubes and ballasts appeared to be non-PCB containing however, prior to disposal, all such equipment should be further inspected to verify such. This summary does not contain all the information presented in the full report. The report should be read in its entirety to obtain a more complete understanding of the information provided and to aid in any decisions made or actions taken based on this information.

2.0 INTRODUCTION

2.1 SCOPE OF SERVICES

Limited Lead Paint Survey
Work efforts associated with the selection and testing of surfaces for the presence of LBP was to be conducted to determine the presence of lead containing paint products present in the subject spaces.

- **Step 1:** Preliminary walk-through and inspection of accessible areas to locate and document suspect areas and materials/equipment for testing.
- **Step 2:** Development and implementation of a sampling scheme for all suspect LBP.
- **Step 3:** Preparation and submission of this report, which includes:
  - a. Inspection Methodology
  - b. Table of tested painted surfaces and lead content
  - c. Recommendations

Limited Visual Hazardous Materials Survey
A visual inspection of the subject spaces was conducted by an experienced and properly trained Environmental Professional for the purpose of identifying the potential presence, location and estimated quantity of fluorescent light bulbs, metal solvents, battery back-up exit signs and emergency lighting, halon fire extinguishers, mercury switches, mercury vapor lights, polychlorinated biphenyl's (PCB) contaminated or containing light ballasts or transformers, hydraulic lifts and hazardous material containers. No samples were collected as a part of this visual survey.

2.2 AUTHORIZATION

Authorization to perform this Limited Lead Paint & Hazardous Materials Survey was given on June 8, 2017, by Mr. Norman Bochenek of The Jenkins Group referencing Intertek-PSI Proposal # 0655-212825.
2.3 PURPOSE

The purpose of this survey was to provide general information on the presence of client-defined suspect hazardous materials, including a visual analysis and documentation for mercury-containing equipment, PCB-containing equipment, CFC-containing equipment, fluorescent bulbs and ballasts, batteries, hydraulic oils, petroleum containers, and limited x-ray fluorescence (XRF) sampling for lead-containing paint. The requested sampling is for informational purposes only and is not intended to satisfy specific Regulatory requirements.

2.4 WARRANTY

The field results reported herein are considered sufficient in detail and scope to determine the presence of accessible and/or exposed lead-containing paint and general hazardous materials in the subject portion of the building. Intertek-PSI warrants that the findings contained herein have been prepared in general accordance with accepted professional practices at the time of its preparation as applied by professionals in the community. Changes in the state of the art or in applicable regulations cannot be anticipated and have not been addressed in this report. The survey and analytical methods have been used to provide the client with information regarding the presence of accessible and/or exposed lead-containing paint and general hazardous materials existing in the client-defined spaces at the time of the inspection. There is a distinct possibility that conditions may exist which could not be identified within the scope of the study or which were not apparent during the site visit. This inspection covered only those areas, which were exposed and/or physically accessible to the Inspector. The study is also limited to the information available from the client at the time it was conducted.

As directed by the client, Intertek-PSI did not provide any service to investigate or detect the presence of moisture, mold or other biological contaminates in or around any structure, or any service that was designed or intended to prevent or lower the risk of the occurrence of the amplification of the same. Client acknowledges that mold is ubiquitous to the environment with mold amplification occurring when building materials are impacted by moisture. Client further acknowledges that site conditions are outside of Intertek-PSI’s control, and that mold amplification will likely occur, or continue to occur, in the presence of moisture. As such, Intertek-PSI cannot and shall not be held responsible for the occurrence or recurrence of mold amplification.

No other warranties are implied or expressed.

3.0 METHODOLOGY

3.1 LIMITED LEAD PAINT SURVEY METHODOLOGY

Intertek-PSI’s representative, Terry McCallister performed the Limited Lead Paint survey. The survey included an initial visual inspection of interior surfaces, for the presence of paints, varnishes, glazes and stains suspected of containing lead. Based on observations, representative building components such as windows and frames, doors and frames, columns, walls, ceilings, and structural beams with homogeneous suspect paint were randomly selected for X-Ray Fluorescence (XRF) analysis.
The on-site analysis was conducted utilizing an Innov-X Inspector Series 3000 lead paint analyzer.

3.2 LIMITED VISUAL HAZARDOUS MATERIAL SURVEY METHODOLOGY

The following activities were conducted in association with this survey:

**Mercury & PCBs**
- Fluorescent light bulbs, ballasts, transformers, mercury vapor lights, and suspect mercury switches observed in the facility were documented and the quantity estimated. Ten percent (10%) of the ballasts were visually inspected for the presence of PCB labels or indicators.

**Heavy Metals**
- Battery backup exit signs and fire detectors were visually inspected for the presence of heavy metals. The locations and quantity of the heavy metals, if any, were documented.

**Halon**
- Fire extinguishing equipment, if any, was visually inspected for the presence of halon. The locations and quantity of the halon extinguishers, if any, were documented.

**CFCs**
- Refrigeration equipment (refrigerators, drinking fountains, freezers and air conditioning units), if any, were observed and documented.

**Hazardous Material Containers**
- Suspect hazardous material containers that were observed at the facility were noted.

4.0 FINDINGS

4.1 LIMITED LEAD PAINT SURVEY RESULTS

Fifty-five readings were taken from various painted surfaces as a part of this limited Lead Paint assessment.

- No lead-based paint was identified in this assessment. However, 8 samples indicated levels of lead below 1.0 mg/cm² and are regulated by OSHA.

4.2 LIMITED VISUAL HAZARDOUS MATERIAL SURVEY

The following hazardous materials were visually identified during this survey:
Visual Hazardous Material Summary

<table>
<thead>
<tr>
<th>Material Item</th>
<th>Observed</th>
<th>Estimated Quantity</th>
<th>General Location</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fluorescent Light Tubes</td>
<td>Yes</td>
<td>4010</td>
<td>Throughout</td>
<td>Good</td>
</tr>
<tr>
<td>Fluorescent Light Bulbs</td>
<td>Yes</td>
<td>24</td>
<td>Throughout</td>
<td>Good</td>
</tr>
<tr>
<td>Ballasts (PCBs)</td>
<td>Yes</td>
<td>380</td>
<td>Throughout</td>
<td>Good</td>
</tr>
<tr>
<td>Exit Sign Batteries</td>
<td>Yes</td>
<td>15</td>
<td>Throughout</td>
<td>Good</td>
</tr>
<tr>
<td>Emergency Lighting and Fire Alarm Lights</td>
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<td>24</td>
<td>Throughout</td>
<td>Good</td>
</tr>
<tr>
<td>CFCs - Refrigerant &amp; A/C Equipment</td>
<td>Yes</td>
<td>9</td>
<td>Throughout</td>
<td>Good</td>
</tr>
</tbody>
</table>

4.3 RECOMMENDATIONS

Lead Paint

Lead-based paint was not identified in the subject areas. However, detectable levels of lead were present in some of the locations sampled. OSHA regulates any amount of lead in the workplace. All painted surfaces in the defined renovation work areas must be treated as lead-containing and all work that impacts these areas should be conducted according to OSHA Regulations for lead in construction.

Hazardous Materials

Most of the fluorescent bulbs observed had green end caps. Typically, the green caps indicate bulbs that do not contain PCBs. However, fluorescent tubes or bulbs without such (or any other markings) were observed and must be assumed to be PCB-containing equipment. None of the ballasts observed had any markings or labeling identifying them as non-PCB-containing. Therefore, without further exhaustive inspection, all ballasts must be assumed to contain PCBs. During renovation all tubes, bulbs and ballasts should be visually inspected to verify such. Additionally, they must be properly disposed of in accordance with applicable State and Federal regulations.

All CFCs and refrigerants should be recaptured and recycled or disposed of according to Regulatory requirements prior to disposal of the equipment containing them. All batteries should be recycled or disposed of according to Regulatory requirements.
APPENDIX A

XRF ANALYSIS FIELD LOGS
<table>
<thead>
<tr>
<th>SAMPLE NUMBER</th>
<th>COMPONENT</th>
<th>SUBSTRATE</th>
<th>COLOR</th>
<th>ROOM</th>
<th>READING (mg/cm²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Test</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.0</td>
</tr>
<tr>
<td>+ Test</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.05</td>
</tr>
<tr>
<td>1</td>
<td>Wall</td>
<td>Drywall</td>
<td>Off White</td>
<td>Printing Office</td>
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</tr>
<tr>
<td>2</td>
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<tr>
<td>3</td>
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<td>Off White</td>
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<tr>
<td>4</td>
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<td>Printing Office</td>
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<tr>
<td>5</td>
<td>Door</td>
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<td>Printing Office</td>
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<tr>
<td>6</td>
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<td>Front Entrance</td>
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<td>7</td>
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<td>Black</td>
<td>Front Entrance</td>
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</tr>
<tr>
<td>8</td>
<td>Pillar</td>
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<td>9</td>
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<td>10</td>
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<td>Wood</td>
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<td>GNC</td>
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</tr>
<tr>
<td>11</td>
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<td>Light Grey</td>
<td>Vision Center</td>
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<tr>
<td>13</td>
<td>Wall</td>
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<td>Multi</td>
<td>Vision Center</td>
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<td>14</td>
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<td>15</td>
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<td>16</td>
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<td>Yellow</td>
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<td>17</td>
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<td>Yellow</td>
<td>Barber Shop</td>
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<td>18</td>
<td>Wall</td>
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<td>White</td>
<td>Barber Shop</td>
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<td>19</td>
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<td>Beauty Salon</td>
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<td>20</td>
<td>Cabinet Door</td>
<td>Wood</td>
<td>White</td>
<td>Beauty Salon</td>
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<td>21</td>
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<td>Color 1</td>
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<td>Color 2</td>
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<tr>
<td>---</td>
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<td>--------</td>
<td>------------</td>
<td>--------</td>
<td>-------------------</td>
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<td>31</td>
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<td>34</td>
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<td>35</td>
<td>Wall</td>
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<td>Offices/Hallway</td>
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<td>36</td>
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<td>Gloss White</td>
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<td>37</td>
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<td>Grey</td>
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<td>38</td>
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<td>Men’s Restroom/Offices</td>
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<td>Off White</td>
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<td>Grey</td>
<td>Custodial Room</td>
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<td>Green</td>
<td>Women’s Locker Room</td>
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<td>46</td>
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<td>Off White</td>
<td>Women’s Locker Room</td>
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<tr>
<td>47</td>
<td>Wall</td>
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<td>White/Brown</td>
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<td>Supervisor Office</td>
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<td>49</td>
<td>Wall</td>
<td>Drywall</td>
<td>White</td>
<td>Office Hallway</td>
<td>0.25</td>
</tr>
<tr>
<td>50</td>
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<td>Metal</td>
<td>Brown</td>
<td>Offices</td>
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</tr>
<tr>
<td>51</td>
<td>Wall</td>
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<td>White</td>
<td>Offices</td>
<td>0.0</td>
</tr>
<tr>
<td>52</td>
<td>Wall</td>
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<td>White</td>
<td>X Exchange Store</td>
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</tr>
<tr>
<td>53</td>
<td>Wall</td>
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<td>Grey</td>
<td>X Exchange Store</td>
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<tr>
<td>54</td>
<td>Wall</td>
<td>Wood</td>
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<td>X Exchange Store</td>
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<td>55</td>
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<td>Plastic</td>
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<td>Front Entrance</td>
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</tbody>
</table>

- Test 0.0
+ Test 1.07
APPENDIX B

HAZARDOUS MATERIAL FIELD TALLY FORMS
### Hazardous and Universal Waste Inventory

**PSI Job Name:** Wright Patterson AFB Limited HAZMAT  
**PSI Job Number:** 06551780  
**Building/Floor:** Army Air Force Exchange Services (AAFES), Wright Avenue, Dayton, Ohio  
**Date:** June 14, 2017  
**Area/Room #s:** Admin Offices, Main Sales, GNC, Optical Shop, Barber Shop, Beauty Shop, Gift Shop  
**Insp. Name:** Terry McCallister

<table>
<thead>
<tr>
<th>Item</th>
<th>Description/ Location</th>
<th>Cond.</th>
<th>Tally</th>
<th>Est. Total</th>
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</thead>
<tbody>
<tr>
<td>Fluorescent Light Tubes</td>
<td>See Below</td>
<td>Good</td>
<td>4010</td>
<td>4010</td>
</tr>
<tr>
<td>Fluorescent Light Bulbs</td>
<td>Admin Offices, Main Sales, GNC, Optical Shop, Barber Shop, Beauty Shop</td>
<td>Good</td>
<td>24</td>
<td>24</td>
</tr>
<tr>
<td>Mercury Switches and Thermostats</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mercury Vapor Lights</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fluorescent Light Ballasts (PCBs)²</td>
<td>Admin Offices, Main Sales, GNC, Optical Shop, Barber Shop, Beauty Shop, Gift Shop</td>
<td>Good</td>
<td>380</td>
<td>380</td>
</tr>
<tr>
<td>&quot;Wet&quot; Transformers, capacitors, etc. (PCBs)²</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hydraulic Lifts &amp; Elevators (PCBs)²</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Metals/Solvents</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exit Sign Batteries</td>
<td>Admin Offices, Main Sales, GNC, Optical Shop, Barber Shop, Beauty Shop, Gift Shop</td>
<td>Good</td>
<td>15</td>
<td>15</td>
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<tr>
<td>Emergency Lighting and Fire Alarm (lights)</td>
<td>Admin Offices, Main Sales, GNC, Optical Shop, Barber Shop, Beauty Shop, Gift Shop</td>
<td>Good</td>
<td>24</td>
<td>24</td>
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<tr>
<td>Automotive Batteries</td>
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<tr>
<td>Paint – Five Gallon</td>
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<tr>
<td>Paint – Gallons</td>
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<td></td>
</tr>
<tr>
<td>Freon - Refrigerant &amp; A/C Equipment</td>
<td>Admin Offices, Main Sales, Optical Shop, Beauty Shop</td>
<td>Good</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>Fire Extinguishers (Halon)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>≤ 1 gal.</td>
<td>&gt; 1 gal.</td>
<td>≤ 1 gal.</td>
<td>&gt; 1 gal.</td>
</tr>
<tr>
<td>--------------------------</td>
<td>----------</td>
<td>----------</td>
<td>----------</td>
<td>----------</td>
</tr>
<tr>
<td>Pesticides/ Herbicides</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤ 1 gal.</td>
<td>–</td>
<td></td>
<td>–</td>
<td></td>
</tr>
<tr>
<td>&gt; 1 gal.</td>
<td></td>
<td>–</td>
<td>–</td>
<td></td>
</tr>
<tr>
<td>Flammable Materials</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤ 1 gal.</td>
<td>–</td>
<td></td>
<td>–</td>
<td></td>
</tr>
<tr>
<td>&gt; 1 gal.</td>
<td></td>
<td>–</td>
<td>–</td>
<td></td>
</tr>
<tr>
<td>Hazardous Materials</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Containers (other)</td>
<td>–</td>
<td></td>
<td>–</td>
<td></td>
</tr>
</tbody>
</table>

Notes: The fluorescent light tubes being used throughout the building appear to be non-PCB. However, during renovation, all bulbs should be checked for PCBs or assumed to contain PCBs and recycled or disposed of according to Regulatory requirements. None of the observed ballasts were labeled non-PCB. During renovation, all ballasts should be considered PCB-containing unless marked otherwise and recycled or disposed of according to Regulatory requirements.
APPENDIX C

INSPECTOR’S CERTIFICATIONS
State of Ohio
Department of Health
Lead Program

Lead Risk Assessor

License Number
LA9344

Expiration Date
09/25/2017

Terry D McCallister
Westech Environmental Solutions
7601 Cheviot Rd
Cincinnati OH 45247

Card not valid if altered

This certification is issued pursuant to Chapter 3742 of the Revised Code and 3781-22 of the Ohio Administrative Code.
PART 1 GENERAL

1.1 WORK INCLUDED

A. Protection of land resources
B. Protection of natural water resources (drinking, groundwater & surface)
C. Prevention of air pollution
D. Disposal of solid waste and recycling
E. Management of hazardous materials (HAZMATs)
F. Management of hazardous waste (HW)
G. Green Procurement of recycled and biobased content products
H. Aboveground and underground storage tanks (ASTs and USTs)
I. Cultural Resources - Inadvertent Discoveries
J. Natural Resources
K. Environmental Management Systems (EMS)

1.2 RELATED WORK

A. Nothing in this Specification Section shall relieve the contractor of any other environmental protection requirement specified in federal, state or local laws and regulations.

B. Other specification sections may cite environmental protection requirements in addition to those specified herein. This may include specification of requirements for asbestos abatement, removal of paint containing lead, removal of items containing polychlorinated biphenyl (PCB) compounds, removal of lamps containing mercury, Ozone Depleting Substance (ODS) Recovery, removal of USTs, and other requirements.

1.3 APPLICABLE PUBLICATIONS

A. U. S. Environmental Protection Agency (EPA) Publications.

2. **Title III List of Lists:** Consolidated List of Chemicals Subject to the Emergency Planning and Community Right-to-Know Act (EPCRA) and Section 112(r) of the Clean Air Act, as Amended http://www2.epa.gov/epcra/consolidated-list-lists

B. **U. S. Occupational Safety and Health Administration (OSHA) Publications**

1. Title 29 of the Code of Federal Regulations (29 CFR)

C. **U. S. Department of Transportation (DOT) Publications.**

1. Title 49 of the Code of Federal Regulations (49 CFR), Section 172.101, HAZMAT Table
http://www.ecfr.gov/cgi-bin/text-idx?SID=1849aac5ee1071de88fe1ba1fbb2c6f&node=pt49.2.172&rgn=div5#se49.2.172_1101

D. **Wright-Patterson Air Force Base (WPAFB), Environmental Branch, 88 CEG/CEIE, Publications**

3. Integrated Pollution Prevention, Green Procurement and Solid Waste Management Plan.

E. **State of Ohio Publications.**

1. Ohio Administrative Code (OAC), Chapter 3745, EPA.
2. OAC, 1301:7-7-28 and 1301:7-9-01 through -17, Ohio Division of State Fire Marshal, Bureau of Underground Storage Tank Regulations.

1.4 **SUBMITTALS**

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

**SD-01 Preconstruction Submittals**

Contractor's Environmental Coordinator; G
See part 3.1, Contractor's Environmental Coordinator, paragraph B.

Environmental Restoration Site Disturbance; G
See part 3.3, Protection of Land Resources, paragraph A; the "Application for Authorization" will take a minimum of 45 days to process.

Erosion Control Plan; G
See part 3.4, Protection of Water Resources, paragraph B.

Storm Water Pollution Prevention Plan; G
See part 3.4, Protection of Water Resources, paragraph C.

Notice of Intent (NOI); G
See part 3.4, Protection of Water Resources, paragraph C.
Sanitary or Wastewater Permit to Install (PTI); G
See part 3.4, Protection of Water Resources, paragraph D.

Plans Approval; G
See part 3.4, Protection of Water Resources, paragraph F.

Ohio EPA "Notification of Demolition and Renovation"; G
See part 3.5, Prevention of Air Pollution, paragraph A.

Fuel Storage Tank Permit to Install; G
See part 3.5, Prevention of Air Pollution, paragraph E.

Certificate of Conformity; G
See part 3.5, Prevention of Air Pollution, paragraph G.

Boiler Startup Information; G
See part 3.5, Prevention of Air Pollution, paragraph I.

Site Specific Spill Plan (SSSP); G
See part 3.8, Spill Prevention, Control, and Reporting, paragraph A. A summary of the types of HAZMATs planned to be used and stored on base shall be submitted with the SSSP in accordance with part 3.9, HAZMAT Management, paragraph B.

HW Storage Permit (WPAFB Form 1433); G
See part 3.10, HW Management, paragraph B.

Resource Conservation and Recovery Act (RCRA) Training Certificate; G
See part 3.10, HW Management paragraph B.

Permit Applications for UST work; G
See part 3.12, paragraph M.

Radioactive Source Authorization Request; G
See part 3.13, Radiation Safety, paragraphs A and B.

Storage Compensation Agreement; G
See part 3.15, Natural Resources, paragraph B.2.

SD-06 Test Reports

Recycling and Solid Waste Summary Report; G
See part 3.7, Solid Waste and Recycling, paragraph D. The quarterly summary reports shall be received on April 7, July 7, October 7, and January 7 covering the three months prior.

SD-11 Closeout Submittals

Notice of Termination (NOT); G
See part 3.4, Protection of Water Resources, paragraph C.

Green Products Determination Form (GPDF); G
See part 3.11, Green Procurement, paragraph C.

1.5 DEFINITIONS

A. Green Procurement: The purchase of environmentally preferable products and services in accordance with the Federally-mandated green procurement program (GPP) elements; Recovered Materials, Energy and Water Efficient Products, Alternative Fuels and Fuel Efficiency, Biobased Products, Non-Ozone Depleting Substances, Priority Chemicals, and Environmentally Preferable Products.

B. HAZMAT: For the purposes of this document, the term HAZMAT includes all items (including medical supply items with the exception of drugs in their finished form and pharmaceuticals in individually issued items) covered under the EPCRA reporting requirement, The OSHA Hazard Communication (HAZCOM) Standard, and all Class I and Class II ODSs.

C. HW: Wastes which are listed by chemical name in 40 CFR 261 Subpart D, and/or exhibit one or more of the characteristics described in 40 CFR 261 Subpart C.

D. Initial Accumulation Point (IAP): A permitted HW collection point at or near an area where HW is generated and under the control of the operator of the process that generates the waste.

E. Issue Point: A centralized location where HAZMAT is received, stored, transferred and issued.

F. Manifest or Uniform HW Manifest: EPA form 8700-22 and, if necessary, EPA form 8700-22A, originated and signed by the generator in accordance with the instructions included in the appendix to 40 CFR Part 262.

G. Material Safety Data Sheet (MSDS): A summary of safety, health, and emergency response information about a manufactured product obtained from the product manufacturer or distributor. The MSDS includes information about the chemical constituents, their hazards, and personal protective equipment to be used. Global Harmonization of Hazard Communication Standards (HCS) is standardizing the MSDSs to 16 standard fields and will be renaming MSDSs to Safety Data Sheets (SDSs) on 1 June 2015. For the purposes of Hazard Communication in regards to this section MSDSs and SDSs can be used at your worksite as both will convey the same information. The rest of WPAFB Specification Section 01 02 20 will continue to refer to these informational documents as MSDSs.

H. Special Waste: A waste as defined by 40 CFR Part 240.101 (Z) is: A non-hazardous solid waste requiring handling other than that normally used for municipal solid waste.


1.6 BASE ENVIRONMENTAL AUTHORITY

A. Environmental Branch of Base Civil Engineering (BCE), office symbol 88 CEG/CEIE, establishes environmental compliance policy, administers environmental programs, and coordinates environment protection requirements for WPAFB. 88 CEG/CEIE consists of the Compliance Section, 88 CEG/CEIEC, and the Environmental Assets Section, 88 CEG/CEIEA. 88 CEG/CEIE is the designated environmental
PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 CONTRACTOR’S ENVIRONMENTAL COORDINATOR

A. The contractor shall designate one individual from his organization to serve as an environmental coordinator and a second individual to serve as an alternate for the environmental coordinator. Within 15 days after receipt of Notice to Proceed (NTP) the contractor shall submit the names and telephone numbers of the designated environmental coordinator and alternate to the contract administrator. The phone numbers shall include both the usual business telephone number and a 24-hour emergency telephone number where the individual can be reached at any time for an environmental emergency.

B. The contractor's environmental coordinator shall serve as a single, integrated point of contact to the contractor's organization for all environmental questions and requirements. This individual shall be responsible for providing the contractor's response to all environmental requirements and shall be authorized to direct the contractor's organization to respond to environment requirements.

C. For all contracts that have a performance period of 180 days or longer, the contractor's environmental coordinator and alternate shall attend the Installation RCRA Training course within 90-days after contract award. This course is a one-day, eight-hour course that explains procedures and requirements for the management of HAZMATs and HW at WPAFB. Contact 88 CEG/CEIE at 937-257-7516 to obtain the schedule of classes and to enroll. This course is not a replacement or substitute for any other training requirement specified by applicable laws or regulations. The contractor shall comply with all other applicable training requirements in addition to this requirement.

3.2 GENERAL REQUIREMENTS

A. Unless otherwise stated, the contractor shall obtain all necessary environmental permits and licenses. The contractor shall be responsible for payment of all permit fees. The contractor shall comply with all terms and conditions of permits.

B. The contractor is responsible for having a competent person on-site who is capable of identifying existing asbestos hazards in the workplace as specified in 29 CFR 1926.32(f). If the contractor encounters suspected asbestos containing materials not covered by the drawings or specifications, the contractor shall immediately notify the contracting officer. Any material that is suspected of containing asbestos shall not be disturbed until the contracting officer has determined the content of the material and the proper handling procedures, if required. All asbestos operations shall be accomplished in accordance with WPAFB Master Section 02 08 10 REMOVAL AND DISPOSAL OF ASBESTOS CONTAINING MATERIALS (WPAFB).

C. The contractor shall maintain all equipment, facilities and structures used for pollution control under this contract. All of these items shall be maintained in good working condition for as long as they are needed to control pollution.

3.3 PROTECTION OF LAND RESOURCES

A. The contractor shall confine all activities to areas designated by the contract drawings and specifications. Past Waste Sites: Contractor
shall be sure areas of work do not interfere with Installation Restoration Sites. These Sites are located on the Installation Development Plan (IDP), the Land Use Control Plan (2012), and the Civil Engineering Geographical Information System (GIS). Prior to the beginning of any exterior construction work the contractor shall identify the land resources to be preserved within the work area. Except in areas indicated on the drawings or specified to be cleared, the contractor shall not remove, drill, cut, deface, injure, or destroy land resources including trees, shrubs, vines, grasses, topsoil, and land forms without permission. No work shall be completed within 300 feet of a boundary of a Landfill, Earthfill, or Waste Burial Site unless an Application for Authorization (of construction activities) is requested through AFCEC/CZO, in accordance with OAC 3745-27-13(F). Any person proposing to obtain authorization shall contact this office a minimum of forty-five days prior to beginning filling, grading, excavating, building, drilling, or mining activities, identifying information necessary to make a determination that the activity will be performed in such a manner that will comply with the requirements of Chapter 3734 of the Ohio Revised Code, will not create a nuisance, and is unlikely to adversely affect the public safety or health or the environment. No ropes, cables, or guys shall be fastened to or attached to any trees for anchorage unless specifically authorized. Stone, earth or other material displaced into un-cleared areas shall be removed and the area restored. Contact the AFCEC/CZO Installation Restoration Program at 937-257-2201 for further information.

B. All disturbed soil areas that previously supported vegetation, regardless of the type of vegetation, shall be restored. If the area is to be seeded (not sodded), it shall consist of perennial species (not annual) and the work shall be started and completed during the time of year when seed would likely germinate which is spring (March through mid-May) or fall (September through mid-October). If seeding cannot be accomplished during these times, then a temporary cover (which could be a temporary cover crop such as rye or a mulch) shall be placed on the disturbed area to prevent erosion in the interim. Seeding and all necessary preparation of the site (cultivation) to make it conducive for seed germination shall be accomplished as soon as possible during the next acceptable time period.

3.4 PROTECTION OF WATER RESOURCES

A. The contractor shall not pollute streams, lakes, or rivers with chemicals, petroleum products, construction wastes, sewage, or other harmful materials. Controls shall be provided as may be necessary to prevent the discharge of any such pollutant into any body of water. Spill containment for all tanks and drums containing petroleum products brought onto base shall be provided. All work under this contract shall be performed in such a manner that objectionable conditions shall not be created in any bodies of water or storm drainage structures that run through or adjacent to the project areas.

B. Before any soil disturbing activity of less than 1 acre, the contractor shall submit an Erosion Control Plan through the contract administrator to 88 CEG/CEIE, Water Quality Program Manager (WQPM) for review and approval. The Erosion Control Plan shall show the contractor's scheme for controlling erosion at the job site, including a site plan showing the area(s) to be disturbed and the placement of erosion control structures. The plan shall state the total acreage of soils to be exposed, including soil stockpiles, and shall include adequate measures to:

1. Reduce by the greatest extent practicable the area and duration of exposure of bare soils.

2. Protect readily erodible soils by use of temporary vegetation, or seeding and mulch, or by accelerating the establishment of permanent vegetation.

3. Retard the rate of runoff from construction site.

4. Trap sediment resulting from construction using silt fences, straw bale structures, other inlet protection, and/or sediment ponds. This
includes pump discharges resulting from dewatering operations. Construction/installation details shall be included for sediment control structures.

5. Provide a schedule for inspection and maintenance of all erosion control measures including any time periods where construction operations are suspended for any reason.

C. Any construction activity that will disturb 1 acre or more of land requires National Pollution Discharge Elimination System (NPDES) Construction General Permit coverage by means of a NOI issued by Ohio EPA. The NOI shall be submitted to 88 CEG/CEIE office for preliminary review and approval. Once approved by CEIE, the contractor is responsible for submitting the NOI directly to Ohio EPA. Contact the 88 CEG/CEIE WQPM to obtain information on how to prepare the NOI package.

1. The construction contractor shall be responsible for ensuring the following documents are prepared, submitted, and approved (anticipate 30 days for regulatory review and approval) prior to breaking ground.

   a. Prepare a Storm Water Pollution Prevention Plan IAW the NPDES permit (2 copies - 1 to be maintained on-site and 1 submitted to 88 CEG/CEIE WQPM for review and approval) (Guidance Document - available upon request)

   b. Prepare a NOI

      i. NOI Application Form: An application form shall be completed in accordance with Ohio EPA instructions.

      ii. Permit Application Fee: Fee is based on acreage disturbed. Reference Ohio EPA website for details (http://www.epa.ohio.gov/dsw/storm/stormform.aspx).

2. At the conclusion of all earth disturbing activity, the construction contractor is responsible for submitting the Notice of Termination (NOT) to Ohio EPA within 45 days of reaching final stabilization. This action terminates Ohio EPA permit coverage, but does not signify Government concurrence or acceptance of all contractual obligations.

3. The items identified in section 3.4 (C) 1 and 2 of this specification are prepared by the contractor performing the project and submitted through the contract administrator to 88 CEG/CEIE WQPM. The contractor shall be the permittee and maintain the responsibilities as outlined in the NPDES Construction General Permit throughout the duration of the project.

D. D. All Construction sites are subject to inspection by WPAFB personnel to ensure all erosion control measures are adequately installed and maintained.

E. Sanitary or Wastewater Permits: A PTI is required under the OAC 3745-42, when a sanitary line is modified or a new one is installed. A PTI application is available online through the Ohio EPA (http://www.epa.state.oh.us/dsw/pti/SanitarySewerExtensions.aspx). The PTI application includes information about the project's scope and includes the following:

1. Three copies of PTI Form A and corresponding Form B
2. Five copies of the Project Detailed Plan
3. Three copies of the Project Specifications
4. Three copies of the Anti-degradation Permit application (if required)
5. Project fee
The items in section 3.4 (D) 1 through 5 of this specification are prepared by the contractor performing the project and submitted directly to the 88 CEG/CEIE WQPM. The Ohio EPA is authorized by regulation to take up to six months to review. The submitter shall be aware of this and plan for this delay when preparing their package. Further delays in review can be prevented if the submitter provides attention to detail; therefore, preplanning is extremely important.

F. Source Water Protection: The contractor shall utilize best management practices to ensure proper storage, handling, use and/or production of regulated substances to prevent their introduction into the ground water aquifer. Particular care shall be exercised on projects which lie within WPAFB's and the City of Dayton's source water protection areas five-year capture zones. The exact locations of the five-year capture zones can be obtained from 88 CEG/CEIE WQPM.

G. Drinking Water Plans Approval: The OAC 3745-91 requires that anyone making modifications to drinking water systems including tapping into or rerouting an existing water main shall submit a Plans Approval package consisting of the following information:

1. Four sets of construction drawings (certified by a P.E.)
2. Two sets of specifications
3. Two copies of the Ohio EPA Water Supply Data Sheet (online)
4. Two copies of the Project Summary Sheet
5. Two copies of the Project Summary Letter
6. Fee Payment

The items in section 3.4 (F) 1 through 6 of this specification are prepared by the contractor performing the project and submitted through the contract administrator to 88 CEG/CEIE WQPM for forwarding to the Ohio EPA. Plans approval packages may take up to thirty days for regulatory review. Submitters are advised to plan their submittal accordingly.

New water mains shall require an appropriate backflow prevention device (Fire or potable). Refer to WPAFB Master Section 22 00 01, BACKFLOW PREVENTION DEVICES (WPAFB) and OAC 3745-95 for details.

Filling of portable water system (such as water buffalos) for use of potable water. The contractor shall contact 88 CES/CEOIU Water Department, 937-257-1928 for chlorine disinfection and 88 AMDS/SGPB (Bioenvironmental) to take a bacteriological sample, 255-6815 before human consumption. There are two water fill stations at WPAFB, one in Area A and one in Area B. NOTE: Do not connect to a water fire hydrant without permission from the fire department and BCE water shop. If permission is granted, a backflow device shall be used.

3.5 PREVENTION OF AIR POLLUTION

A. The contractor is responsible for accomplishing the required asbestos surveys and filing an "Ohio Environmental Protection Agency Notification of Demolition and Renovation" with the Regional Air Pollution Control Agency (RAPCA) at least 10 working days prior to demolishing any structures or any load-bearing components within structures. A copy of the notification shall be submitted in accordance with WPAFB Master Section 02 08 10 or 02 08 50 as may be applicable, REMOVAL AND DISPOSAL OF ASBESTOS CONTAINING MATERIALS (WPAFB), through the contract administrator to the 88 CEG/CEIE Asbestos Program Manager (APM).

B. The contractor shall not provide any comfort cooling, refrigeration units, or chillers of any kind which contain a Class I or Class II (i.e. HCFC-22, HCFC-142b, HCFC-123) ODS.
C. The contractor shall not cause or permit any fugitive dust that violates the opacity limits of OAC 3745-17-07 or 20% opacity as a three-minute average. Reasonably available control measures shall be used to prevent fugitive dust from becoming airborne. Such measures shall include, but not be limited to, one or more of the following:

1. Use of water or other suitable dust suppression chemicals for demolition and construction operations and the clearing of land. If water is used, it shall be reapplied at frequent intervals to keep all parts of the disturbed area at least damp at all times.

2. Use of adequate containment methods during sandblasting or other similar operations.

3. The periodic application of water or other suitable dust suppression chemicals or the use of canvas or other covering for all materials stockpiles, except temporary stockpiles on-site for 30 days or less.

4. Covering at all times of open-bodied vehicles when transporting materials likely to become airborne.

5. Prompt removal, in such a manner as to minimize re-suspension, of earth or other material from paved streets onto which earth or other materials has been deposited by trucking or earth moving equipment or erosion by water or other means.

D. No open burning of any construction waste and/or unsalvageable materials shall be allowed.

E. Recovery of ODSs shall be performed in accordance with WPAFB Master Section 02 09 10, OZONE DEPLETING SUBSTANCE RECOVERY (WPAFB).

F. If the contractor chooses to bring a tank on base for refueling of company vehicles, the contractor shall keep a log of the fuel throughput for this tank, whether it is gasoline or diesel. The contractor shall also notify 88 CEG/CEIE Air Quality Program Manager (AQPM) at 937-257-5536 if they are bringing such a tank on base. If it is expected that more than 6,000 gallons of gasoline will be dispensed in any calendar year, the contractor shall obtain a permit to install from the Ohio EPA for this operation via notification of 88 CEG/CEIE AQPM. At the conclusion of the contract, the contractor shall provide a copy of their throughput logs to 88 CEG/CEIE AQPM.

G. The contractor shall only install Emergency Generators and any other stationary combustion engines that meet the application emissions standards and fuel requirements as outlined in 40 CFR 60, Subpart IIII (compression ignition) or Subpart JJJJ (spark ignition). With each stationary engine the contractor shall provide the manufacturer's "Certificate of Conformity" (40 CFR 89) for that engine to the 88 CEG/CEIEA Government Contract Representative Air Quality PM.

H. At the start of any project requiring Boiler installation or replacement the contractor shall verify with the Air Quality PM that all required Permits have been obtained.

I. The WPAFB Air Quality PM is required to send an initial notification to OEPA and USEPA 15 days after startup or initial boiler light-up. Therefore 15 days prior to boiler installation the contractor shall submit the following Boiler Information to 88 CEG/CEIE Government Contract Representative Air Quality PM;

a. Facility Number/Location
b. Heat Input Rating
c. Manufacturer Name and Model  
d. Fuel Type  
e. Steam or Hot Water  
f. Estimated Light-Off Date (date the burner will be lit for the first time)

3.6 CONTROL OF PCB COMPOUNDS

A. All work involving the handling of PCBs shall be performed in strict conformance to the requirements of the U.S. EPA.

B. No work shall be performed on or near transformers containing over one gallon of PCB type oil without daily clearance. The daily clearance shall be obtained as directed by the contracting officer. Servicing of PCB transformers that require the removal of the transformer coil from the transformer casing is prohibited. When rebuilding or servicing PCB transformers, dielectric fluids containing less than 2 parts per million of PCBs shall be used. PCBs removed in servicing or rebuilding shall be captured and disposed of in accordance with 40 CFR 761.70 or 761.75.

C. Work involving the removal and handling of PCB containing lamp ballasts shall be conducted in accordance with WPAFB Master Section 02 08 33, REMOVAL OF POLYCHLORINATED BIPHENYL FLUORESCENT LIGHT BALLASTS (WPAFB).

D. Work involving the cleanup of low or high level "old" PCB spills shall comply with WPAFB Master Section 02 08 40, PCB SPILL CLEANUP AND SITE RESTORATION (WPAFB) in addition to all applicable sections of 40 CFR Part 761.

3.7 SOLID WASTE AND RECYCLING

A. Litter shall be controlled and containerized at all times. Care shall be exercised to insure that no litter is lost from any vehicle while in transit to or from the construction site.

B. All waste materials generated by this work shall be disposed of, by the contractor, outside the limits of WPAFB, except as noted in 3.7.C. below, and in strict conformance with all applicable laws and regulations.

C. The contractor shall generate the least amount of solid waste as possible, maximize pollution prevention processes, and maximize landfill diversion efforts through source reduction, reuse of materials, and recycling. The contractor shall divert at least 60% of the construction and demolition waste coming from the construction site IAW DoD Strategic Sustainability Performance Plan. In cases where 60% is unfeasible, the contractor shall provide written explanation as to why this amount could not be diverted. The contractor shall recycle as many construction and demolition waste types as is practical, including piping, fittings, conduit, electrical wire, cast iron, other metals, and cardboard. The contractor shall participate in the Qualified Recycling Program (QRP) for recyclable wastes generated on the installation.

1. Recyclable metals, to include scrap communication wire; electrical wire; brass; copper; aluminum; and steel shall be recycled through the Wright-Patterson AFB Recycling Center. Metal shall be cut in lengths that will fit in a 30 yard container.

2. Recyclable cardboard shall be recycled through the Wright-Patterson AFB Recycling Center.
3. Cellulose ceiling tiles may be eligible for recycling. If the contractor chooses to recycle ceiling tiles, it shall be determined that no friable asbestos is above or has fallen on the tiles. Analytical results used to make this determination shall be forwarded to 88 CEG/CEIE for review. Any ceiling tiles with friable asbestos material above them are not eligible for recycling. The ceiling tiles shall be kept dry, free of mold and adhesive and palletized per 88 CEG/CEIE instructions. If ceiling tiles become wet or have mold and adhesive, they will not be eligible for recycling. Ceiling tiles shall be palletized 4ft x 4ft and 6ft tall in stacks straight as possible. 88 CEG/CEIE can provide the pallet and shrink wrap if available. A walk-thru of the project site shall be performed by 88 CEG/CEIE personnel prior to beginning the recycling process. All picks up must be scheduled at least one week in advance if the contractor chooses to recycle ceiling tiles through 88 CEG/CEIE.

4. Other recyclable materials that are cost effectively segregated from demolition debris and/or collected during the construction/demolition project shall be turned into the Wright-Patterson AFB Recycling Center. Contact the Government Contract Representative to confirm what materials are recyclable and to coordinate turn-in.

5. Contractor shall be responsible for on-site storage of recycled material as well as transportation of materials to the WPAFB recycling center.

   *Note: All recyclables shall be delivered with minimal amounts of nonrecyclables. Metal products can be co-mingled. Drinking containers such as aluminum, plastic, and glass can be co-mingled. Paper and cardboard must be in standalone containers each by themselves. The contractor shall provide their project number, contract number, and building number to the recycling Program Manager at the time of or before their first recycling drop-off. All trucks carrying recyclables shall be weighed in at Building 293 in Area A on the recycling center scales full and then empty. If recycling center scales are inoperable, the contractor shall use Defense Logistics Agency (DLA) scales located at Building 741 in Area B. The contractor will get a weight ticket so that the weights of recyclables can be included by the contractor on their quarterly diversion report. The recycling center is open M-F 0700 to 1530 and closed on holidays and some other predetermined worker training days. Call 937-257-4889 to ensure the recycling center is open for business.

D. The contractor shall submit the WPAFB Diversion Report quarterly through the contract administrator to 88 CEG/CEN for every quarter during the project duration regardless of the amount being diverted. The report shall include: (1) the cost to recycle and the tonnage of construction and demolition materials recycled, (2) the cost to divert/reuse the tonnage of construction and demolition materials diverted/reused, (3) the cost to mulch and the tonnage and cost of construction and demolition materials mulched, (4) the cost for waste-to-energy and the tonnage of construction and demolition materials converted from waste-to-energy, (5) the cost to landfill and the tonnage of construction and demolition materials land-filled (6) the cost to incinerate and the tonnage of construction and demolition materials incinerated, and (7) explanation of the diversion rate if less than 50%. The quarterly summary reports shall be on the WPAFB Diversion Form and received on April 7, July 7, October 7, and January 7 covering ONLY the three months prior. This form is supplied during Pre-Construction meetings or can be provided by 88 CEG/CEN.

E. The contractor shall manage all solid wastes and all special wastes in strict conformance with all applicable environmental laws, policies, regulations and procedures.

3.8 SPILL PREVENTION, CONTROL, AND REPORTING

A. Spill prevention is the responsibility of the contractor. The contractor shall develop a SSSP for each storage location where HAZMAT, including oil and other types of petroleum products, or HW are
stored along with a list of types of HAZMATs (paint, adhesives, acids, fuel etc.) that will be used at the project site. A copy of the short-term contractor SSSP standard format can be obtained by contacting 88 CEG/CEIE at 937-257-7152. Each SSSP shall be submitted through the contract administrator to 88 CEG/CEIE for review and approval prior to bringing any HAZMAT onto WPAFB. The approved SSSP documents shall be posted at the HAZMAT/HW and petroleum storage locations along with the HAZMAT inventory.

B. All contractor personnel shall be familiar with the SSSP including what actions to take in the event of a spill, required notifications to be made, and where the contractor’s spill containment and cleanup equipment and materials are kept.

C. The contractor shall report all spills that occur in performing the work of the contract regardless of who is responsible for the spill. The spills shall be reported as follows, with the report made immediately following awareness of the spill and any emergency containment procedures:

1. Fuel and Oil Spills: Report all spills of more than one gallon of material. Report all spills of any size if the material enters a sewer or drain. Report all spills of any size that create a fire hazard. Report these spills to the Base Fire Department by calling 911 (937-257-9111 from a cell phone or off base line) or Fire Dispatch at 937-257-3033 and also notify the government's project inspector.

2. Spills of Hazardous Chemicals: Report all spills of any size to the Base Fire Department by calling 911 (937-257-9111 from a cell phone or off base line) or Fire Dispatch at 937-257-3033 and also notify the government's project inspector.

3. Spills of Other Materials (such as paint, tar, etc.): Report all spills that enter sewers or drains or that have the potential to damage or pollute the environment. Report these spills to the base Fire Department dialing 911 (937-257-9111 from a cell phone or off base line) using a base telephone or by calling 937-257-3033 and notify the government's project inspector also. After duty hours report these to the Base Fire Department by calling 911 or Fire Dispatch at 937-257-3033.

D. The contractor shall be responsible for containment of all spills. The contractor is responsible for maintaining spill containment and cleanup equipment and materials on-site that are appropriate for the materials being stored and in sufficient quantities to provide containment for the volume of material used and stored. However, if assistance is needed for containment or safety, the contractor shall immediately notify the Base Fire Department at 911 (937-257-9111 from a cell phone or off base line) or Fire Dispatch at 937-257-3033. 88 CEG/CEIE shall determine the amount of cleanup required. The contractor shall clean up all spills that result from the contractor's actions or activities, including faulty equipment. The cleanup methods shall be as required by or acceptable to the contracting officer or the contracting officer's technical representative. The contractor shall reimburse the Government for all materials and assistance provided by the Government and used in containment or cleanup of those spills resulting from the contractor's actions.

3.9 HAZARDOUS MATERIALS MANAGEMENT

A. Based on WPAFB information collection and reporting requirements, contractors are divided into two categories for reporting and managing HAZMATs: exempt and non-exempt. The following are considered "Exempt" Contractors:

1. Construction - contractors who perform major construction projects such as building and repairing roads, walkways, buildings, and installation of major process equipment;
2. Facility Maintenance - contractors who maintain base HVAC equipment, process equipment (e.g., cleaning oil water separators) or perform minor building maintenance functions;
3. Janitorial - contractors used to clean base office spaces and restrooms;
4. Laboratory Support - contractors supporting Laboratory Research and Development work needed to support Department of Defense activities (e.g., Air Force Research Laboratories);
5. Vehicle Maintenance - contractors used to maintain base vehicles (e.g., cars, small trucks, emergency vehicles, heavy construction equipment); and
6. Food Service - contractors who operate base restaurants, cafeterias and lunch rooms.

B. Exempt Contractor Specific Requirements: Contractors listed as exempt in paragraph A. of this section shall meet the following requirements.

1. Notification and Documentation: Contractor shall submit a list of the types of HAZMATs (paints, adhesives, fuel) that will be used at the project site to 88 CEG/CEIE along with the SSSP developed for the project site as required in Section 3.8, A of this document. An updated HAZMAT inventory shall be posted at the site along with the SSSP at all times. An MSDS/SDS (5 years old or less or appropriate to the age of the material) for each HAZMAT brought onto WPAFB by the contractor shall be readily available at the project site or in the possession of the user prior to the HAZMAT being used.

2. Container Labeling:
   a) Individually label each HAZMAT container with an adhesive label or tag with the following information:
      (i) Contractor's name
      (ii) Contractor's address
      (iii) Contractor's point of contact and phone number
      (iv) Contract number
   b) Durable, adhesive labels shall be printed electronically or filled out legibly with a pen capable of withstanding diverse climate/weather conditions. If paper labels are used they should be protected with a plastic overlay to prevent deterioration. If a label becomes lost, worn, faded, of defaced in any manner, the label shall be replaced immediately. If a HAZMAT container is too small for placement of the label, the item can be stored in a plastic bag with the label attached or affixed to the container by other means as long as the label stays with the product.

C. Non-Exempt Contractor Specific Requirements: Contractors who do not fall into one of the above mentioned categories, or work side by side with government employees potentially exposing them to chemicals are "non-exempt". Non-exempt contractors shall track and report HAZMAT in accordance with AFI32-7086 Wright-Patterson Supplement and the WPAFB IHMP Plan.

D. Material Storage and Use: The contractor shall follow manufacturer's guidelines and professional recommendations for control of humidity, temperature, cleanliness and material handling relative to storage and use of all HAZMATS. The contractor shall use, handle, and store all HAZMATS in accordance with all federal, state, local, and Air Force laws, policies, regulations, and procedures as specified, but not limited to, the WPAFB IHMP Plan. The contractor shall furnish all equipment necessary to manage HAZMATS. This equipment includes, but is not limited to, approved chemical security cabinets, secured gas cylinder storage cages, locks, secondary containment, spill response equipment, fire extinguishers, and personal protective equipment, to securely manage HAZMATS at the project site.

E. Removal of Unused Materials: Upon completion of the project, the contractor shall remove all HAZMATs from the project site and/or WPAFB. NO HAZMATS shall be left by the contractor unless specified in their contract.
F. Security/Management: All HAZMAT containers, including gas cylinders, shall be secured so that they are under control of the contractor and to prevent access to unauthorized personnel (Note: Containers shall be stored indoors or in an area not accessible by the general base population).

G. Clean Air Act Section 112(r)-Risk Management Program: Contractors planning to bring onto WPAFB bulk quantities of HAZMAT exceeding thresholds quantities in 40 CFR Part 68 shall notify the HAZMAT Cell 30 working days prior to bringing the materials on-site.

3.10 HAZARDOUS WASTE MANAGEMENT

A. Hazardous, Toxic, or Special Waste Disposal. The contractor shall manage all hazardous, toxic or special wastes which cannot be disposed of as solid waste in a "Subtitle D" landfill in accordance with all Federal, State, local and Air Force environmental laws, policies, regulations and procedures, including the WPAFB HW Management Plan.

B. IAP: The contractor shall establish an IAP if any hazardous or other regulated wastes are to be stored on WPAFB for greater than 24 hours. The contractor shall schedule an IAP site visit with a 88 CEG/CEIE representative prior to waste storage by calling 937-257-7516, and requesting inspection of the proposed IAP area. For each IAP, the contractor shall apply in writing through the contract administrator to 88 CEG/CEIE for a "WPAFB Form 1433 - Hazardous Waste Storage Permit." The permit shall include the proposed IAP location, description of the regulated waste, estimated quantity of waste to be generated, and the type(s) of waste containers to be stored. The contractor shall manage the IAP in accordance with the WPAFB HW Management Plan and shall furnish all containers, labels, locks, security, chemical storage cabinets, secondary containment, spill response equipment, fire extinguishers, personnel protective equipment, and other materials as may be necessary. A maximum of 55 gallons of HW and/or one quart of acutely HW may be stored in an IAP at any one time. The contractor's environmental coordinator and alternate shall serve as the primary and alternate managers for each IAP. The IAP manager shall properly complete and maintain all required documentation associated with the IAP including, but not limited to, container labeling, MSDSs, waste profile sheets, container tracking logs, weekly inspection logs, SSPPs, and RCRA training certificates.

C. HW Disposal: The contractor shall be responsible for collection of all HW, proper containerization, labeling and secure storage of that waste on-site. The contractor shall be responsible for repackaging any containers that are considered by 88 CEG/CEIE to be unsuitable for shipment. The contractor shall turn collected HWs over to the 88 CEG/CEIE representative by filling out a WPAFB Form 1438 HW Pick-up Form within twenty-four hours after the contractor has completed the project, or has exceeded 55 gallons HW or 1 quart acutely HW. (Note: Waste will be picked up at contractors HW storage site)

D. HW Container Storage and Labeling

1. The following container storage and labeling requirements shall be considered supplementary to all applicable Federal, State, and Air Force laws, regulations and policies governing the management of containers containing HW. These requirements address the labeling and security of all items containing HW including drums, bottles, boxes, cans, barrels, bags, and miscellaneous containers. The contractor shall maintain a running inventory of material, waste, and empty containers.

2. Labels
   a. Individually label each container with an adhesive label or tag with the following information:
      (i) Contractor's name
      (ii) Contractor's address
      (iii) Contractors' phone number
      (iv) Contract number
   b. Each container shall be individually labeled. Labels shall be filled out legibly with a waxed based pencil (note: grease pencil) or other marking pens capable of withstanding diverse climate/weather
conditions. Marking pen shall resist fading and streaking. Ballpoint pens, pencils, and magic markers are not acceptable.

c All containers shall have one of the following acceptable labels properly filled out and in good condition:
   (i) NON-REGULATED WASTE (Blue label - NON-RCRA but DOT regulated, i.e.; sodium hydroxide solid)
   (ii) NON HAZARDOUS WASTE (Green Label - NON-RCRA / NON-DOT)
   (iii) HAZARDOUS WASTE
   (iv) EMPTY
   (v) LOCALLY DEVELOPED LABEL (Consistent with Section four listed below)
   (vi) UNIVERSAL WASTE
d If a label becomes lost, worn, faded, or defaced in any manner, the label shall be replaced immediately. Paper labels exposed to adverse weather conditions should be protected with a plastic overlying to prevent deterioration.

f All containers that contain HW shall have the operating organizations and responsible parties name stenciled on the container label. For bottles and vials too small to stencil, a self-adhering label or tag containing the above mentioned information may be substituted. Note: All containers less than 1 gallon shall have the specified information stenciled on it.)
g If containers of unknown constituents are found, 88 CEG/CEIE shall be notified immediately and the unknown container(s) shall be marked with the following information:
   (i) Date 88 CEG/CEIE was notified.
   (ii) Name and phone number of container owner.
   (iii) Date, company name or organizational symbol, phone #, and initials of the individual collecting a sample for laboratory analysis of the unknown contents.
h Areas where more than 12 empty containers are stored homogeneously shall be clearly sectioned off and identified as empty. The containers shall have a sign affixed adjacent to the storage area to clearly identify EMPTY CONTAINER STORAGE.

3. Security/Management: All containers shall be secured so that they are under control of the contractor and to prevent access to unauthorized personnel (Note: Containers shall be stored indoors or in an area not accessible by the general base population).

E. HW Turn-In: The contractor shall turn-in all HW generated on WPAFB to the 88 CEG/CEIE representative by filling out the following blocks of the WPAFB form 1438 (NOTE: The contractor can call 937-257-7516 and request an electronic copy of WPAFB Form 1438):

1. Name - Primary or Alternate IAP Manager's name
2. Office Symbol - Name of Contractor
3. Building Number - Facility number where waste was generated
4. Extension - Primary or Alternate IAP Manager's phone number (cell phones acceptable)
5. Unit Environmental Coordinator (UEC) Coordination - Quality Assurance Evaluator / Job Inspectors signature
6. Waste Container Information - Common or generic name of waste
7. Constituents - Chemicals and, if known, their percentages in the waste
8. EPA Waste Codes - IAW 40 CFR Part 261
9. Check One - Check appropriate box
10. Process Generating Waste - How is the waste generated?
11. Container Type - general description, i.e. metal drum, cardboard box, glass bottle, etc.
12. Container Size - Volume of container (not volume of the waste)
13. Number of Containers - The number of HW containers requiring pick-up
14. Physical State - Solid / Liquid / Gas / Sludge
15. pH - Self-explanatory
16. Flashpoint - Self-explanatory
17. Site Manager Signature - Contractors HW site manager signature

F. HW Recycling: Any HW that is being offered for recycling (e.g., batteries, solvent waste being sent for recycling, wipes being sent for laundering) may be handled outside of the normal HW disposal channels. The contractor shall obtain approval in writing through the contract administrator from 88 CEG/CEIE prior to commencing any such operations. All recycled HW shall be accompanied with a manifest signed by the 88 CEG/CEIE prior to removal from WPAFB.

G. Used Oil and Waste Liquid Petroleum Products (WLPP): The contractor shall manage all Used Oil and WLPP in accordance with the WPAFB Hazardous Waste Management Plan Used Oil Procedure.

H. The contractor shall be liable for all claims, costs, losses, damages and other expenses the government may incur as a result of the contractor's negligence or willful misconduct during the performance of this contract.

3.11 GREEN PROCUREMENT

A. WPAFB has a requirement for the cost effective green procurement of environmentally preferable products and services in accordance with established federal "green" procurement preference programs. Green Procurement is the purchase of environmentally preferable products and services in accordance with the Federally-mandated green procurement program (GPP) elements. There are six mandatory program elements and one voluntary element that are governed by several laws, Executive Orders (EOs), and regulations. The six mandatory programs elements are:

- Recovered Materials (Formerly Affirmative Procurement) driven by Resource Conservation and Recovery Act (RCRA) section 6002, EO 13423, EO 13514 and 40CFR Part 247 requires Federal agencies to purchase recovered material products that satisfy EPA's Comprehensive Procurement Guideline (CPG). The CPG is a list of products that can be made with recovered materials, are technologically and economically feasible to produce, and will conserve raw materials and reduce the solid waste stream.
- Energy and Water Efficient Products driven by the Energy Policy Act (EPACT) of 1992, EO 13221, EO 13423, and 13514 requires Federal agencies to reduce energy use, purchase energy-efficient products, increase the use of renewable energy, and conserve water.
- Alternative Fuels and Fuel Efficiency driven by the EPACT of 2005, EO 13150, EO 13423, and EO 13514 requires Federal agencies to purchase alternative fueled vehicles (AFV), alternative fuels, and fuel efficient vehicles.
- Biobased Products driven by the Farm Security and Rural Investment Act of 2002 (FSRIA) section 9002, 7 CFR Part 2902, EO 13423, and EO 13514 requires Federal agencies to select biobased items from the USDA published product list.
- Non-Ozone Depleting Substances driven by the Montreal Protocol of 1987, EO 13423, EO 13514, and AFI 32-7086 requires Federal agencies to meet all mission critical Class I ODS requirements from the DLA ODS Reserve, find alternatives to the continued use of Class I and Class II ODS, and purchase approved alternatives to ODS products from the EPA's Significant New Alternatives Policy (SNAP) Program.
- Priority Chemicals driven by EO 13423 and 13514 requires Federal agencies to reduce usage of priority chemicals. The EPA has defined the priority chemical list to include cadmium, lead, polychlorinated biphenyls (PCBs), mercury, and naphthalene.

The voluntary program element is:
- Environmentally Preferable Products (EPP) mentioned in EO 13423 and EO 13514 encourages Federal purchasers to follow EPA's Environmentally Preferable Purchasing (EPP) guidelines as part of the GPP.

B. The contractor shall participate in Green Procurement IAW the laws, Executive Orders (EOs), and regulations mentioned in 3.11 section A of this specification. In accordance with 40 CFR 247.2 and 7 CFR 2902, the contractor is required to research, propose, and utilize these CPG and biobased products available in the marketplace. CPG products with the highest percentage of recovered materials practicable and items composed of the highest percentage of biobased products shall be utilized, unless otherwise specified, or if one or more of the following exemptions apply:

1. Does not meet appropriate performance specifications.
2. Is not available competitively (from two or more sources).
3. Is not available within a reasonable time frame.
4. Is only available at an unreasonable price.

There will be some overlap between the CPG list for recycled-content purchasing and USDA list for biobased item purchasing. Procurements that are subject to the CPG do not also have to satisfy the biobased product requirements, if the two sets of requirements are inconsistent. This does not mean that CPG requirements must automatically be followed in place of biobased purchasing. Purchasers should look at the benefits and costs of both types of products, and select the one that provides the best value overall.


C. Prior to beginning work, the contractor shall certify that the percentage of recovered materials and biobased products to be used in the performance of the contract will be at least the amount required by applicable specifications or other contractual requirements and all Green Procurement Elements are being considered. After work is completed, the contractor shall submit the WPAFB Green Products Determination Form (GPDF) through 88 CEG/CEIE listing the total material utilized for the performance of the contract, which are recovered materials and biobased products as well products that are Energy and Water Efficient, Alternative Fuels and Fuel Efficient, Non-Ozone Depleting, and Priority Chemicals. If CPG products or biobased products are not utilized, the contractor shall provide a written explanation as to why they were not used to the contracting officer and maintain documentation as to why the products were not used. The contractor shall maintain certified copies from the manufacturer or supplier attesting that the material furnished contains, or does not contain (with reason why), the GPP element requirements.

D. Additional information concerning Green Procurement can be obtained from 88 CEG/CEIE at 937-257-5627.

3.12 ABOVEGROUND AND UNDERGROUND STORAGE TANKS

A. All project designs involving any actions with ASTs or USTs shall be coordinated through the 88 CEG/CEIE Storage Tank Program Manager (STPM) at 937-257-2201 to ensure all tank regulatory requirements are addressed and the tank database for WPAFB can be kept up-to-date.

B. All tanks shall be constructed of material that is compatible with the product to be stored.
C. All secondary containment areas for tank and piping systems shall be constructed of material compatible with the product to be stored. Containment areas shall also be impervious and capable of holding product and preventing contamination of soil and water in the event of a spill or release.

D. All tanks shall be labeled as to product stored and associated hazards. All labeling shall meet applicable regulatory requirements.

E. For ASTs, containment shall be provided by either external secondary containment of sufficient capacity to hold at least 110% of the total volume of the tank system or, alternatively, the tank shall have a double-wall with interstitial monitoring capability. The exception to this requirement is for ASTs holding extremely hazardous substances, such as sulfuric acid. Tanks intended to store HAZMATs, such as sulfuric acid, shall have a double-wall and external secondary containment. Containment for piping shall be either double-wall or installation of appropriate containment or diversionary structures or equipment to prevent a release from reaching surface water before cleanup can occur.

F. Temporary storage tanks brought onto base shall also have acceptable, impervious secondary containment or a double wall for the tank system, including piping. Temporary tanks shall be properly labeled as to product stored and hazards and inspected regularly and the inspection documented. Per the WPAFB SPCC Plan, accumulated storm water in secondary containment areas shall be inspected for the presence of product stored prior to discharge and the inspection documented. Any amount of product present in secondary containment areas shall be removed promptly and prior to discharge of any accumulated water. Oil-only absorbent pads can be used to remove small amounts (e.g., sheen) of petroleum product from accumulated storm water. Leaking tanks shall be repaired without delay. Users of temporary tanks shall receive required oil-handlers training prior to bringing the tank onto WPAFB. Oil handler training is provided through the 88 CEG/CEIE STPM.

G. Dispensing of petroleum products shall be accomplished over an area impervious to the product and capable of preventing direct contact of the product with soil in the event of a spill or release.

H. All tanks shall have spill protection around the fill pipe and overfill protection in the form of a high level alarm with both an audible and visual signal and an automatic shutoff to stop flow at 90% capacity of the tank unless otherwise authorized through the 88 CEG/CEIE STPM.

I. All ASTs shall have a Veeder-Root automatic tank gauging system capable of monitoring product and water levels inside the tank and the interstitial space for double-wall tanks.

J. All tanks shall have a SSSP (see part 3.8, Spill Prevention, Control, and Reporting, paragraph A.).

K. All USTs storing petroleum products shall meet requirements outlined in OAC 1301:7-9. All USTs shall have double wall construction and shall be equipped with a Veeder-Root automatic tank gauging system for interstitial, product level, and water level monitoring. The UST system shall have a method, or combination of methods, for release detection that can detect a release from any portion of the tank and the connecting underground piping that routinely contains product. The UST system shall be equipped with both a visual and audible high level alarm to prevent overfills and a high liquid level pump cutoff device to stop flow at 90% full.

L. A State of Ohio Bureau of Underground Storage Tank Regulations (BUSTR) permit is required prior to engaging in any of the following with respect to USTs: an installation, an upgrade or modification, a permanent abandonment, a permanent removal, a replacement, a repair, a change in service or a temporary closure. Contact 88 CEG/CEIE STPM (937-257-2201) for additional information regarding permits.
M. The 88 CEG/CEIE STPM provides UST permitting support and submits tank permit and registration forms to the appropriate regulatory agencies. Contractors shall not submit any forms to the regulatory agencies unless first authorized to do so by the 88 CEG/CEIE STPM. Permits to install for USTs shall be submitted to 88 CEG/CEIE STPM at least 60 days prior to tank installation and contain design drawings of the UST system per Ohio BUSTTR requirements. An UST registration form shall be submitted to the 88 CEG/CEIE STPM within 5 days after the tank is put into service.

3.13 CULTURAL RESOURCES

A. The Air Force policy for historic preservation is to integrate historic preservation requirements with planning and management of other activities, and to consider historic resources during the earliest stages of project planning so as to reduce conflicts with the military mission and regulatory requirements. The National Historic Preservation Act (NHPA) of 1966 and AFI 32-7065 establish affirmative responsibilities of federal agencies to preserve historic and prehistoric resources. Any property (site or structure, or both) that may qualify for listing on the National Register of Historic Places shall not, by NHPA and AFI 32-7065, be inadvertently demolished or altered or allowed to deteriorate. The Archaeological Resource Protection Act of 1979 (ARPA) also protects all archaeological resources from illicit use, including excavation and removal from federal lands. For a current list of WPAFB historic properties contact the 88 CEG/CEIE Cultural Resources Manager (CRM).

B. Any proposed work (undertaking) inside, on, or in the vicinity of a historic property (structure or site) as identified above shall be presented to the 88 CEG/CEIE CRM at the earliest possible stage in the planning process. It shall be the responsibility of the designer to contact 88 CEG/CEIE CRM (937-257-01374) at the onset to coordinate the proposed work. Any project requiring coordination with the State Historic Preservation Office shall need to incorporate into the planning process a 45-day review cycle, typically at the 30-35% design stages. At no time will the contractor contact the Ohio Historic Preservation Office directly without prior written permission from the CRM. All coordination with the State Historic Preservation Office is accomplished by 88 CEG/CEIE CRM.

C. INADVERTENT DISCOVERY OF ARTIFACTS: If cultural or archaeological objects are encountered during a project, work in the discovery area shall immediately cease, the objects shall be secured but not moved, and 88 CEG/CEIE CRM shall be notified immediately. An in situ evaluation of the resources shall be made by a qualified archaeologist. Based on recommendations from the archaeologist, decisions regarding the treatment of the resources shall be made in consultation with the 88 CEG/CEIE CRM and the State Historic Preservation Office.

D. INADVERTENT DISCOVERY OF HUMAN REMAINS: If human remains or objects are encountered during a project, work in the discovery area shall immediately cease, the objects shall be secured but not moved, and 88 CEG/CEIE CRM shall be notified immediately. The installation commander, as the primary management authority, and the appropriate Native American organizations shall also be notified by the CRM of the discovery. All activity in the area of the discovery shall be suspended for up to 30 days after certification that the appropriate Native American organizations have been notified. Disposition and control of the remains or objects shall follow the requirements of Section 3, Subsections (a) and (b), of the Native American Graves Protection and Repatriation Act and the procedures set forth for this in the current version of the WPAFB Integrated Cultural Resources Management Plan (ICRMP). Contact the 88 CEG/CEIE CRM at 937-257-1374 for more information about the ICRMP.

3.14 NATURAL RESOURCES
A. Guidelines For Removing And Cutting Trees: Any projects which will impact suitable Indiana bat habitat shall require the implementation of avoidance and minimization procedures. To conserve the habitat for the Indiana bat, the base 1) prohibits timber harvest and retains all snag/cavity trees unless they pose a safety hazard or compromise the military mission; 2) requires coordination with the 88 CEG/CEIE Natural Resources Program Manager (NRPM) for activities or projects that require tree removal in forested areas or small woodlots; 3) prohibits instream gravel removal in the Mad River; and 4) avoids removal of suitable Indiana bat roost trees (i.e. trees with exfoliating bark) encountered to the maximum extent possible, and prohibits cutting between 01 April and 30 September to avoid incidental take of roosting bats; and 5) restricts the use of aerial application or fogging with pesticides. Aerial spraying and/or fogging shall be coordinated with 88 CEG/CEIE NRPM and the United States Fish and Wildlife Services (if appropriate). All contractors are instructed to clear trees only during the period of 1 October through 31 March, and not to disturb any live or dead trees with peeling bark, cracks or crevices. Should cutting or removal be necessary, prior to any action, a detailed report containing the location, number, type and size of tree(s) shall be coordinated with 88 CEG/CEIE NRPM. In addition, future tree planting shall be approved by the 88 CEG/CEIE NRPM including the number and type of tree(s). When planning and/or planting trees or shrubs the "10-20-30 diversity rule" should be utilized such that the plants should be no more than 10% from the same species, no more than 20% from the same genus, and no more than 30% from the same family. A list of trees recommended for planting on WPAFB is available in Base Facility Standard Section 3.11.1 and from the 88 CEG/CEIE NRPM.

B. Floodplain Requirements (Reference Miami Conservancy District (MCD) Land Use Policy for more details).

1. Building Restrictions. All Conforming (new) habitable structures shall be located or constructed on natural ground at or above the minimum building elevation of 813.4' (NAVD88). Foundations and basements for these structures may extend below the minimum building elevation provided there are no openings below the minimum building elevation. Additions to conforming habitable structures, regardless of size, can only be constructed if the lowest natural ground elevation, where the addition is to be constructed, is at or above the minimum building elevation. Remodeling and/or repair to a conforming habitable structure will be permitted. Non-conforming (pre-existing) habitable structures: additions to non-conforming habitable structures regardless of size and/or location are prohibited. Remodeling which does not change the basic use or increase the square footage of the structure will be permitted. New non-habitable structures: The following structures and/or facilities can be constructed or located below the minimum building elevation subject to prior MCD approval: Garages (non-attached) associated with an existing habitable structure; out buildings; storage sheds; utility structures; gravel operation facilities and recreational facilities such as shelters (open on at least 3 sides). The total square footage of all permanently constructed non-habitable structures shall not exceed 5% of that portion of the property located below the minimum building elevation (All legal structures existing prior to Jan 1, 2002 will be exempt from this limitation except for the purpose of calculating limitations for future construction.). Pre-existing non-habitable structures may be used for any use considered compatible within a retarding basin subject to written District approval.

2. Any project located within the Huffman Retarding Basin. For any project or part of a project, located within the Huffman Retarding Basin, the following shall apply: Any fill, concrete, pavement, or other material placed at an elevation of 835.0’ or lower within the retarding basin shall require coordination with MCD and may require the completion of a Storage Compensation Agreement. Contractor shall be responsible for completing the agreement including paying all fees and associated cost. Fill material obtained from elsewhere within the retarding basin may alleviate the need to purchase fill credits or remove equal amount of fill elsewhere. Credits for fill may be available for purchase from agents approved/supplied by MCD. The completed agreement shall be coordinated with 88 CEG/CEIE prior to submission to MCD. For further information, contact the 88 CEG/CEIE NRPM.

3.15 ENVIRONMENTAL MANAGEMENT SYSTEMS
A. Executive Order 13423 - Strengthening Federal Environmental, Energy, and Transportation Management and Executive Order 13514 - Federal Leadership in Environmental, Energy, and Economic Performance requires that all federal facilities to implement an EMS. The required elements of the mandated EMS are found in the ISO 14001:2004(E) Environmental management systems - Requirements with guidance for use. Section 4.4.2 Competence, training, and awareness requires all individuals working for or on the behalf of the organization receive awareness level training specific to the installation EMS. This includes government employees and contractors working on the installation.

B. All contractors working for or on the behalf of installation shall complete EMS Awareness level training. This can be accomplished by reviewing the Fundamentals of Environmental Management Systems document and submitting the accompanying sign-in sheet to 88 CEG/CEIE. This training document is supplied during Pre-Construction meetings or can be provided by 88 CEG/CEIE (937-257-7152).

END OF SECTION 01 02 20
SECTION 01 10 00
SUMMARY OF PROJECT

PART 1 GENERAL

1.1 PROJECT INFORMATION

A. Project Identification: Shopping Center Image Update

Project number: 2090-16-001.

Project Location: Wright-Patterson AFB, Ohio.

B. Owner: EXCHANGE.

EXCHANGE Contracting Office: TBD; Army & Air Force Exchange Service; 3911 South Walton Walker Blvd.; Dallas, TX 75236. 214.312.XXXX; XXXXXX@aafes.com

EXCHANGE Project Manager: Tim Nalodka RE-C-Ren; Army & Air Force Exchange Service; 3911 South Walton Walker Blvd.; Dallas, TX 75236. 214.312.2150; nalodkat@aafes.com

EXCHANGE General Manager: Donald Walter; Army & Air Force Exchange Service; Main Exchange, Bldg 1250, Kittyhawk Area A; WPAFB, OH 45433. 937.879.5730; walterdonald@aafes.com

C. Architect: The Jenkins Group, Inc.; 300 Park Boulevard, Suite 250; Itasca, IL 60143; Norman Bochenek, (Project Manager); David Duffy, (Project Architect) ; 630.250.9100.

D. Wright-Patterson Air Force Base: Civil Engineering Directorate, 88 ABW/CE, Wright-Patterson Air Force Base, (Building 11, Area C) Ohio

E. Architect's Consultants: The Architect has retained the following design professionals who have prepared designated portions of the Contract Documents:

MEP Engineer: Charlie Calvert (Mechanical/Plumbing), Chip Fox (Electrical); McCoy & Howard Consulting Engineers; 413 Main Street; Mount Vernon, IL 62864; 618.242.0473.

FP Engineer: Joseph Meyer (Fire Protection Engineer); SSC Engineering, Inc; 18207 Edison Avenue, Chesterfield, MO 63005-3715; 636.530.7770

Structural Engineer: Thomas Griffis (Structural Engineer); Martin, White and Griffis Structural Engineers; 501 East Speedway Blvd. Suite 225, Tucson, AZ 85716; 520.547.4555

1.2 STATEMENT OF WORK

A. Scope: The work covered by these specifications consists of furnishing all plant, supervision, labor, equipment, materials and incidentals necessary to perform all operations required to complete the work, all in accordance with these specifications and the applicable drawings, and subject to the terms and conditions of the contract.
B. Location: The work to be performed is located within the Main Exchange Mall, Main Exchange Sales Area, Food Court Dining Area, Administration Area and the Exchange Exterior, Commissary Exterior, Pharmacy Exterior.

C. Principal Features:

The work to be performed in connection with this project includes, but is not limited to the following:

a. Entry Vestibules and Mall: Demolition of floor, wall and ceiling finishes. Polish existing concrete floors, replace vinyl wall-covering, replace acoustical ceiling tiles in existing grid, paint existing soffits, remove existing storefront into main store checkout area and fill opening with GWB, replace existing fluorescent lay-in light fixtures with LED. Clean diffusers and grilles in ceilings.

b. Mall Services: Demolition of existing finishes in restrooms. Remove existing toilet partitions and wash stations. Existing plumbing fixtures and piping to be reused. Provide solid surface counter and undermount sinks, replace existing fluorescent fixtures with LED. Floor and wall tile to be current AAFES standard. Paint existing GWB ceilings. Clean diffusers and grilles in ceilings.


d. GNC and Optical Shop: Demolish existing floor finishes and provide AFCI carpet. Replace acoustical ceilings in existing grid. New lighting to be LED. Clean diffusers and grilles in ceilings.

e. Gift Shop: Demolish existing floor finishes and provide AFCI carpet.

f. Mall Shops: Provide new main exchange and shop entry portals per current AAFES standards.

g. Food Court Dining Area: Demolition of floor, wall and ceiling finishes. Polish existing concrete floors, replace vinyl wall-covering, replace acoustical ceiling tiles in existing grid, paint existing soffits, replace existing fluorescent lay-in light fixtures with LED. Clean diffusers and grilles in ceilings.

h. Main Exchange: Demolish existing floor finishes and provide AFCI carpet. Polish existing concrete floors. Existing sales area floor devices and wiring will be removed back to the source. Sales area floor boxes will be left in place but grouted full for polishing. Install and extend GWB partitions where indicated. Replace acoustical ceilings in existing grid in main area, raise and install new ceilings in alcoves. Clean diffusers and grilles in ceilings. New lighting to be LED with automatic controls with switching located in the admin space entry to the sales area for local control. Remove existing slatwall. Revised layout and finishes will be in accordance with new merchandising equipment plan by AAFES.

i. Administration Area: Demolition of floor, wall and ceilings. Provide all new finishes and ceilings in accordance with current AAFES standards. Replace all existing doors and hardware, reuse HM frames. New HM exit doors. Renovate existing restrooms to be code accessible and provide all new plumbing fixtures, piping and finishes. New lighting to be LED. Replace air handling unit serving the admin area with a new unit. Connect to existing hot and chilled water piping. Replace existing VAV boxes with new, provide new ductwork downstream of VAV boxes and new diffusers and grilles. Revise as much ductwork upstream of VAV boxes as possible. Revise controls for new VAV boxes. Provide new exhaust fan for toilet rooms. Provide new diffusers and grilles in ceilings.
j. General Interior: Abate asbestos containing tile and mastic in floors, lead and PCB ballasts and any other materials identified in the Hazardous Material Surveys.

k. Correct fire protection deficiencies in shoe storage/mezzanine area.


D. The Contractor is advised to take note of the following General Provisions of the Contract: Cleaning; Material and Workmanship; Accident Prevention; Protection of Existing Structures, Utilities and Improvements; Operation and Storage Areas; Site Investigation; Permits and Responsibilities. Copies of the General Provisions may be obtained from the Contracting Officer.

1.2 SPECIAL BASE REQUIREMENTS

A. Regular business hours during the week for the WPAFB Civil Engineering Directorate are 7:30AM to 4:00PM, Monday through Friday, excluding Federal Holidays.

The Main Exchange normal business hours of operation are:

- Monday – Saturday 9:00 AM to 7:30 PM
- Sunday 10:00 AM to 5:00 PM
- Holiday times 11:00AM – 5:00PM

The Food Court normal business hours of operation are:

- Monday – Saturday 9:00 AM to 6:30 PM
- Sunday 10:30 AM to 4:00 PM Charley’s Only, Burger King closed
- Holiday times 11:00AM – 4:00PM

The Barber Shop normal business hours of operation are:

- Monday – Friday 8:00 AM to 6:00 PM
- Saturday 8:00 AM to 5:00 PM
- Sunday 10:00 AM to 4:00 PM
- Holiday times 12:00AM – 4:00PM

The Stylique Salon normal business hours of operation are:

- Monday – Saturday 9:00 AM to 6:00 PM
- Sunday closed
- Holiday times closed

The GNC normal business hours of operation are:

- Monday – Saturday 9:00 AM to 6:00 PM
- Sunday 10:00 AM to 5:00 PM
- Holiday times closed

The Optical Shop normal business hours of operation are:

- Monday – Friday 10:00 AM to 6:00 PM
- Saturday 10:00 AM to 5:00 PM
- Sunday closed
- Holiday times 12:00AM – 4:00PM
The Gift Shop and Mall normal business hours of operation are:

- Monday – Friday 10:00 AM to 6:00 PM
- Saturday 10:00 AM to 5:00 PM
- Sunday 11:00 AM to 4:00 PM
- Holiday times 12:00AM – 4:00PM

Designated items of work can only be performed during non-operational hours. Refer to Construction Phasing Plans.

B. The Contractor is to familiarize themselves with the requirements for gaining daily access to the base. All workers, subcontractors and material deliveries will require permits to gain site entry.

C. Wright-Patterson AFB may require special access requirements during times of heightened security measures and/or force protection events requiring the Contractor to adjust schedules and access accordingly. Advance notice will be given to the Contractor as soon as possible in the event of such an occurrence.

D. The display of signs of a commercial nature within the boundaries of the installation will not be permitted. In no event will the contractor be permitted to use the government installation for the resale of surplus, structures, other improvements, or related equipment.

1.3 UTILITIES (WATER, GAS AND ELECTRICITY)

A. Existing waterlines, gas and electrical will be used to obtain utilities for this project. The Contractor will not be charged for consumption of utilities (water, gas and electricity) refer to Section 01 51 00, "Temporary Utilities".

1.4 LAYING OUT WORK

A. Dimensions and elevations indicated in layout of work shall be verified by the Contractor. Discrepancies between drawings, specifications, and conditions shall be referred to the Contracting Officer in writing for adjustment before work affected is performed. Failure to make such notifications shall place responsibility upon the Contractor to carry out work in a satisfactory and workmanlike manner.

B. The Contractor shall be held responsible for the location and elevation of all the construction contemplated by the construction documents.

C. Prior to commencing work, the Contractor shall carefully compare and check all Architectural, Structural, Mechanical, and Electrical drawings, each with the other, that in any way affect the locations of elevation of the work to be executed by him, and should any discrepancy be found, he shall immediately report the same to the Contracting Officer for verifications and adjustment. Any duplication of work made necessary by failure or neglect on the Contractor's part to comply with this function shall be done at his sole expense.

D. The drawings accompanying these specifications indicate generally the design and arrangement of all apparatus, fixtures, accessories, etc. necessary to complete the work required. The exact location or arrangement of equipment is subject to minor changes necessitated by field conditions and shall be made as required without additional cost to
AAFES. Measurements shall be verified by actual observations at the construction site, and the Contractor shall be responsible for all work fitting into place in a satisfactory and workmanlike manner meeting the approval of the Contracting Officer.

1.5 EXISTING OVERHEAD OR UNDERGROUND WORK

A. Carefully check the site where this project is to be erected and observe any overhead wires and equipment. Any such work shall be moved, replaced, or protected, as required, whether or not shown or specified.

B. Attention is directed to the existence of pipe and other underground improvements which are shown on the drawings. All reasonable precautions shall be taken to preserve and protect all such improvements shown on the drawings.

C. Locations of underground lines, shown on the drawings, are based on the best available sources, but are to be regarded as approximate only. Exercise extreme care in locating and identifying these lines before excavating in adjacent areas.

1.6 INTERRUPTION OF EXISTING UTILITIES SERVICES

A. The Contractor shall perform the work under this Contract with a minimum of outage time for all utilities. Interruption shall be by approved section of the utility. In some cases, the Contractor may be required to perform the work while the existing utility is in service. The existing utility services may be interrupted only when approved by the Contracting Officer. When it is necessary to interrupt the existing utilities, the Contractor shall notify the Contracting Officer and WPAFB Civil Engineering in writing at least seven days in advance of the time he desires the existing service to be interrupted. The interruption time shall be kept to a minimum. Depending upon the activities at the facility which require continuous service from the existing utility, an interruption may not be subject to schedule at the time desired by the Contractor. In such cases the interruption may have to be scheduled at a time of minimum requirement of demand for the utility. The amount of time requested by the Contractor for interruption of existing utility services shall be as approved by the Contracting Officer.

1.7 EXCAVATION

A. Prior to commencing any excavation work the Contractor shall obtain a valid Excavation Permit, from WPAFB Civil Engineering. It shall be the Contractor's responsibility to obtain the necessary signatures and coordination for the permit.

1.8 HOT WORK PERMIT

A. Prior to commencing any welding, the Contractor shall obtain a hot work permit from the WPAFB Fire Prevention Office (937) 904-3157 between the hours of 0700 – 1630 Monday - Friday. 24 hour lead time is requested.

1.9 BARRICADES AND WARNING DEVICES

A. The Contractor shall provide barricades and dust barriers to protect adjacent operational spaces. Barricades at all points of excavation and construction in vehicle traffic areas shall be in accordance with Manual for Uniform Traffic Control Devices by the Department of Transportation, latest edition.

1.10 PROTECTION FOR OPEN FLAME DEVICES
A. When open flame and/or spark producing devices, i.e., acetylene oxygen welding equipment, electric arc welding, etc., are employed for job accomplishment, the following procedures are mandatory:

1. Inspect all surroundings and equipment to insure that combustible substances are not present in any area where contact of metal at a temperature above the flashpoint of any compound is possible.
2. Ensure that no open containers or spills of combustible substances are present.
3. Ensure that ignition is not possible by conduction, convection, radiation, or dispersion of molten metal.
4. Proper protection equipment and practices will be used, i.e., fireproof blankets, wetting of surrounding area, removal of combustible materials where practicable, earth filled backing and portable fire extinguishers of proper type on hand.
5. When the above devices are being used notify the Installation Fire Department 24 hours ahead of usage.

1.11 FIRE PROTECTION

A. The Contractor shall at all times maintain good housekeeping practices to reduce the risk of fire damage. All scrap materials, rubbish, and trash shall be removed daily from in and about the building and shall not be permitted to be scattered on adjacent property.

B. Suitable storage space shall be provided 50 feet minimum outside the building area for storing flammable materials and paints; no storage will be permitted in the building. Excess flammable liquids being used inside the building shall be kept in closed metal containers and removed from the building during unused periods.

C. A contractor shall provide a fire extinguisher at each location where cutting and welding is being performed. Where electric or gas welding or cutting is done, interposed shields of incombustible material shall be used to protect against fire damage due to sparks and hot metal. When temporary heating devices are used, a watchman shall be present to cover periods when other workmen are not on the premises.

D. The Contractor shall provide fire extinguishers in accordance with the recommendations of NFPA No. 10 and 241.

E. Fire Codes: The Contractor shall obey all requirements of the National Fire Codes, and Base/Post Fire Regulations, as they relate to his work on base/post.

1.12 WORK BY OTHERS (IF APPLICABLE)

A. Work not included: Except for such auxiliary work as is shown or specified or is necessary as a part of the construction, the following work is not included in the Contract:

1. Any work shown, but marked "NOT IN CONTRACT" (N.I.C.).
2. Any work indicated to be furnished and installed by the Exchange or AAFES.
3. Any work indicated to be furnished and installed by the Vendors or Concessionaires.

1.13 EXCHANGE-FURNISHED AND INSTALLED EQUIPMENT

A. See Specification Section 01 10 17: EXCHANGE Furnished and Installed Equipment.
1.14 EXCHANGE FURNISHED-CONTRACTOR INSTALLED EQUIPMENT

A. See Specification Section 01 10 18: EXCHANGE Furnished Contractor Installed Equipment.

1.15 LINING OF JOINTS IN FINISH MATERIALS

A. It shall be the responsibility of the Contractor to make certain in the installation of jointed floor, wall, and ceiling and pavement materials that:

1. The joints line through in a straight line and in both directions wherever possible.
2. The joints relate to all openings and breaks in the structure and be symmetrically placed wherever possible. This includes heating registers, light fixtures, equipment, etc.
3. If, because of the non-related sizes of the various materials and locations of openings, etc., it is not possible to accomplish the above, the Contractor shall meet with the Contracting Officer to determine the most satisfactory arrangement. The Contractor shall establish center lines for all trades.

1.16 INTEGRATING WORK

A. All streets, buildings, and other improvements shall be protected from damage.

B. Contractor's operations shall be confined to the immediate vicinity of the project work and shall not in any way interfere with or obstruct the ingress or egress to and from street or adjacent property.

C. If new work is to be connected to existing work, special care shall be exercised not to disturb or damage the existing work more than necessary. All damaged work shall be replaced, repaired, and restored to its original condition at no cost to the Exchange Service.

1.17 HEADROOM UNDER PIPES

A. All horizontal runs of plumbing and heating pipes and/or electrical conduit suspended from ceilings shall provide for a maximum headroom clearance, but in no case shall this clearance be less than 7'-0" without written consent from the Contracting Officer. Where piping or conduit is left exposed within a room, the same shall run true to plumb, horizontal or intended planes. Where possible, uniform margins are to be maintained between parallel lines and/or adjacent wall, floor, or ceiling surfaces.

1.18 PATCHING GOVERNMENT-OWNED FACILITIES

A. Government-owned structures, facilities, streets, curbs, walks, etc., that are damaged or removed due to required excavations or other construction work, shall be patched, repaired or replaced, and be left in their original state of repair by the Contractor, to the satisfaction of the Contracting Officer and of authorities having jurisdiction thereof.

1.19 LOCATION OF EQUIPMENT AND PIPING

A. Drawings showing location of equipment, piping, ductwork, etc., are diagrammatic and job conditions shall not always permit their installation in the location shown. When this situation occurs, it shall be brought to the Contracting Officer's attention immediately and the relocation determined in a joint conference. The Contractor will be held responsible
for the relocating of any items without first obtaining the Contracting Officer’s approval. He shall remove and relocate such items at his own expense if so directed by the Contracting Officer.

1.20 OVERLOADING

A. The Contractor shall be responsible for overloading any part or parts of structures beyond their safe calculated carrying capacities by placing of materials, equipment, tools, machinery, or any other item thereon. No loads shall be placed on floors or roofs before they have attained their permanent and safe strength.

1.21 STANDARDS

A. Any material specified by reference to the number, symbol, or title of a specific standard such as Commercial Standard, a Federal Specification, a trade association standard, or other similar standard shall comply with the requirements in the latest revision thereof, and any amendment or supplement thereto, in effect on the date of invitation for proposals, except as limited to type, class, or grade, or modified in such reference, and except as otherwise indicated.

B. The standard referred to, except as modified in the specifications, shall have full force and effect as though printed in these specifications. These standards are not furnished to bidders for the reason that the manufacturers and trades involved are assumed to be familiar with their requirements.

1. Where Federal Specifications are referred to as a measure of quality and standard, they refer to Federal Specifications established by the Procurement Division of the United States Government and are available from the Superintendent of Documents, U.S. Government Printing Office.

2. Where Federal Specification numbers are used, they refer to the latest edition including amendments thereto.

3. Where Commercial Standards are referred to as a measure of quality, standard, and method of fabrication, they refer to Commercial Standards issued by the U.S. Department of Commerce.

4. Where ASTM Serial Numbers are used, they refer to the latest tentative specifications, standards specifications, standards methods, or standard method of testing issued by the American Society for Testing and Materials.

1.22 CERTIFICATE OF CONFORMANCE

A. Except where tests and/or inspections in connection with structural materials are specified or required by applicable laws, rules, and regulations, manufacturer’s certificate covering conformance with the requirements of the above mentioned Federal Specifications and Commercial Standards may be acceptable in lieu of such items. Such certificates shall be furnished to the Contracting Officer for all items so specified.

1.23 OCCUPANCY BY THE EXCHANGE

A. EXCHANGE shall reserve the right and privilege of partial occupancy during and prior to the absolute completion of the total work. Refer to the Drawings for additional information.
Access shall be allowed at all times to the Exchange and its own Contractors in the endeavor.

1.24 TESTS AND REPORTS

A. See Specification Section 01 40 00: Quality Requirements.

1.25 REFERENCES

A. All references to the word "Government" or "Exchange" in the specifications shall mean Army and Air Force Exchange Service (AAFES).

B. Wherever the word "provide" is used in the Contract Documents as a directive, it shall be interpreted as meaning "provide and install completely and ready for use".

C. Definitions:

1. Vendor: Person or persons selling any material item.
2. Base, Post, Installation or Facility: Location on which Exchange is being remodeled.
3. Concessionaire: Person who is directly responsible for the lease of and operation of the concessions.
4. Architect-Engineer: That person or firm responsible for preparing the working drawings and specifications.
5. AAFES or Exchange: Army and Air Force Exchange Service.
6. Inspection Agency: Project Inspector contracted by EXCHANGE.

1.26 TOXIC MATERIALS

A. Removal or disposal of toxic materials or asbestos is included in this contract. If the Contractor encounters such materials beyond those identified in Section 00 32 10 Hazardous Material Surveys, he shall immediately notify the Contracting Officer.

1.27 SUBMISSION OF PHOTOGRAPHS

A. Contractor shall submit, to the Contracting Officer, digital photographs taken on or about the first of every month, showing the general conditions of the work as viewed from each area and phase of work. Photographs (minimum of 20) must accompany each Application for Payment. Each print shall be identified by date of exposure, project title, and Exchange Project Number, location and direction taken. The contractor may also submit a video of the above requirements as an option to photographs.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION 01 10 00
SECTION 01 10 17

EXCHANGE FURNISHED AND INSTALLED EQUIPMENT (EF/EI)

PART 1  GENERAL

1.1  EXCHANGE FURNISHED AND INSTALLED PROPERTY (EF/EI)

A.  Property:  Property is indicated on the drawings.

B.  Schedule:  Contractor shall schedule early completion of designated areas for beneficial occupancy by EXCHANGE usage prior to completion of entire project.

C.  EXCHANGE will furnish and install equipment as indicated on the Fixture Plan and in the drawings.

D.  Contractor's Duties:

1.  Provide access for EXCHANGE personnel.
2.  Coordinate work and cooperate with the installers of the property so that installation can be accomplished in accordance with construction schedule.
3.  Provide mechanical and electrical connections to equipment and building systems where indicated on the drawings and in the specification.
4.  Provide security of designated areas.
5.  Schedule equipment delivery dates and installation times to coordinate with the overall schedule.  Provide EXCHANGE advance notice so equipment can be ordered on time.

E.  EXCHANGE Duties:

1.  Inspect designated area prior to use and issue statement of acceptance of area for installation of property.
2.  Make final mechanical and electrical connections between property and building systems where indicated on the drawings and/or in the specifications.
3.  Provide custodial services for designated areas during use after beneficial occupancy.

1.2  DELIVERY DATE CHANGES

A.  Requests by Contractor to change designated delivery dates shall be made in writing at least 30 days in advance of the designated delivery date.  If the Contractor is not ready to accept delivery of EXCHANGE furnished property the Contractor shall be responsible for storage and redelivery cost.  Should EXCHANGE be unable to effect the change, or should the Contractor fail to submit his request within the time stated above, the Contractor's obligation under this contract and as stated herein shall not be relieved and further, the Contractor will have no basis upon which he can file a claim under these conditions.

1.3  EXCHANGE ACTIVITIES AFFECTING PROGRESS OF WORK:

A.  Serving Areas & Food Preparation Areas:  Schedule date of use and possession of food preparation serving areas 30 days prior to completion of project.
B. Construction in each area at date scheduled for its use and possession by EXCHANGE shall be sufficiently complete, in accordance with Contract Documents, so EXCHANGE may occupy the area for the use for which it is intended. Comply with Contract Clauses titled inspection of Construction, and Use and Possession Prior to Completion.

1.4 ACCEPTANCE OF AREAS FOR BENEFICIAL OCCUPANCY

A. Inspection: Prior to acceptance by EXCHANGE of an area for beneficial occupancy, the Contracting Officer will conduct an inspection of the specific area. A list of deficiencies will be provided to the Contractor.

B. Acceptance: If the Contracting Officer determines the specific area is sufficiently complete for beneficial occupancy by EXCHANGE, the area will be accepted in writing with the exception of the deficiencies listed. The deficiencies listed shall be completed or corrected prior to final acceptance at the completion of the project.

C. Damage: Damage resulting from EXCHANGE’ use will not be considered the Contractor’s responsibility.

D. Refer to clause entitled “Final Inspection and Acceptance” of the EXCHANGE “General Provisions”.

1.5 MATERIALS AND EQUIPMENT (EF/EI):

A. Equipment or material to be furnished and installed by EXCHANGE as indicated on the Drawings and as follows:

1. Shelving and display fixtures as indicated.
2. Check-out and POS equipment as indicated.
3. Microwaves and refrigerators as indicated.
4. Telephone system equipment.

B. See Part 3 for Final Connection information.

PART 2 – PRODUCTS – NOT USED

PART 3 - EXECUTION

3.1 FINAL CONNECTIONS:

A. Final utility connections to EXCHANGE furnished and installed equipment shall be made by the Contractor as part of the construction contract. Contractor shall construct all openings, furnish and install required sleeves and conduit, and furnish and install all reinforcing, miscellaneous supports, angles, plates, anchors, and bolts necessary to secure EXCHANGE-furnished equipment in place.

B. The Contractor shall provide for, and cooperate with, personnel installing EXCHANGE furnished materials and equipment, when overlap of work occurs.

END OF SECTION 01 10 17
SECTION 01 10 18

EXCHANGE FURNISHED CONTRACTOR INSTALLED EQUIPMENT (EF/CI)

PART 1 GENERAL

1.1 EXCHANGE FURNISHED/CONTRACTOR INSTALLED EQUIPMENT (EF/CI):

A. EXCHANGE furnished/Contractor installed equipment shall be handled in accordance with the "Army and Air Force Exchange Service General Provisions" clause entitled "EXCHANGE Furnished Property".

B. EXCHANGE Furnished Equipment: EXCHANGE will furnish the equipment indicated for installation by the Contractor as indicted on drawings and as follows:

1. EXCHANGE Furnished/Contractor Installed Items: Carpet floor finish indicated for installation in the Retail, Mall Services and Administrative Areas by the Contractor (EF/CI).

2. CONTRACTOR Provide complete installation of carpet floor finish, including floor box trim/cover plate removal/reinstallation and cleaning for items furnished by EXCHANGE.

1.2 WORK INCLUDED:

A. The material noted below will be furnished by the Exchange and shall be installed by the Contractor. See drawing references to (EF/CI). The Contractor shall provide for and cooperate with personnel furnishing the designated material.

B. Receiving, handling and installing of new EF/CI carpeting in Retail, Mall Services and Administration Area indicated

C. See Division 1 for General Requirements.

D. Contractor's Duties:

1. Designate required delivery date for each product. Notify the Contracting Officer in writing at least 30 days in advance of the date that EXCHANGE furnished equipment and furnishings will be needed.

2. The equipment will be received at the job site by a representative of EXCHANGE who will jointly, with the Contractor, verify condition and quantities. The representative will then effect receipted transfer of custody of the equipment to the Contractor.

3. Unload, handle, store (on-site), protect, uncrate, assemble, install set in final position, align, join, level, and make all utility connections to all items of equipment. Installation shall be performed in accordance with the specifications, equipment plans, and schedules shown on the Drawings and the rough-in drawings provided by EXCHANGE.

4. Construct all openings, furnish and install required sleeves and furnish and install all reinforcing, miscellaneous supports, angles, plates, anchors, and bolts necessary to secure EXCHANGE furnished equipment in place.

5. Repair or replace items damaged as a result of Contractor's operations.
6. Apply finish indicated, if any.
7. The installation shall be complete in all respects, including mechanical and electrical hook ups, and put into good operating condition.

E. EXCHANGE Duties:

1. Deliver all EXCHANGE furnished items to the job site. Schedule delivery date with supplier in accordance with Progress Chart.
2. Provide Contractor with installation drawings and instructions.

1.3 DELIVERY:

A. Contractor shall unload, handle, store, protect, uncrate, assemble, set in final position, align, join, and level all Exchange-Furnished material, and shall make all utility connections thereto. EXCHANGE will provide supervision for installation of the material.

B. The material will be received at the job site by a representative of the local EXCHANGE who, together with the Contractor, will jointly verify conditions and quantities. The representative of the local EXCHANGE will then affect receipted transfer of custody of the material to the Contractor. Material damaged by or during construction operations shall be replaced at no additional cost to EXCHANGE.

1.4 FAILURE TO VERIFY:

A. Failure to execute above required verification shall not relieve the Contractor of responsibility for proper installation of the material, which shall be installed without additional cost to EXCHANGE.

1.5 DELIVERY DATE CHANGES:

A. Requests by Contractor to change designated delivery dates shall be made in writing at least 60 days in advance of the designated delivery date. If the Contractor is not ready to accept delivery of EXCHANGE furnished equipment the Contractor shall be responsible for storage and delivery cost. Should EXCHANGE be unable to effect the change, or should the Contractor fail to submit his request within the time stated above, the Contractor's obligation under his contract and as stated herein shall not be relieved and further, the Contractor will have no basis upon which he can file a claim under these conditions.

PART 2 – PRODUCTS – NOT USED

PART 3 - EXECUTION

3.1 INSTALLATION

A. The Contractor shall construct openings, furnish and install required sleeves and conduit, and furnish and install reinforcing, miscellaneous supports, angles, plates, anchors, and bolts necessary to secure EXCHANGE-furnished equipment in place. Final electrical connections to EXCHANGE furnished equipment shall be made by the Contractor as part of the Construction Contract.

END OF SECTION 01 10 18
SECTION 01 10 60
SAFETY POLICIES AND PROCEDURES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Contractor required health and safety plan.
   1. Contractor is responsible for reading the Risk Assessment Plan and following the directions therein.
   2. Contractor must maintain OSHA permissible exposure limits related by the risk assessment: That is, 25 ppm (170 mg/cubic meter) during any 8 hour work shift for a 40-hour week

B. Sample Safety Plan.

1.2 RELATED SECTIONS

A. Submittal Procedures - Section 01 33 00 (Construction Hazard Plan, Job Safety and Health Plan, Emergency Response Plan).

B. Project Record Documents - Section 01 78 39.

C. Environmental Protection – Section 01 02 20

1.3 REFERENCES

A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

   1. OSHA 1910 R.E.G. - 29CFR, OSHA 1910.120

1.4 SUBMITTALS

A. Submittals for EXCHANGE approval - The following items shall be submitted for EXCHANGE approval:

   1. Designation of Safety Representative: The Contractor shall designate in writing a qualified employee OSHA Trained under 1910.120 responsible for the overall supervision of all accident prevention activities. Duties shall include ensuring applicable safety requirements are incorporated into work methods and inspecting the job site to ensure that safety measures and instructions are actually being applied. This person shall be on site at all times that work is in progress.
   2. The Contractor shall be trained and certified in OSHA 1910.120 procedures. All other employees performing site work will meet OSHA 1910 training requirements for their job capacity.
B. Submittals for Information Only - The following items shall be Contractor certified:

1. **Job Hazard Analysis**: Contractor shall develop a job hazard analysis for presentation at the pre-construction conference. The Contractor’s job hazard analysis shall list potential hazards that could arise during the course of the work.

2. **Job Safety and Health Plan**.
   
a. The Contractor shall develop a Job Safety and Health Plan for presentation at the Pre-construction conference. The Contractor’s Safety Plan shall make whatever provisions are necessary to conduct his work in accordance with current OSHA standards.

b. The safety and health plan must specifically address the excavation portion of construction and will be specific to perchloroethylene (tetrachloroethylene) (PCE), and incorporate decontamination procedures for personnel and equipment, continuous vapor monitoring, a prohibition against eating in proximity to the site, and a prohibition against the smoking of tobacco products in the proximity to the site.

c. The following are minimum requirements for the health and safety plan:

   1. The Contractor is responsible for all compounds and degradation products addressed by the Risk Assessment Plan.

   2. **Specialized Designs**: Specialized designs will be provided when the situation requires. Examples of such designs include, but are not limited to, vapor barriers in areas of known vapor hazard.

   3. **Safety Plans**: Safety Plans will be the responsibility of the Contractor for construction areas identified by the installation and/or EXCHANGE as areas of known hazards only. These plans are required by 29 CFR 1910 and are the responsibility of the Contractor. This requirement will be coordinated through the Health and Safety Program of the military installation by the Contractor.

   4. **Minimum Requirements for the Health and Safety Plan are as follows**:

      a. Must be kept on site, and must be written.

      b. Will contain a hazard analysis (safety and health risk) for each site task and operation (to be supplied by the installation).

      c. Will include employee training (per paragraph (3) of 1910.120).

      d. Will include personal protective equipment to be used by employees for each of the site tasks and operations (paragraph (g) (5) of 1910.120).

      e. Will include provision for medical surveillance (paragraph (f) of 1910.120).

      f. Will include the frequency and types of air monitoring, personal monitoring, environmental sampling techniques, instruments to be used (their maintenance and calibration).

      g. Will include a site control program (per paragraph (d) of 1910.120) to be coordinated with the installation.

      h. Will include a decontamination procedure (per paragraph (k) of 1910.120).

      i. Will include an emergency response plan (per paragraph (1) of 1910.120).

      j. Will include a confined space entry procedure (per 1910.146, 147 or program equivalent).

      k. Will include provision for spill containment (per paragraph (j) of
1910.120).

(l) Will include pre-entry briefings (prior to each site task activity) for all employees involved in the task, supervision, or emergency response.

(m) Written verification of adherence to the “plan” by a Safety and Health Supervisor is required (the supervisor must meet the 1910.120 training requirements for supervisors).

(n) Deficiencies will be corrected immediately upon discovery and after consultation with the EXCHANGE Contracting Officer and Installation Safety Office.

d. Hazard Response Plan: The unplanned or non-predicted discovery of such hazards as transite pipe, contaminated soils, and other possible hazards will be addressed within an Emergency Response Plan (EMR) by all contractors. This requirement will be coordinated through the Health and Safety Program of the military installation by the contractor (sample provided).

e. Material Safety Data Sheets will be maintained at the site for all hazardous materials in use.

1.5 MONTHLY SAFETY MEETINGS

A. The Contractor will schedule subsequent safety meetings with subcontractor personnel on a monthly basis. The Owner’s representative and Installation may attend periodically. Minutes of safety meetings shall be prepared and signed by the Contractor and submitted to the Contracting Officer for inclusion in the contract file.

1.6 ACCIDENT REPORTING AND RECORD KEEPING

A. Accident reporting and record keeping shall be in accordance with Installation requirements. Telephonic reports of injuries or property damage will be made as soon as possible after the incident and will be followed by a copy of an Accident Report.

1.7 LIFE OF CONTRACT REQUIREMENTS

A. The Contractor shall comply with all provisions of this section during the life of the contract.

1.8 HEAD PROTECTION (HARD HATS)

A. All work sites under this contract are designated Hard Hat Areas. The Contractor shall post the area and shall ensure that all personnel, vendors and visitors use hard hats while within the limits of the work site.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION 01 10 60
SECTION 01 10 61
SAMPLE SAFETY PLAN

1. APPLICABLE PUBLICATIONS: The publications listed below form a part of this specification and are referred to in the text by the basic designation only.

1.1 US ARMY CORPS OF ENGINEERS:
   EM 385-1-1 U.S. Army Corps of Engineers Safety and Health Requirements Manual

1.2 NATIONAL FIRE PROTECTION ASSOCIATION (NFPA):
   NFPA 70-1993 National Electric Code (NEC)

1.3 SOCIETY OF AUTOMOTIVE ENGINEERS (SAE):
   J 994-85 Alarm, Backup, Electric-Performance, Test, and Application, Recommended Practice.

2. GENERAL: Work safety is of paramount importance. The Contractor shall comply with the Contract Clause in the Solicitation entitled ACCIDENT PREVENTION, including the U.S. Army Corps of Engineers Safety and Health Requirements Manual referred to therein in addition to the provisions of this specification.

3. SAFETY PROGRAM: The U.S. Army Corps of Engineers Safety and Health Requirements Manual, EM 385-1-1, and all subsequent revisions to in the Contract Clause ACCIDENT PREVENTION of this contract, are hereby supplemented as follows:

   a. The Contractor shall designate an employee responsible for overall supervision of accident prevention activities. Such duties shall include:
      
      1. Assuring applicable safety requirements are incorporated in work methods
      2. Inspecting the work to ensure that safety measure and instructions are actually applied.

      The proposed safety supervisor's name and qualifications shall be submitted in writing for approval to the Contracting Officer's Representative. This individual must have prior experience as a safety engineer or be able to demonstrate his/her familiarity and understanding of the safety requirements over a prescribed trial period. The safety engineer shall have the authority to act on behalf of the Contractor's general management to take whatever action is necessary to assure compliance with safety requirements. The safety supervisor is required to be on the site when work is being performed.

   b. Prior to commencement of any work at a job site, a preconstruction meeting shall be held between the Contractor and the Contracting Officer to discuss the Contractor's safety program and in particular to review the following submittals:

      1. Contracts Accident Prevention Plan: An acceptable accident prevention plan, written by the prime contractor for the specific work and implementing in detail the pertinent requirements of EM 385-1-1, shall be submitted for Government approval.
2. **Activity Phase Hazard Analysis Plan:** Prior to beginning each major phase of work, an activity hazard analysis (phase plan) shall be prepared by the Contractor for that phase of work and submitted to the Contracting Officer. A phase is defined as an operation involving a type of work presenting hazards not experienced in previous operations or where a new subcontractor or work crew is to perform work. The analysis shall address the hazards for each activity performed in the phase and shall present the procedures and safeguards necessary to eliminate the hazards or reduce the risk of an acceptable level.

c. **Subsequent jobsite safety meetings shall be held as follows:**

1. A safety meeting shall be held at least once a month for all supervisors on the project to review past activities, to plan ahead for new or changed operations and to establish safe working procedures to anticipate hazards. An outline report of each monthly meeting shall be submitted to the Contracting Officer.

2. At least one safety meeting shall be conducted weekly, or whenever new crews begin work, by the appropriate field supervisors or foreman for all workers. An outline report of the meeting giving date, time, attendance, subjects discussed and who conducted it shall be maintained and copies furnished the Contracting Officer on request.

4. **ACCIDENTS:** Chargeable accidents are to be investigated by both Contractor personnel and the Contracting Officer.

4.1 **ACCIDENT REPORTING, ENG FORM 3394:** Section I, paragraph 01.D, of EM 385-1-1 and the Contract Clause entitled ACCIDENT PREVITION are amended as follows: The prime Contractor shall report on Eng Form 3394, supplied by the Contracting Officer, all injuries to his employees or subcontractors that result in lost time and all damage to property and/or equipment in excess of $2,000 per incident. Verbal notification of such accident shall be made to the Contracting Officer within 72 hours following such accidents. The written report shall include the following:

a. A description of the circumstances leading up to the accident, the cause of the accident, and corrective measures taken to prevent recurrence.

b. A description of the injury and name and location of the medical facility giving examination and treatment.

c. A statement as to whether or not the employee was permitted to return to work after examination and treatment by the doctor, and if not, an estimate or statement of the number of days lost from work. If there have been days lost from work, state whether or not the employee has been re-examined and declared fit to resume work as of the date of the report.

4.2 **OSHA Requirements:**

4.2.1 **OSHA Log:** A copy of the Contractors' OSHA Log of Injuries shall be forwarded monthly to the Contracting Officer.

A. The Contractor shall comply with all provisions of this section during the life of the contract.

4.2.2 **OSHA Inspections:** Contractors shall immediately notify the Contracting Officer when an OSHA Compliance Official (Federal or State Representative) presents his/her credentials and informs the Contractor that the workplace will be inspected for OSHA compliance. Contractors shall also notify the Contracting Officer upon determination that an exit interview will taken place upon completion of an OSHA inspection. (NABSA).
5. SUBMITTALS FOR GOVERNMENT APPROVAL: Submittals shall be in accordance with Section 01 33 00 CONTRACTOR SUBMITTAL PROCEDURES. All required submittals of items specified in this section shall be for information only, except for those items including, but not limited to, the following which shall be submitted for Government approval:

a. Written designation of safety representative.

b. Written project specific accident prevention plan.

c. Written activity phase hazard analysis plan.

END OF SECTION 01 10 61
SECTION 01 13 00

SAFETY REGULATIONS AND CODES

PART 1 - GENERAL

1.1 REQUIREMENTS INCLUDED

A. Reference Standards.
B. Licenses and Permits
C. Safety.
D. Fire Safety.
E. Affirmative Procurement Program
F. Use of Ionizing Radiation (IR)
G. Use of Lasers
H. Use of Radioactive Materials
I. Use of Radio Frequency (RF) Radiation
J. Use of Ultraviolet (UV) Radiation
K. Ozone Depleting Substances
L. Lead Base Paint
M. Cleaning & Debris Control
N. Excavation at IRP Sites
O. Contaminated Soil
P. Suspected Hazardous Materials
Q. Hazardous Waste Testing
R. Spill Response and Reporting
S. Waste Disposal and Environmental Protection

1.2 REFERENCE STANDARDS

A. Federal, State and Local Codes and Ordinances take precedence over these Specifications and Drawings where conflicts occur, unless the Drawings or Specifications call for more stringent requirements. Notify the Contracting Officer in writing of conflicts.
B. Comply with all applicable laws, building and construction codes, OSHA Safety and Health Regulations and applicable requirements of any governmental agency under whose jurisdiction this Work is being performed.

C. Obtain a copy of standards referenced in the various Specification Sections. Maintain a copy at the jobsite during execution of Work to which the standard applies.

D. Construction that is not governed by the contract specifications will be governed by the more stringent provisions of the latest published edition or statute adopted edition, of the following applicable codes, regulations and standards.

ABA    Architectural Barriers Act
ADA    Americans With Disabilities Act Accessibility Guidelines
AFR    Air Force Regulations
ASME   American Society of Mechanical Engineers
CFR    Code of Federal Regulations
FAR    Federal Acquisition Regulations
IBC    International Building Code
IMC    International Mechanical Code
IPC    International Plumbing Code
NEC    International Electrical Code
NFPA   National Fire Code
OSHA   Occupational Safety and Health Act
UFC    Unified Facilities Criteria

Other applicable codes and standards as applicable or as referenced by the individual specification Sections.

1.3 LICENSES AND PERMITS

A. For the duration of this contract, Contractor shall obtain and maintain current required Federal, State and local licenses and permits.

B. License and permit fees and taxes shall be paid by the Contractor without additional cost to the Government.

C. Obtain required vehicle and entry permits from Installation security.

D. Obtain any additional Installation required permits from the Contracting Officer. Current permit requirements shall be provided to the Contractor at the preconstruction conference.
1.4 SAFETY

A. Comply with all Federal and State regulations concerning safety of personnel and equipment. All Contractor personnel shall wear hard hats and steel toe safety shoes while on the project site. In addition, all personnel shall wear hearing protection (ear muffs or ear plugs) when inside the power plant, excluding office areas, restrooms, break rooms and other “quiet” areas. Ensure that lock out, tag out procedures are established and used as directed by 29 CFR 1910.145. Comply with the lock out, tag out procedures in use by CH&PP personnel. Ensure that contractor’s personnel on site are trained on the government’s procedures.

B. Comply with all safety, traffic and protection requirements in effect on Installation. Government will brief the Contractor on these requirements at the preconstruction conference.

C. Provide safety barriers around open excavations, openings in floors and other hazards created by the Contractor’s activities.

D. The Contracting Officer may direct the Contractor to cease activities which, in their opinion, are unsafe.

1.5 FIRE SAFETY

A. Comply with all fire safety and protection requirements in effect on Installation. Government will brief the Contractor on these requirements at the preconstruction conference.

B. Prior to beginning any welding, use of open flame device, or any activity that produces sparks, obtain a “hot work permit” from Installation Fire Department. The permit shall be renewed each day when welding or open flame devices will be used.

C. If the contract work requires numerous days of hot work, the Contractor may elect to have one of his on-site personnel designated as a Permit Authorizing Individual (PAI). The Contractor’s PAI may issue hot work permits at the work site, thus avoiding the requirement for daily permits issued by the Fire Department.

D. The Contractor’s PAI shall be the on-site superintendent, a foreman, the Contractor’s Safety Manager, or other individual with sufficient knowledge and experience to recognize unsafe work practices or conditions and having authority to stop work immediately if such unsafe practices or conditions are observed. To be designated as a PAI, a person must schedule and successfully complete PAI certification training offered by the Post Fire Department. PAI certification training is estimated to last 60 to 90 minutes.

E. Fire Department personnel may periodically visit the site to ensure the Contractor is complying with fire safety requirements. A PAI’s certification may be revoked if the PAI has failed to issue permits on days when hot work is performed, or if unsafe practices or conditions are observed.

F. Questions concerning these requirements may be directed to Installation Fire Chief.

G. The Contractor shall notify the Base Fire Department a minimum of 48 hours before, and again immediately prior to, temporarily closing any street or paved building access, interrupting water service to any fire hydrant or interrupting the operation of any fire detection, alarm or suppression system. The fire Department shall be immediately notified upon reopening closed areas, restoration of water service to any fire hydrant, or reactivation of any...
detection, alarm or suppression system. This notification requirement is in addition to other contract requirements.

H. Provide a 10 lb, ABC fire extinguisher at all work stations.

I. Report a fire: Dial 911.

1.6 AFFIRMATIVE PROCUREMENT PROGRAM

A. These standards apply to all new construction, demolition, rehabilitation, alteration, modification, repair, and maintenance of existing facilities.

B. In an effort to comply with the affirmative procurement requirements of Section 6002 of the Resource Conservation Recovery Act (RCRA) and Executive Order 13101, the government strongly promotes the use of the recycled and recovered materials and products identified in the Environmental Protection Agency’s Comprehensive Procurement Guidelines.

C. Recycled and recovered materials and products must be considered first before any other materials and products will be accepted. Recycled and recovered materials and products must be used throughout the project unless they either do not meet the requirements of this specification, delay the progress of the work, or are cost prohibitive.

D. Examples of these materials and products are detailed below. These are recommended quantities and represent minimum compliance. The actual requirement is to use the maximum amount of recycled material possible, while meeting the performance specifications.
1.7 USE OF IONIZING RADIATION (IR)

A. Submit a written request for approval at least 30 calendar days before commencement of activities which require the use of IR generating devices.

B. Submit request to the Installation Radiation Safety Officer (RSO) with a courtesy copy to the Contracting Officer. Request shall include:

1. Description/Characteristics:
   a. X-ray unit manufacturer
   b. Model number
   c. Serial number
   d. Maximum kVp, mA, Sec
   e. Ionizing radiation source/emitter (electron tube)

2. The part of the EXCHANGE contract describing work to be done at the Installation and the inclusive dates of such work.

3. An acknowledgment that the RSO may make initial and periodic checks to ensure the Contractor is following applicable radiological health and safety practices which prevent unnecessary exposures to Installation personnel.

1.8 USE OF LASERS

A. Submit a written request for approval at least 30 calendar days before commencement of activities which require the use of a laser.

B. Submit request to the RSO with a courtesy copy to the Contracting Officer. Request shall include:

1. Description/Characteristics:
a. Manufacturer.
b. Model.
c. Number of same units.
d. Serial number(s).
e. Laser medium.
f. Mode of operation (i.e. continuous wave (CW), single pulse, multiple pulse).
g. Maximum exposure time (train length).
h. Ime (sec) & wave length.
i. Energy/pulse (J) or CW power (W).
j. Pulse repetition frequency.
k. Pulse width.
l. Beam diameter (at 1/e point).
m. Beam divergence (at 1/e point).

2. The part of the EXCHANGE contract describing work to be done and the inclusive dates of such work.

3. An acknowledgment that the RSO may make initial and periodic checks to ensure the contractor is following applicable radiological health and safety practices which prevent unnecessary exposures to Installation personnel.

1.9 USE OF RADIOACTIVE MATERIALS (RAM):

A. Prior to bringing RAM onto Post property, the Contractor shall obtain permission from the RSO. To obtain approval, forward an application to the RSO, and a courtesy copy to the Contracting Officer at least 30 calendar days before the planned date for commencement of activities on the installation. Requests shall include:

A description of the proposed activities on NRC Form 241, Report of Proposed Activities in Non-Agreement States, (the 180-day limitation on the form does not apply to organizations holding an NRC license). Contractors possessing Agreement State Licenses shall also submit an NRC Form 241 to NRC in compliance with 10 CFR 150.21. Contractors requiring more than 180 days of operation per calendar year on the installation shall possess an NRC license.

1. The procedures established to ensure radiological health and safety of Post personnel and the public while on Army or Air Force installations on site and the name of the responsible Contractor representative.

2. A current copy of the applicable NRC, or Agreement State license. Expired licenses are unacceptable. To be valid at the installation, the license must either specifically state the installation by name on the license or state approval for work at temporary job sites anywhere in the United States where the NRC or Agreement State maintains jurisdiction. DOE or DOE prime contractors must provide, in lieu of a license, written certification of their exemption from NRC licensing requirements and cite the applicable exemption of 10 CFR.

3. The part of the EXCHANGE contract describing work to be done and the inclusive dates of such work.

4. An acknowledgment that the Post RSO may make periodic checks to ensure the Contractor is following applicable radiological health and safety practices which prevent unnecessary exposures to Army or Air Force personnel and prevent potential contamination of Government property.
1.10 USE OF RADIO FREQUENCY (RF) RADIATION

A. Prior to using equipment generating RF Radiation in excess of seven watts peak power and a frequency of 1000 MHz or greater on Installation must submit a written request for approval at least 30 calendar days before commencement of activities which require the use of the RF generating device.

B. Submit request to the RSO, with a courtesy copy to the Contracting Officer. Submittal shall include:
   1. Description.
   2. Nomenclature.
   3. Location of emitters.
   4. Quantity.
   5. Frequency (Mhz).
   6. Pulse width (microsec.).
   7. Pulse repetition freq. (pps).
   8. Peak power (kW).
   10. Antenna band width (degrees-- horizontal/vertical).
   11. Antenna gain (dB).
   12. Scan rate (rpm).

C. The part of the EXCHANGE contract describing work to be done at the Installation and the inclusive dates of such work.

D. An acknowledgment that the RSO may make initial and periodic checks to ensure the Contractor is following applicable radiological health and safety practices which prevent unnecessary exposures to Installation personnel.

1.11 USE OF ULTRAVIOLET (UV) RADIATION

A. Submit a written request for approval at least 30 calendar days before commencement of activities which require the use of UV generating devices on Post.

B. Submit request to the RSO, with a courtesy copy to the Contracting Officer. Request shall include:
   1. The part of the EXCHANGE contract describing work to be done at the Installation and the inclusive dates of such work.
   2. An acknowledgment that the RSO may make initial and periodic checks to ensure the Contractor is following applicable radiological health and safety practices which prevent unnecessary exposures to Installation personnel.

1.12 OZONE DEPLETING SUBSTANCES

A. No ozone depleting substances (refrigerants or any other compounds) shall be used in any capacity on this project unless specifically approved by the HazMart.
1.13 LEAD BASE PAINT

A. No paint with a lead content of 0.06 percent or greater shall be used in any capacity on this project unless specifically approved by the HazMart.

1.14 CLEANING AND DEBRIS CONTROL

A. During the term of this Contract, the Contractor shall remove any materials and equipment that are not required for the completion of the work as promptly as possible. All debris shall be removed from the site and legally disposed. The Contractor shall take particular care to eliminate any hazards created by his operations.

B. The Contractor is responsible for any damage caused by his debris without additional cost to the Government.

C. The Contractor shall maintain at all times during his work at this Project Site a strict windblown debris control program. This program shall ensure no windblown debris or other debris from his work shall contaminate or interfere with any access to or operation of any facility or any parking area, road or street.

1.15 CONTAMINATED SOIL

A. If unexpected contaminated soil is encountered while performing work, stop work immediately and contact the Contracting officer. Do not resume work until approved by the Contracting Officer.

1.16 SUSPECTED HAZARDOUS MATERIALS

A. Any suspect hazardous materials encountered during demolition or construction shall immediately be brought to the attention of the Contracting Officer’s representative. Work shall not resume until the Contracting Officer is satisfied that the materials are not hazardous. Should they be found to be hazardous, the contractor shall immediately take steps to contain the material, so further damage and contamination does not occur. The contractor shall then submit a proposal for removal.

1.17 HAZARDOUS WASTE TESTING

A. The Contractor shall subject a representative sample of each type of hazardous waste, or potentially hazardous waste, generated to TCLP (Toxic Characteristic Leaching Procedure) testing. Sampling and testing for appropriate metals, and volatile and semi-volatile chemicals shall be performed by an independent test agency that is regularly engaged in the sampling and testing of hazardous materials and waste. Provide the test results to Installation Hazardous Waste Facility before transferring the waste to the facility. Refer to the attached Waste Disposal and Borrow Pit Worksheet for additional hazardous waste handling requirements.
1.18 SPILL RESPONSE AND REPORTING

A. Spills of hazardous waste, hazardous materials or non-regulated substances such as oils, antifreeze, grease, latex paint, hydraulic fluid, etc. shall immediately be reported to Department of Public Works for reporting purposes to local, state and federal agencies and proper clean-up action. If a spill occurs after normal working hours, or on a weekend or holiday, report spills to the Installation Fire Department and request they contact Department of Public Works.

B. The contractor is encouraged to have a supply of absorbent pads on-site to aid in immediate clean-up of smaller spills, such as oil, coolant or hydraulic fluid leaks from vehicles or equipment.

C. Spill notification placards are to be placed on the job site (CEV or DPW) will provide format and required locations prior to construction.

D. The contractor shall develop a spill plan. The format for the plan will be provided by CEV or DPW prior to construction.

1.19 WASTE DISPOSAL AND ENVIRONMENTAL PROTECTION

A. The Contractor shall comply, and ensure that all subcontractors comply, with all Federal, State, local laws, and regulations, ordinances and standards related to environmental pollution control and abatement in effect and the specific requirements stated elsewhere in the Contract Documents.

B. Any previously unidentified suspected hazardous materials encountered during performance of the work of the contract shall immediately be brought to the attention of the Contracting Officer.

C. Comply with the requirements of Installation Waste Disposal requirements.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION 01 13 00
SECTION 01 14 20
CONSTRUCTION PHASING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Format.
B. Content.
C. Revisions to schedules.
D. Submittals.

1.2 RELATED SECTIONS

A. Exhibit "A" - General Conditions of the EXCHANGE Contract for Construction, Article entitled: "Schedule and Progress".
B. Section 01 10 00 - Summary
C. Section 01 31 00 - Progress Management and Coordination
D. Section 01 32 00 – Construction Progress Documentation
E. Section 01 50 00 – Temporary Facilities, Barriers and Controls

1.3 GENERAL

A. The Construction Phasing Plans shall serve as a guide in managing the construction progress.
B. In preparing this system, the scheduling of construction shall be the responsibility of the contractor.

1.4 COORDINATION

A. Construction shall be phased and coordinated with the Contracting Officer in order to keep to a minimum, any disruption of, or interference with, the operation of the existing retail facility. The Contractor shall notify the contracting officer, within 15 days of notice to proceed, if any problems concerning specified construction phasing occur. The Shopping Center will be in operation, throughout this contract. Contractor shall submit, in accordance with Section 01 32 00, Contractors prepared progress chart system, a detailed schedule of work. The Contractor shall keep the Contracting Officer advised of any anticipated changes in the work schedule in sufficient time to permit adjustment of store operations, without adversely affecting the ability of the Shopping Center to function.

B. Schedule: The Contractor must submit the schedule, for review, to the Contracting Officer within 15 days after execution of a contract. Items specified herein are complementary to work items shown on the drawings.
C. Beneficial occupancy inspection (finishes only) will be made at the end of each work item, to allow early access for fixture installations.

D. Phasing: All phases shall be included in the contract performance period.

1.5 BARRIERS:

A. Building areas adjacent to areas to be renovated will not be vacated; therefore, temporary barriers shall be erected by the Contractor as work progresses. Provide temporary barriers as specified in Section 01 50 00 Temporary Facilities, Barriers and Controls in the locations as required, from floor to ceiling or from floor to underside of roof deck, to seal operational portions of the retail facility from areas of construction. Security walls, however, shall be secured up to the bottom of roof deck. Temporary barriers exposed to customer view shall be painted with two coats of color as approved by the Contracting Officer.

1.6 MATERIALS:

A. All isolation valves and temporary ductwork used to keep system on line in occupied phases for mechanical systems (air-handling units, supply piping, water lines, sprinklers, and other similar items) shall be included by the Contractor at no additional cost to the Exchange.

1.7 GENERAL:

A. Electrical Systems:

1. Install electrical distribution and telephone to existing construction.
2. All of the above work shall be completed without disruption of exchange operation during normal business working hours.

B. Plumbing System:

1. Install all required piping and valves at the connection points. Shutdown of the plumbing systems to make necessary connections and extensions shall be accomplished at a time so as not to interfere with operation of the exchange, and shall be of minimum duration. All proposed shutdowns of the plumbing systems shall be coordinated with the exchange management.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 01 14 20
SECTION 01 14 50
CUTTING AND PATCHING

PART 1 - GENERAL

1.1 SECTION INCLUDES
   A. Requirements and limitations for cutting and patching of Work.
   B. Utility trench cutting and patching.

1.2 RELATED SECTIONS
   A. Section 01 10 00 - Summary.
   B. Section 01 33 00 - Submittals.
   C. Individual Product Specification Sections:
      1. Cutting and patching incidental to work of the section.
      2. Advance notification to other sections of openings required in work of those sections.
      3. Limitations on cutting structural members.

1.3 SUBMITTALS
   A. Submit written request in advance of cutting or alteration which affects:
      1. Structural integrity of any element of Project.
      2. Integrity of weather exposed or moisture resistant element.
      3. Efficiency, maintenance, or safety of any operational element.
      5. Work of EXCHANGE or separate contractor.
   B. Include in request:
      1. Identification of Project.
      2. Location and description of affected Work.
      3. Necessity for cutting or alteration.
      4. Description of proposed Work and Products to be used.
      5. Alternatives to cutting and patching.
      6. Effect on work of EXCHANGE or separate contractor.
      7. Written permission of affected separate contractor.
      8. Date and time work will be executed.

PART 2 – PRODUCTS

2.1 MATERIALS
PART 3 – EXECUTION

3.1 EXAMINATION
A. Examine existing conditions prior to commencing Work, including elements subject to damage or movement during cutting and patching.
B. After uncovering existing Work, assess conditions affecting performance of work.
C. Beginning of cutting or patching means acceptance of existing conditions.

3.2 PREPARATION
A. Provide temporary supports to ensure structural integrity of the Work. Provide devices and methods to protect other portions of Project from damage.
B. Provide protection from elements for areas which may be exposed by uncovering work.

3.3 CUTTING
A. Execute cutting and fitting to complete the Work.
B. Uncover work to install improperly sequenced work.
C. Remove and replace defective or non-conforming work.
D. Remove samples of installed work for testing when requested.
E. Provide openings in the Work for penetration of mechanical and electrical work.
F. For underground utility work. Sawcut perimeter of area required. Demolish concrete slab on grade and base course. Scarify and prepare sub-base to receive new base course materials, vapor barrier, piping and floor slab.
G. Employ skilled and experienced installer to perform cutting for weather exposed and moisture resistant elements, and sight exposed surfaces.
I. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.

3.4 PATCHING
A. Execute patching to complement adjacent Work.
B. Fit Products together to integrate with other Work.
C. Execute work by methods to avoid damage to other Work, and which will provide appropriate surfaces to receive patching and finishing.

D. Employ original installer to perform patching for weather exposed and moisture resistant elements, and sight-exposed surfaces.

E. Restore work with new Products in accordance with requirements of Contract Documents.

F. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

G. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated material, to full thickness of the penetrated element.

H. Refinish surfaces to match adjacent finish. For continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.

I. At utility trenches; install #4 x 12” long dowels 24” o.c. epoxy anchored into edge of existing concrete slab, 8” min. embed. Install 5” thick concrete slab, 3000psi, over 10 mil vapor barrier and compacted aggregate sub-base/fill.

END OF SECTION 01 14 50
SECTION 01 22 00
UNIT PRICES

PART 1 - GENERAL

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

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

1.3 DEFINITIONS
A. Unit price shall be added to Contractor’s proposal on EXCHANGE Solicitation Form 4450-024, as a price per unit of measurement for materials or services added to or deducted from the Contract Sum by appropriate modification, if concealed conditions cause quantities of Work required by the Contract Documents are to be increased or decreased.

1.4 PROCEDURES
A. Unit prices include all necessary material, plus cost for delivery, installation, insurance, applicable taxes, -overhead, and profit.
B. Measurement and Payment: See individual Specification Sections for work that requires establishment of unit prices. Methods of measurement and payment for unit prices are specified in those Sections.
C. Owner reserves the right to reject Contractor's measurement of work-in-place that involves use of established unit prices and to have this work measured, at Owner's expense, by an independent surveyor acceptable to Contractor.
D. List of Unit Prices: A schedule of unit prices is included below in Part 3, Specification Sections referenced in the schedule contain requirements for materials described under each unit price.
PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 SCHEDULE OF UNIT PRICES

A. Unit Price 1: Interior concrete slab repairs and joint filler replacements at areas of Polished Concrete.
   1. Description: See Section 03350 Interior Concrete Slab Repairs and Joint Filler Replacement.
   2. Unit of Measurement: Linear feet and unit price.
   3. Refer to Worksheet at end of Section 03 35 40.

END OF SECTION 01 22 00
SECTION 01 23 00
OPTIONS

PART 1 - GENERAL

1.1 DEFINITIONS

A. Options: An amount proposed by bidders and stated on the Bid Form for certain work defined in the Bidding Requirements that may be added to or deducted from the Base Bid amount if Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.

1. The cost or credit for each option is the net addition to or deduction from the Contract Sum to incorporate option into the Work. No other adjustments are made to the Contract Sum.

1.2 PROCEDURES

A. Coordination: Modify or adjust affected adjacent work as necessary to completely integrate work of the option into Project.

1. Include as part of each option, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of the options.

B. Notification: Immediately following award of the Contract, notify each party involved, in writing, of the status of each option. Indicate if options have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated modifications to options.

C. Execute accepted options under the same conditions as other work of the Contract.

D. Schedule: A Schedule of Options is included at the end of this Section. Items referenced in the schedule contain information necessary to achieve the work described under each option.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 SCHEDULE OF OPTIONS

A. Base Bid: All work excluding that listed in Option No. 1: AFP Items.

B. Option No. 1: AFP Items

1. Replace damaged GFRC panels. See A4.1, A/A5.1, A/A5.4, A/A7.1 and associated sections and details. (Exchange)
2. Paint precast concrete panels, precast columns, canopy ceilings & exterior metal doors, frames, railings. See sheets A3.2, A3.3, A5.4, A5.5 and associated details and schedules. (Exchange)

3. Paint precast concrete panels, precast columns, canopy ceilings & exterior metal doors, frames, railings. See sheets A3.5, A3.6, A5.4, A5.5, A5.6 and associated details and schedules. (Commissary)

4. Remove and replace all exterior joint sealants. See roof plans, elevations and associated details. (Entire Building)

5. Remove and replace metal panels and fascias on accent building walls and on canopies. Rework associated roof / soffits. See A3.2, A4.1, A5.2, A5.4, A5.5 and associated sections and details. (Exchange)

6. Remove and replace metal panels and fascias on accent building walls and on canopies. Rework associated roof / soffits. See A3.5, A3.6, A4.2, exterior elevations and associated sections and details. (Commissary)

7. Demolish walkway canopy. Fill holes (from removed piers). See A0.5, A1.5, A4.2, A5.3, A7.3. (Commissary)

8. Remove and replace wood fence. Paint precast screen panels and supports. Remove barbed wire and brackets. See A0.0 and A1.0 and associated details. (Exchange)

9. Replace grease trap. See A0.0, A1.0, P1.2, P2.1 and associated details. (Exchange)

10. All work associated with hazardous material removal and disposal. See A0.1 - A0.4, A1.0 - A1.4 and spec sections 003210, 020810, 020834, 020900. (Interior)

11. Vestibule Air Curtains. See MD1.2, M1.1, M1.2 and associated information. (Interior)

12. New sprinkler system in shoe stock area / mezzanine area (room E2) and revisions to existing. See fire protection drawings. Replace (11) sprinkler heads with new in room MS18 (not shown on drawings). (Interior)

13. Replace administrative area HVAC unit (room A10). See MD1.3, M1.3 and associated details. (Interior)

END OF SECTION 01 23 00
SECTION 01 25 00
SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 ACTION SUBMITTALS

A. Documentation:

1. Justification.
2. Coordination information.
3. Detailed comparison.
4. Product Data.
5. Samples.
6. Certificates and qualification data.
7. List of similar installations.
8. Material test reports.
9. Research reports.
10. Detailed comparison of Contractor's construction schedule.
11. Cost information.
12. Contractor's certification.
13. Contractor's waiver of rights to additional payment or time.

1.2 CONTRACTING OFFICERS APPROVAL

A. The contract is based on materials and methods described in the contract document.

B. The Contracting Officer will consider proposals for substitution of materials, equipment and methods only when such proposals are accompanied by full and complete technical data and all other information required by the Contracting Officer to evaluate the proposed substitution.

C. Do not substitute materials or equipment, unless such substitution has been specifically approved for this Work by the Contracting Officer.

D. Requests for substitution must be made no less than 10 days prior to proposal closing date. No further substitutions will be permitted after contract award.

E. Where the phrase “or equal” or “or equal as approved in advance by the Contracting Officer” occurs in the Contract Documents, do not assume that material and equipment will be approved as equal by the Contracting Officer unless the item has been specifically approved for this work by the Contracting Officer. All requests for “or equal” or “equal as approved in advance by the Contracting Officer” must be submitted 10 days prior to proposal closing date.

F. The decision of the Contracting Officer shall be final.
1.3 SUBSTITUTIONS FOLLOWING AWARD OF CONTRACT

A. Substitutions for Cause: Not later than 15 days prior to time required for preparation and review of submittals. The submittal must include a justification explaining the rational for the requested substitution. The contractor shall be liable for costs of the Contracting Officer’s review for Contractors failure to order materials, equipment, e.g. in sufficient time.

B. Substitutions for Convenience: Not allowed after contract award.

1.4 AVAILABILITY OF SPECIFIED ITEMS

A. Verify prior to bidding that all specified items will be available in time for installation during orderly and timely progress of the Work.

B. In the event specified item or items will not be so available, notify the Contracting Officer 10-days prior to receipt of proposals with a recommended replacement item.

C. Costs of delays because of non-availability of specified items, when such delays could have been avoided by the Contractor, will be back-charged as necessary and shall not be borne by EXCHANGE.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 01 25 00
SECTION 01 31 00
PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 REQUESTS FOR INFORMATION (RFIs)
   A. RFI Forms: Software-generated form acceptable to Architect and EXCHANGE Project Manager.
   B. Architect’s Action: Allow seven working days for Architect’s response for each RFI.
   C. RFI Log: Maintain a tabular log of RFIs. Submit log weekly.

1.2 PROJECT WEB SITE
   A. Use Contractor’s approved web site for project communication and documentation.

1.3 PRECONSTRUCTION MEETING
   A. The Contracting Officer and/or Contracting Officer’s representative will schedule and preside at preconstruction meeting.
   B. Attendance Required:
      1. Contracting Officers and/or Contracting Officer’s representative and other Headquarters EXCHANGE representatives.
      2. Local and regional EXCHANGE representatives.
      3. Installation representative (Engineering, Fire Marshall, Security, etc.)
      4. Contractor
   C. Agenda:
      1. Execution of Notice to Proceed.
      3. Submission of list of sub-contractors.
      4. Review of EXCHANGE checklist of contract requirements.
      5. Discussion of Schedule.
      6. Discussion of critical sequencing.
      7. Designation of responsible personnel.
8. Processing of field decisions and change orders.
9. Submission of applications for payment.
10. Submittal of shop drawings.
11. Procedures for maintaining record documents.
12. Fire and safety procedures.
15. Housekeeping procedures.
16. Use of premises
   a. Office and storage locations.
   b. Personnel parking.
17. Major equipment deliveries.
18. Other issues pertinent to completing the contract.

D. Meeting minutes: Minutes will be taken by the A/E and distributed to EXCHANGE, Contractor, and Installation Engineer.

1.4 PROGRESS MEETINGS

A. The contractor shall schedule and preside at monthly progress meetings.

B. The contractor shall make arrangements for meetings, prepare agenda with copies for participants.

C. Location of Meetings: Construction office, or as directed in the notice.

D. Attendance Required:
   1. Contractor’s project manager.
   2. Contractor’s superintendent.
   3. Major sub-contractors and suppliers.
   4. EXCHANGE representatives (EXCHANGE’ option).
   5. INSTALLATION Engineering (INSTALLATION option).

E. Agenda:
   1. Review minutes of previous meetings.
   2. Review of work progress.
   3. Field observations, problems and decisions.
   4. Identification of problems which impede planned progress.
   5. Review of submittals schedule and status of submittals.
   6. Review of off-site fabrication and delivery schedules.
   7. Maintenance of progress schedule.
   8. Corrective measures to regain projected schedules.
   9. Coordination of projected progress.
   10. Maintenance of quality and work standards.
   11. Effect of proposed changes on progress schedule and coordination.
   12. Other business relating to work.

F. Meeting Minutes: Architect/Engineer shall record meeting minutes, and distribute copies to the participants (including the EXCHANGE Contracting Officer, within three (3) business days of the meeting.
1.5 PROJECT MEETINGS

A. The Contractor shall schedule and preside at other project meetings when required.

B. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity that requires coordination with other construction.

1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect, and EXCHANGE Commissioning Authority of scheduled meeting dates. Installation Engineering shall be advised as an optional as-required attendee.

2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
   b. Options.
   c. Related RFIs.
   d. Related Change Orders.
   e. Purchases.
   f. Deliveries.
   g. Submittals.
   h. Review of mockups.
   i. Possible conflicts.
   j. Compatibility requirements.
   k. Time schedules.
   l. Weather limitations.
   m. Manufacturer's written instructions.
   n. Warranty requirements.
   o. Compatibility of materials.
   p. Acceptability of substrates.
   q. Temporary facilities and controls.
   r. Space and access limitations.
   s. Regulations of authorities having jurisdiction.
   t. Testing and inspecting requirements.
   u. Installation procedures.
   v. Coordination with other work.
   w. Required performance results.
   x. Protection of adjacent work.
   y. Protection of construction and personnel.

3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.

4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.

5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.

C. Coordination Meetings: At weekly intervals, in addition to specific meetings held for other purposes.
PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 01 31 00
SECTION 01 32 00
CONSTRUCTION PROGRESS DOCUMENTATION

PART 1  GENERAL

1.1 SECTION INCLUDES

A. Format
B. Content
C. Revisions to schedules
D. Submittals

1.2 RELATED SECTIONS

A. General Provisions of the EXCHANGE Contract for Construction, Article entitled: "Schedule and Progress"
B. Section 01 10 00 - Summary of Project
C. Section 01 33 00 - Submittals

1.4 GENERAL

A. The Contractor-prepared progress chart shall serve as a guide in managing the construction progress.
B. In preparing this system, the scheduling of construction shall be the responsibility of the Contractor.
C. The schedules shall be prepared using the Critical Path Method (CPM).

1.4 FORMAT

A. Prepare schedules as a horizontal bar chart with separate bar for each major portion of work or operation, identifying first workday of each week.
B. The format shall be such to enable the Contracting Officer to evaluate the reasonableness of the proposed schedule and to determine if the actual construction is on schedule.

1.5 CONTENT

A. Show complete sequence of construction by activity with dates for beginning and completion of each element of construction.
B. Identify each item by specification section number.
C. Show accumulated percentage of completion of each item and total percentage of Work completed as of the first day of each month.

D. Indicate delivery dates for EXCHANGE furnished products.

1.6 REVISIONS TO SCHEDULES

A. Indicate progress of each activity to date of submittal and projected completion date of each activity.

B. Identify activities modified since previous submittal, major changes in scope and other identifiable changes which could affect the schedule.

C. Provide narrative report with each submittal describing work accomplished during the previous period, the work scheduled for the next period, anticipated problem areas and delays and impact on the schedule. Report corrective action taken or proposed.

1.7 SUBMITTALS

A. Submit a preliminary schedule through the Contracting Officer defining the Contractor's proposed operations for the first sixty (60) of the contract within ten (10) days after date of Notice to Proceed. Indicate the Contractor's general approach for the balance of the project. Include the cost of the activities expected to be completed or partially completed before submission and approval of the complete progress schedule.

B. Upon approval of the preliminary schedule by the Contracting Officer and within thirty (30) calendar days after the Notice to Proceed, the Contractor shall submit the complete Progress Schedule.

C. Submit revised Progress Schedules with each monthly Application for Payment.

D. Submit the number of opaque reproductions which Contractor requires plus four (4) copies which will be retained by Contracting Officer.

1.8 DISTRIBUTION

A. Distribute copies of reviewed schedules to project site file, subcontractors, suppliers and other concerned parties.

B. Instruct recipients to promptly report in writing, problems anticipated by projections indicated in schedules.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION 01 32 00
SECTION 01 33 00

SUBMITTAL PROCEDURES

PART 1  GENERAL

1.1  SECTION INCLUDES

A.  Submittal procedures.
B.  Construction progress schedules.
C.  Shop Drawings.
D.  Samples.
E.  Product Data.
F.  Certificates.

1.2  RELATED SECTIONS

A.  Section 01 10 00 - Summary of Project.
B.  Section 01 32 00 - Construction Progress Schedules
C.  Section 01 78 39 - Project Record Documents.

1.3  SUBMITTAL PROCEDURES

A.  Transmit each submittal with EXCHANGE Form 4450-48, Shop Drawings and Material Approval Submittal.
B.  Sequentially number the transmittal form. Revise submittals with original number and a sequential alphabetic suffix.
C.  Identify Project, Contractor, subcontractor or supplier; pertinent drawing and detail number, and specification section number, as appropriate.
D.  Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of products required, field dimensions, adjacent construction work, and coordination of information is in accordance with the requirements of the work and Contract Documents.
E.  Schedule submittals to expedite the Project. Transmit submittals to Contracting Officer. Coordinate submission of related items.
F.  Identify variations from Contract Documents and Product or system limitations which may be detrimental to successful performance of the completed Work. Failure to identify such variations will not relieve the Contractor of the responsibility for completing the work in full accordance with the Contract Documents even though such submittals are approved by the Contracting Officer.
G. Prior to approval of the material/product submitted, the contractor shall include with the submittal a written certification that the material/product contains no asbestos. This certificate is mandatory before approval will be issued.

H. Provide space for Contractor and Contracting Officer review stamps.

I. When revised for resubmission, identify all changes made since previous submission.

J. Distribute copies of reviewed submittals as appropriate. Instruct parties to promptly report any inability to comply with requirements.

1.4 CONSTRUCTION PROGRESS SCHEDULES

A. Submit preliminary Progress Schedule within ten (10) days of the Notice to Proceed.

B. Submit complete (final) Progress Schedule within thirty (30) days of the Notice to Proceed.

C. Submit monthly revisions of Progress Schedule.

D. Refer to Section 01 32 00 - Construction Progress Documentation, for submittal information.

1.5 SHOP DRAWINGS

A. Shop Drawings For Review:

1. Submitted to Contracting Officer for review for the limited purpose of checking for conformance with information given and the design concept expressed in the contract documents.

2. Shop drawings shall be prepared by a qualified detailer.

3. Minimum sheet size for shop drawings shall be 8 1/2" x 11".

4. After review, and distribute copies in accordance with Submittal Procedures article above and for record documents purposes described in Section 01 77 00 - Project Closeout.

B. Shop Drawings For Project Close-out:

1. Submitted for the EXCHANGE’s benefit during and after project completion.

C. Indicate special utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

1. Submit the number of opaque reproductions which Contractor requires, plus three (four on structural, mechanical, and electrical submittals) copies which will be retained by Contracting Officer.

1.6 SAMPLES

A. Samples For Review:

1. Submitted to Contracting Officer for review for the limited purpose of checking for conformance with information given and the design concept expressed in the contract documents.
2. All exterior color samples shall be submitted to the Installation Design Manager for approval prior to ordering of materials.

3. After review, produce duplicates and distribute in accordance with Submittal Procedures article above and for record documents purposes described in Section 01 77 00 - Project Closeout.

B. Samples For Information:

1. Submitted for the Contracting Officer's knowledge as project administrator or for EXCHANGE.

C. Samples For Selection:

1. Submitted to Contracting Officer for aesthetic, color, or finish selection.
2. Submit samples of finishes from the full range of manufacturers' standard colors, or in custom colors (if so stated in the product specification section), textures, and patterns for Contracting Officer selection.
3. All exterior color samples shall be submitted to the Installation Design Manager for approval prior to ordering of materials.
4. After review, distribute in accordance with Submittal Procedures article above and for record documents purposes described in Section 01 77 00 - Project Closeout.

D. Submit samples to illustrate functional and aesthetic characteristics of the Product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.

E. Include identification on each sample, with full Project information.

F. Submit the number of samples specified in individual specification sections; two of which will be retained by Contracting Officer.

G. Reviewed samples which may be used in the Work are indicated in individual specification sections.

H. Coordinate sample submittals with respective shop drawings.

1.7 PRODUCT DATA

A. Submit Manufacturer's catalog sheets, brochures, diagrams, schedules, performance charts, specifications, illustrations, and other descriptive data.

B. Product data that relates to shop drawings or samples must be submitted with the respective shop drawings or samples.

1.8 CERTIFICATES

A. When specified in individual specification sections, submit certification by the manufacturer, installation/application subcontractor, or the Contractor to Contracting Officer, in quantities specified for Product Data.

B. Certify that material or Product conforms to or exceeds specified requirements. Submit supporting reference data, test results, affidavits, and/or certifications as appropriate.
C. Certificates may be recent or previous test results on material or Product, but must be acceptable to Architect/Engineer.

1.9 LIMITATIONS AND CONTRACTOR’S RESPONSIBILITIES

A. Submittals will be reviewed for the limited purpose of checking for conformance with the design concept and the information shown in the drawing and specifications. These reviews shall not include review of the accuracy for completeness of details. A review shall not indicate that the reviewer has checked the entire system of which the reviewed item is a component. The reviewer shall not be required to review partial submissions.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION 01 33 00
SECTION 01 33 10

WEATHER TABLE

PART 1 - GENERAL

1.1 INFORMATION AND DATA

A. Information and data furnished or referred to in the weather table is furnished for the Contractor’s information.

1.2 CONTRACT TIME LIMITS

B. The contract time limits include weather conditions that are shown in the table listed herein.

1.3 TIME EXTENSIONS FOR UNUSUALLY SEVERE WEATHER

A. This provision specifies the procedure for the determination of time extensions for unusually severe weather affecting exterior work in accordance with the Contract. The following listing defines the monthly anticipated adverse weather for the contract period and is based on NOAA data for the geographic location of the project.

B. Weather Table:

<table>
<thead>
<tr>
<th>MONTHLY ANTICIPATED ADVERSE WEATHER CALENDAR DAYS</th>
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</thead>
<tbody>
<tr>
<td>Wright-Patterson AFB, Ohio (Green County)</td>
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</table>

<table>
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<tr>
<th>JAN</th>
<th>FEB</th>
<th>MAR</th>
<th>APR</th>
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</tbody>
</table>

This listing of anticipated adverse weather will constitute the base line monthly weather time evaluations. Throughout the contract each month, actual adverse weather days will be recorded on a calendar basis (including weekends and holidays) and compared to the monthly anticipated adverse weather in this listing. The term "actual adverse weather days" shall include days impacted by actual adverse weather. The number of actual adverse weather days affecting exterior work shall be calculated chronologically from the first to the last day in each month. Adverse weather days must prevent work for 50 percent or more of the contractor’s work day and delay work critical to the timely completion of the project. If the number of actual adverse weather days exceeds the number of days anticipated in the above listing, the Contractor may submit in writing to the Contracting Officer a request for a time extension within 30 days of the adverse weather. Based upon the above NOAA data the Contracting Officer will determine if the time extension for the Contractor is warranted. The Contracting Officer will then convert any qualifying delays to calendar days and issue a modification in accordance with the contract. Any Time extensions granted under this provision will be at no cost to the EXCHANGE.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION
SECTION 01 40 00
QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 REQUIREMENTS INCLUDED

A. The Contractor shall establish a quality control system to perform sufficient inspection and tests of all items of work, including that of his subcontractor(s) to insure conformation to applicable specifications and drawings with respect to the materials, workmanship, construction, finish and functional performance. Tests of materials and/or special inspections will be made, when required by these specifications, by applicable law, rules and regulations in accordance with respective Sections of the specifications. Where required, the Contractor shall employ and pay for the services of an independent agency to perform specific services and testing.

B. The Contractor shall arrange and pay for all services and testing which are not specifically indicated to be provided by EXCHANGE.

C. If a material is not required to be field tested, the Contracting Officer may require the supplier to furnish with each delivery of such material, a certificate bearing legal signature of said supplier, stating that such material complies with specification requirements.

D. If any work or material requiring tests and inspections is executed, enclosed or covered before tests are made, or test reports distributed, then the Contractor shall, at his own expense, uncover such part of this work or material and keep it uncovered until such tests and inspections have been made and test reports distributed. If work or material so tested and inspected shall not be found to conform to the requirements of the Construction Documents, it shall be deemed and construed to be defective materials or faulty workmanship and the Contractor, at his own expense, shall replace work or material removed and repair all work disturbed thereby.

1.2 EXCHANGE RESPONSIBILITY

A. No testing by Exchange.

1.3 CONTRACTORS RESPONSIBILITY

A. Contractor shall employ and pay for the services of an Independent Testing Agency to perform specified quality control testing during construction indicated in the following sections:

1. Testing Adjusting and Balancing for HVAC: Section 23 01 00.

B. Cooperate with the Contracting Officer and laboratory personnel and provide access to work an to manufacturer’s operations. Provide samples of materials to be tested, in required quantities. Furnish casual labor and facilities required to provide access to work to be tested; to obtain and handle samples at the site; to facilitate inspections and tests; and for laboratory’s exclusive use for storage and curing of test samples. Notify laboratory sufficiently in advance of operations to allow for its assignment of personnel and scheduling of tests.

C. The use of independent testing services shall in no way relieve the Contractor of his responsibility to furnish materials and construction in full compliance with the plans and specifications.
D. The Contractor shall coordinate testing laboratories so that the work will be inspected and tested according to contract requirements. This coordinately includes notification of when tests should be taken, easy access to the work, and general cooperation in every way to insure proper control of the work.

E. Upon completion of the project the Contractor shall submit a signed certificate stating tests for this work were made in accordance with provisions of these specifications and, further, all such tests and reports made were reported as required. This certificate shall list all tests and dates when work was completed.

1.4 AGENCY RESPONSIBILITIES

D. Test samples of mixes submitted by Contractor.

E. Provide qualified personnel at site. Cooperate with Contracting Officer and Contractor in performance of services.

F. Perform specified sampling and testing of Products in accordance with specified standards.

G. Ascertain compliance of materials and mixes with requirements of Contract Documents.

H. Promptly notify Contracting Officer, and Contractor of observed irregularities or non-conformance of Work or Products.

I. Perform additional tests required by Contracting Officer.

J. Provide Contracting Officer with three (3) copies of each written test report, and the Contractor each with one copy of each test report. Each report shall include:

1. Date issued.
2. Project title and number.
3. Testing Laboratory name, address and telephone number.
4. Name and signature of laboratory inspector.
5. Date and time of sampling or inspection.
6. Record of temperature.
7. Date of test.
8. Identification of product and specification section.
9. Location of sample or test in the project.
10. Type of inspection or test.
11. Results of tests and compliance with Contract Documents.
12. Interpretation of test results, when requested by the Contracting Officer.

H. Upon completion of the project, the testing agency shall prepare a certificate, certified in the presence of a Notary Public, stating testing for this work was conducted in accordance with the provisions of these specifications, and further, all tests and reports were provided for this job were reported as required.

1.5 LIMITS ON TESTING AUTHORITY

A. Agency or laboratory may not release, revoke, alter, or enlarge on requirements of Contract Documents.

B. Agency or laboratory may not approve or accept any portion of the Work.
C. Agency or laboratory may not assume any duties of Contractor.

D. Agency or laboratory has no authority to stop the Work.

1.6 RELATED REQUIREMENTS

A. Required Submittals Section 01 33 00.

B. Related requirements and tests specified in Division 2 through 33.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION 01 40 00
SECTION 01 50 00
TEMPORARY FACILITIES, BARRIERS AND CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

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

1.3 USE CHARGES

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

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

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

1.4 INFORMATIONAL SUBMITTALS

A. Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire-prevention program.

B. Dust- and HVAC-Control Plan: Submit coordination drawing and narrative that indicates the dust- and HVAC-control measures proposed for use, proposed locations, and proposed time frame for their operation. Identify further options if proposed measures are later determined to be inadequate. Include the following:
1. Locations of dust-control partitions at each phase of work.
2. HVAC system isolation schematic drawing.
3. Location of proposed air- filtration system discharge.
5. Other dust-control measures.

1.5 QUALITY ASSURANCE

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

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

C. Accessible Temporary Egress: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Interior Barriers for Phasing: Polyethylene Sheet: Reinforced, fire-resistive sheet, 10-mil (0.25-
mm) minimum thickness, with flame-spread rating of 15 or less per ASTM E 84 and passing NFPA 701 Test Method 2, secured to temporary wood or metal framework without excess sagging or pillowing.

B. Dust-Control Adhesive-Surface Walk-off Mats: Provide mats minimum 36 by 60 inches (914 by 1624 mm).

C. Spring-Loaded Poles, Ceiling/Wall Rails and Side Wall Clamps: Zipwall Barrier Products for fast set-up and break-down dust barrier system that consists of spring-loaded support poles that extend from 4 feet 7 inches to 12 feet that hold plastic sheeting in position as a curtain-barrier. Zipwall, 37 Broadway, Arlington MA 02474. Phone: 1-800-718-2255, website: www.zipwall.com. Also available are longer poles that adjust from 6 foot 9 inches to approximately 21 feet with spring loaded jacks.

D. Insulation: Unfaced mineral-fiber blanket, manufactured from glass, slag wool, or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively.

2.2 TEMPORARY FACILITIES

A. Common-Use Field Office: Of sufficient size to accommodate needs of Contractor, Owner, Architect, and construction personnel office activities and to accommodate Project meetings specified in other Division 01 Sections. Keep office clean and orderly. Coordinate "Storage and Fabrication Sheds" Paragraph below with Owner for use of existing building for storage and protection of materials to be incorporated into Project.

B. Temporary Restroom Rental Units (Location per Construction Phasing Plan): Provide and maintain, fully-functioning, pre-manufactured restroom units while the Customer Restrooms are
not in use. Provide temporary connections as needed for full operation of unit. Set unit level and fixed in place.

1. Portable Restroom Trailers, LLC 1-888-998-7689 Classic Double ADA 2 station portable restroom or equal.
   a. 105 gallon fresh water tank
   b. 350 gallon waste water tank
   c. 900 uses including hand washing per tank
   d. Garden hose water supply
   e. Power supply – 110v
   f. Men’s and Women’s ADA Compliant Suites
   g. Full flush toilet and sink
   h. Heat and AC
   i. Interior and Exterior LED Lighting

2. Portable Restroom Trailers, LLC 1-888-998-7689 Comfort Elite 10 station portable restroom or equal.
   a. 105 gallon fresh water tank
   b. 670 gallon waste water tank
   c. 6 toilets, 4 urinals
   d. Garden hose water supply
   e. Power supply – 120/30A
   f. Separate Men’s and Women’s Suites
   g. Full flush toilets and sinks
   h. Heat and AC
   i. Interior and Exterior LED Lighting

3. When building Restroom work is completed and fully operational, Contractor shall disconnect and remove temporary utilities, remove Temporary Restroom Units and return existing building site area back to pre-use conditions.

C. Storage and Fabrication Sheds: Provide temporary storage sheds as necessary to accommodate weather-sensitive materials and equipment for construction operations.

2.3 Store combustible materials apart from building

2.4 EQUIPMENT

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

B. Air-Filtration Units: Primary and secondary HEPA-filter-equipped portable units with four-stage filtration. Provide single switch for emergency shutoff. Configure to run continuously.
PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work.

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

3.2 TEMPORARY UTILITY INSTALLATION

A. Water Service: Install water service and distribution piping in sizes and pressures adequate for construction.

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

C. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.

D. Isolation of Work Areas in Occupied Facilities: Prevent dust, fumes, and odors from entering occupied areas.

1. Prior to commencing work, isolate the HVAC system in area where work is to be performed according to coordination drawings.
   a. Disconnect supply and return ductwork in work area from HVAC systems servicing occupied areas.
   b. Maintain negative air pressure within work area using HEPA-equipped air-filtration units, starting with commencement of temporary partition construction, and continuing until removal of temporary partitions is complete.

2. Maintain dust partitions during the Work. Use vacuum collection attachments on dust-producing equipment. Isolate limited work within occupied areas using portable dust-containment devices.

3. Perform daily construction cleanup and final cleanup using approved, HEPA-filter-equipped vacuum equipment.

E. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.

1. Provide dehumidification systems when required to reduce substrate moisture levels to level required to allow installation or application of finishes.
F. Electric Power Service: Connect to Owner's existing electric power service. Maintain equipment in a condition acceptable to Owner.
   1. Connect temporary service to Owner's existing power source, as directed by Owner.

G. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.
   1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.

3.3 SUPPORT FACILITIES INSTALLATION

A. General: Comply with the following:
   1. Provide construction for temporary offices, shops, and sheds located within construction area or within 30 feet of building lines that is noncombustible according to ASTM E 136. Comply with NFPA 241.
   2. Maintain support facilities until Architect schedules Substantial Completion inspection. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.

B. Parking: Use designated areas of Owner's existing parking areas, if available and approved by the Exchange for construction personnel.

C. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction.

D. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.
   1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

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

B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
   1. Comply with work restrictions specified in Section 01 10 00 Summary of Project.

C. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241; manage fire-prevention program.
1. Prohibit smoking in construction areas.
2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
4. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.

3.5 OPERATION, TERMINATION, AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.
B. Maintenance: Maintain facilities in good operating condition until removal.
C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.
D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

1. Materials and facilities that constitute temporary facilities are property of Contractor.
2. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 01 77 00 Project Closeout.

END OF SECTION 01 50 00
SECTION 01 51 00
TEMPORARY UTILITIES

PART 1  GENERAL

1.1  SECTION INCLUDES

A.  Temporary Utilities: Electricity, lighting, heat, ventilation, telephone service, water and sanitary facilities.

1.2  RELATED SECTIONS

A.  Section 01 50 00 – Temporary Facilities, Barriers and Controls  
B.  Section 01 77 00 - Project Closeout.

1.3  TEMPORARY ELECTRIC

A.  The contractor shall furnish and install a complete, temporary electric service for construction needs throughout the construction period.

1.  The temporary electric service shall originate from within the existing building.  
The electrical contractor shall be responsible for furnishing and installing all fused cutouts, conductors, disconnects, and miscellaneous hardware.

2.  The temporary electric service shall be a 120/208 volt, 3 phase, 4 wire, 200 amp service for construction operations.

3.  Provide power centers, located such that all points of the construction area can be reached with extension cords no more than 100 feet long.  Provide 20 amp, 120 and 208 volt grounded outlets, for use by all trades, each protected by a circuit breaker.

4.  The Contractor will not be charged for a reasonable amount of electricity consumed.  The contractor shall maintain strict conservation measures to prevent wasteful use of electricity.

5.  Use of electric resistance heating devices is not permitted.

6.  Unusually heavy electric loads, such as electric welding equipment, and other equipment with special power requirements shall not be connected to the existing system.

B.  Provide and maintain incandescent lighting for construction operations to achieve a minimum lighting level of five (5) foot candles.

1.  Provide branch wiring from power source to distribution boxes with lighting conductors, pigtails, and lamps as required.

2.  Provide guarded lighting sockets and lamps.  Use 100 watt lamps, minimum.  
Maintain 110 volts in lighting system.

3.  Maintain lighting and provide routine repairs.

4.  Permanent building lighting may be utilized during final stages of construction.

C.  Standards: the temporary electric service shall comply with the National Electric Code.  
Extension cords used by any and all trades, shall be UL approved.  No temporary power is to come from the building.
1.4 TEMPORARY HEATING

A. The Contractor may use the existing permanent heating system for temporary heat during construction, supplemented by temporary equipment if needed, under the following conditions:

1. Use of the existing permanent equipment does not spread hazardous or objectionable dust, fumes, mists, vapors, gases or odors into areas occupied by EXCHANGE or other Personnel or customers.
2. Use of the existing permanent equipment does not damage or cause excessive wear to the equipment.
3. The Contractor shall provide and pay for operation, maintenance, and replacement of filters and worn or damaged parts on the equipment used.

B. The Contractor will not be charged for a reasonable amount of fuel or energy used by the existing permanent equipment. The Contractor shall maintain strict conservation measures to prevent waste of fuel or energy.

C. The Contractor shall pay for the fuel consumed by temporary heating devices.

D. Temporary equipment using electric resistance heating is not permitted.

1.6 TEMPORARY COOLING

A. The Contractor may utilize the existing cooling system, extend and supplement with temporary cooling devices as needed to maintain specified conditions for construction operations.

B. The Contractor will not be charged for a reasonable amount of fuel or energy consumed by the existing system. The Contractor shall maintain strict conservation measures to prevent waste of fuel or energy.

1.7 TEMPORARY VENTILATION

A. The Contractor shall provide adequate ventilation to:

1. Aid in curing installed materials.
2. Dispersal of humidity.
4. Prevent hazardous accumulations of dust, fumes, mists, vapors, or gases in areas occupied during construction.

B. The Contractor may use the existing, permanent ventilating equipment, supplemented by temporary equipment, if required, under the following conditions:

1. Use of the existing, permanent equipment does not spread hazardous or objectionable dust, fumes, mists, vapors, gases, or odors into areas of the building occupied by EXCHANGE personnel or customers.
2. Use of the existing, permanent equipment does not cause damage to equipment.
3. The Contractor shall provide and pay for operation, maintenance, and replacement of filters and worn or damaged parts on the equipment used.
1.8 TEMPORARY WATER SERVICE

A. Connect to existing water source for construction operations at time of project mobilization.

B. The Contractor will not be charged for a reasonable amount of water consumed for construction purposes. The Contractor shall maintain strict conservation measures to prevent waste of water.

C. Extend branch piping with outlets located so water is available by hoses with threaded connections. Provide temporary pipe insulation to prevent freezing.

1.9 TEMPORARY SANITARY FACILITIES

A. Provide and maintain required facilities and enclosures. Existing facility and temporary customer facilities use is not permitted. Provide at time of project mobilization.

B. Furnish, install, and maintain adequate portable chemical toilets for use by construction personnel.

C. Provide regular maintenance service to maintain clean and sanitary conditions.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Temporary Egress: Maintain temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction.

B. Covered Walkway: Erect protective covered walkway for passage of individuals through or adjacent to areas of Work where overhead hazard exists.

C. Temporary Barriers: Provide floor-to-ceiling dustproof barriers to limit dust and dirt migration and to separate areas occupied by EXCHANGE and tenants from fumes and noise.

1. Dust Barrier: Where dust barriers are required, provide a single layer of 6 mil fire resistant clear polyethylene fiberglass reinforced sheet as manufactured by Griffolyn, or equal. Tape all joints and provide fire resistive treated 2 x 4 wood or metal stud top and bottom runners and verticals 4 foot o.c. with polyethylene sheet wrapped and taped to the runners.

2. Opaque Dust Barrier: Where dust barriers are required and where indicated for long duration separation of construction operations from EXCHANGE and tenant spaces, provide braced metal stud framing covered on construction side with 6 mil fire resistant clear polyethylene fiberglass reinforced sheet as manufactured by Griffolyn, or equal. Tape all joints and perimeter. Provide ½ inch gypsum board, fire taped on the EXCHANGE/tenant side from floor to ceiling. Provide R-11 batt insulation for thermal separation from unconditioned construction areas and noise reduction adjacent to sales, food service or office areas.
D. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241.

1. Prohibit smoking in construction areas.
2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.

END OF SECTION 01 51 00
SECTION 01 58 00
CONSTRUCTION SITE SIGN

PART 1 - GENERAL

1.1 SECTION INCLUDES
   A. Construction site sign.
   B. Maintenance.
   C. Removal.

1.2 RELATED SECTIONS
   A. Section 01 10 00 – Summary of Project.
   B. Section 01 33 00 Submittal Procedures.

1.3 QUALITY ASSURANCE
   A. Design sign and structure to withstand 60 miles/hr (100 km/hr) wind velocity.
   B. Sign Painter: Experienced as a professional sign painter for minimum three years.
   C. Finishes, Painting: Adequate to withstand weathering, fading, and chipping for duration of construction.

1.4 SUBMITTALS
   A. Show content, layout, lettering, color, structure, sizes, and grades of members.

PART 2 - PRODUCTS

2.1 SIGN MATERIALS
   A. Structure and Framing: New, wood, structurally adequate.
   B. Sign Surfaces: Exterior grade plywood with medium density overlay, minimum 3/4 inch (19 mm) thick, 48 inches x 96 inches.
   C. Rough Hardware: Galvanized.
   D. Paint and Primers: Exterior quality, two coats; sign background of color as indicated on the drawing.
   E. Graphics: Vinyl sign face graphic with adhesive backing printed to match electronic design file furnished by EXCHANGE (EF).
2.2 CONSTRUCTION SITE SIGN

A. One painted project sign of construction, design, and content shown on the next pages, location shown on drawings.

B. Contractor provide vinyl graphic with adhesive backing installed on Contractor prepared structure and painted background.

C. EXCHANGE will furnish electronic file with design information for use in manufacturing vinyl.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install construction site sign within 30 days after Notice to Proceed.

B. Erect at designated location.

C. Erect supports and framing on secure foundation, rigidly braced and framed to resist wind loadings.

D. Install sign surface plumb and level, with butt joints. Anchor securely.

E. Paint exposed surfaces of sign, supports, and framing.

3.2 MAINTENANCE

A. Maintain signs and supports clean, repair deterioration and damage.

3.3 REMOVAL

A. Remove signs, framing, supports, and foundations at completion of Project and restore the area.

END OF SECTION 01 58 00
SECTION 01 71 00
CLEANING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Progress Cleaning.
B. Final Cleaning.

1.2 RELATED SECTIONS

A. General Provisions of the Contract.
B. Section 01 10 00 – Summary of Project.
C. Section 01 14 50 - Cutting and Patching.
D. Section 01 55 00 – Temporary Facilities, Barriers and Controls.
E. Individual Specification Sections - Cleaning Requirements.

1.3 SAFETY REQUIREMENTS

A. Standards: Maintain project in accordance with the following safety and insurance standards:


B. O.S.H.A. Standards:

1. The Contractor shall be required to comply with OSHA Requirements in 29 CFR 1926 and 29 CFR in 1910. The OSHA Standards are subject to change, and such changes may affect the Contractor in his performance under the contract. It is the Contractor's responsibility to know such changes, effective dates of changes, and comply with all requirements.

C. Hazards Control:

1. Store volatile wastes in covered metal containers and remove from premises daily.
2. Prevent accumulation of wastes which create hazardous conditions.
3. Provide adequate ventilation during the use of volatile or noxious substances.

D. Conduct cleaning and disposal operations to comply with local ordinances and anti-pollution laws.

1. Do not burn or bury rubbish and waste materials on the installation.
2. Do not dispose of volatile wastes such as mineral spirits, oil, or paint thinner in storm or sanitary drains.
3. Do not dispose of wastes into streams or waterways.
PART 2 - PRODUCTS

2.1 MATERIALS
A. Use only cleaning materials recommended by the manufacturer of the surface to be cleaned.
B. Use cleaning materials only on surfaces recommended by cleaning material manufacturer.

PART 3 - EXECUTION

3.1 PROGRESS CLEANING
A. Execute cleaning to ensure that the building, grounds, and public properties are maintained free from accumulations of waste materials and rubbish.
B. Maintain site in a clean and orderly condition.
C. Wet down dry materials and rubbish to lay dust and prevent blowing dust.
D. Remove waste materials, debris, and rubbish from site and legally dispose of at public or private dumping areas off of Government property.
E. Vacuum clean interior building areas when ready to receive finish painting, and continue cleaning to eliminate dust.
F. Handle materials in a controlled manner with as few handlings as possible; do not drop or throw materials from heights. Open free-fall chutes are not permitted.
G. Schedule cleaning operations so that dust and other contaminants resulting from the cleaning process will not fall on wet, newly painted surfaces.

3.2 FINAL CLEANING
A. Employ professional cleaners for final cleaning.
B. In preparation for substantial completion or occupancy, conduct final inspection of sight-exposed interior and exterior surfaces and of concealed spaces.
C. Remove grease, dust, dirt, stains, temporary labels, fingerprints, and other foreign materials from sight-exposed interior and exterior finished surfaces; polish surfaces so designated to shine; finish vacuum carpeted and soft surfaces.
D. Repair, patch, and touch-up marred surfaces to specified finish, to match adjacent surfaces.
E. Clean all glass.
F. Replace air conditioning filters if units were operated during construction.
G. Clean ducts, blowers, and coils, if air H.V.A.C. units were operated without filters during construction.
H. Maintain cleaning until project, or portion thereof, is occupied by EXCHANGE.

END OF SECTION 01 71 00
SECTION 01 77 00
PROJECT CLOSEOUT

PART 1 - GENERAL

1.1 SECTION INCLUDES:

A. Substantial Completion.
B. Final Inspections.
C. Closeout Submittals.
   1. Operation and Maintenance Manuals.
   2. Operation and Maintenance Instruction.

1.2 RELATED SECTIONS:

A. General Provisions of the Contract: Final Acceptance and Payment.
B. Section 01 33 00 – Submittal Procedures.
C. Section 01 71 00 - Cleaning.
D. Section 01 72 39 - Project Record Documents.

1.3 SUBSTANTIAL COMPLETION:

A. Preliminary Procedures: Before requesting inspection, complete the following.
   1. Contractor's list of incomplete items (punch list) prepared.
      a. Submit PDF electronic file.
      b. Submit paper copies.
   2. Owner advised of pending insurance changeover.
   3. Warranties, maintenance service agreements, and similar documents submitted.
   4. Releases, occupancy permits, and operating certificates submitted.
   5. Project Record Documents submitted.
   6. Tools, spare parts, and extra materials delivered.
   7. Final changeover of locks performed.
   8. Startup testing completed.
   10. Temporary facilities removed.
   11. Owner advised of heat and utility changeover.
   13. Owner's personnel instructed in operation, adjustment, and maintenance of equipment and systems, including demonstration and training videotapes submitted.
B. Contractor:
   1. Submit written certification to Contracting Officer that project, or designated portion of Project, is substantially complete.
   2. Submit list of major items to be completed or corrected.

C. Contracting Officer will make an inspection after receipt of certification.

D. Should Contracting Officer consider that work is substantially complete:
   1. Contractor shall prepare, and submit to Contracting Officer, a list of items to be completed or corrected, as determined by the inspection.
   2. Contracting Officer will prepare and issue a Certificate of Substantial Completion, containing:
      a. Date of Substantial Completion.
      b. Contractor's list of items to be completed or corrected, verified, and amended by Contracting Officer.
      c. The time within which Contractor shall complete or correct work of listed items.
      d. Time and date EXCHANGE will assume possession of work or designated portion thereof.
      e. Responsibilities of EXCHANGE and Contractor for:
         (1) Utilities.
         (2) Operation of mechanical, electrical, and other systems.
         (3) Maintenance and cleaning.
         (4) Security.
      f. Signatures of:
         (1) Contracting Officer.
         (2) Contractor.
   3. EXCHANGE occupancy of project or designated portion of project:
      a. Contractor shall:
         (1) Perform final cleaning in accordance with Section 01 71 00.
      b. EXCHANGE will occupy project, under provisions stated in Certificate of Substantial Completion.
   4. Contractor: Complete work listed for completion or correction, within designated time.

E. Should Contracting Officer consider that work is not substantially complete:
   1. Contracting Officer shall immediately notify Contractor, in writing, stating reasons.
   2. Contractor: Complete work, and send second written notice to contracting officer, certifying that project, or designated portion of project, is substantially complete.
   3. Contracting Officer will reinspect work.

1.4 FINAL INSPECTION

A. Contractor shall submit written certification that:
   1. Contract documents have been reviewed.
2. Project has been inspected for compliance with contract documents.
3. Work has been completed in accordance with Contract Documents.
4. Equipment and systems have been tested in presence of Facility Representatives and are operational.
5. Project is completed and ready for final inspection.

B. Contracting Officer will make final inspection after receipt of certification.

C. Should the Contracting Officer consider that work is finally complete in accordance with requirements of contract documents, he shall request contractor to make project closeout submittals.

D. Should the Contracting Officer consider that work is not finally complete:
   1. He shall notify contractor, in writing, stating reasons.
   2. Contractor shall take immediate steps to remedy the stated deficiencies, and send second written notice to the Contracting Officer certifying that work is complete.
   3. The Contracting Officer will reinspect work.

1.5 PROJECT RECORD DOCUMENTS:

A. Project Record Documents: Specified requirements of Section 01 78 39.

1.6 OPERATION AND MAINTENANCE MANUALS:

A. Submit data bound in 8-1/2 x 11 inch text pages, three D side ring binders with durable plastic covers.

B. Prepare binder cover with printed title "Operation and Maintenance Manuals", title of project, and subject matter of binder when multiple binders are required.

C. Internally subdivide the binder contents with permanent page dividers, logically organized as described below; with tab titling clearly printed under reinforced laminated plastic tabs.

D. Contents: Prepare a Table of Contents for each volume, with each product or system description identified, typed on 20 pound white paper, in three parts as follows:
   1. Part 1: Directory, listing names, addresses, and telephone numbers of Contractor, Subcontractors, and major equipment suppliers.
   2. Part 2: Operation and maintenance instructions, arranged by system and subdivided by specification section. For each category, identify names, addresses, and telephone numbers of Subcontractors and suppliers. Identify the following:
      a. Significant design criteria.
      b. List of equipment.
      c. Parts list for each component.
      d. Operating instructions.
      e. Value chart.
      f. Maintenance instructions for equipment and systems.
      g. Maintenance instructions for finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents.
   3. Part 3: Project documents and certificates, including the following:
a. Shop drawings and product data.
b. Air and water balance reports.
c. Certificates.
d. Photocopies of warranties.
e. Training Sessions attendance roster.
f. Warrantees.

4: Part 4 WPAFB Requirements, include the following:

a. Assemble data packages into electronic Operation and Maintenance Manuals. Assemble each manual into a composite electronically indexed file using the most current version of Adobe Acrobat or similar software capable of producing PDF file format. Provide compact disks (CD) or data digital versatile disk (DVD) as appropriate, so that each one contains operation, maintenance and record files, project record documents, and training videos. Include a complete electronically linked operation and maintenance directory.

Bookmark Product and Drawing Information documents using the current version of CSI Masterformat numbering system, and arrange submittals using the specification sections as a structure. Use CSI Masterformat and UFGS numbers along with descriptive bookmarked titles that explain the content of the information that is being bookmarked.

Provide the following information on the disk label and disk holder or case:

a. Building Number
b. Project Title
c. Activity and Location
d. Construction Contract Number
e. Prepared For: (Contracting Agency)
f. Prepared By: (Name, title, phone number and email address)
g. Include the disk content on the disk label
h. Date
i. Virus scanning program used

E. Submit six (6) copies of the operation and maintenance manuals to the Contracting Officer.

1.7 OPERATION AND MAINTENANCE INSTRUCTION:

A. The Contractor shall provide, at his expense, manufacturer's representatives to completely check out all mechanical and electrical systems and items covered by the drawings and specifications. This requirement shall be scheduled just prior to, and during the initial start up. After all systems are functioning properly, the representatives shall instruct Facility Maintenance Personnel in the proper operation and maintenance of each item. In addition to instructions given at the project, the Facility Maintenance Personnel shall be given a classroom instruction course on operation and maintenance of the systems. Training sessions shall be limited to four (4) continuous hours where practical. Schedule additional four (4) hour sessions as required.

1.8 DD FORM 1354:

A. Preparation of DD Form 1354 "Transfer and Acceptance of Military Real Property": At the conclusion of the project the Contractor will compile and furnish to the Contracting Officer certain costs and quantity data of materials and systems furnished and installed. A list of items for which the costs and quantity data are required will be furnished to the Contractor. Such information will be...
returned to the Contracting Officer within 10 days from the receipt of the list. Form is attached at the end of Division 1.

1.9 WARRANTY AND EXTENDED WARRANTIES:

A. Upon completion of project, prior to final payment, guarantees required by technical divisions of Specifications shall be properly executed in quadruplicate by subcontractors and submitted to Contracting Officer. Delivery of guarantees shall not relieve contractor from any obligation assumed under contract.

B. Submit guarantee covering entire project for one year. In addition, where separate guarantees, for certain portions of work, are for longer periods, General Contractor's guarantee shall be extended to cover such longer periods.

C. Guarantees shall become valid and operative upon issuance of Certificate of Inspection and Acceptance by EXCHANGE. Guarantees shall not apply to work where damage is a result of abuse, neglect by EXCHANGE, or his successor(s) in interest.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION 01 77 00
SECTION 01 78 39

PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Submittals: Section 01 33 00 – Submittal Procedures.

1.2 RECORD FIELD DATA

A. General: Maintain at job site, two complete sets of Contract Documents. During construction, both sets shall be marked to show all deviations in actual construction from the Contract Documents.

1. Red Markers: Indicate all additions.
2. Green Markers: Indicate all deletions.

B. Record Documents: The drawings shall show, but no be limited to, the following information:

1. Locations and description of any utility lines and other installations of any kind or description known to exist within the construction area. Include dimensions and/or survey coordinates to permanent features.
2. Locations and dimensions of any changes within the building or structure and the accurate location and dimension of all underground utilities and facilities.
3. Correct grade or alignment of roads, structures and utilities if any changes were made from Contract Drawings.
4. Correct elevations if changes were made in site grading.
5. Changes in details of design or additional information obtained from shop drawings prepared or furnished by the Contractor including, but not limited to:
   a. Fabrication erection
   b. Installation and placing details
   c. Pipe sizes
   d. Insulation materials
   e. Equipment pad dimensions
6. Topography and grades of all drainage.
7. All changes or modifications from the original design.
8. Where contract drawings or specifications allow options, only the option actually used in the construction shall be shown on the Record Drawings. The option not used shall be deleted.

C. Record Field Data: All deviations shall be shown in the same general detail utilized in the Contract Documents. Marking of the documents shall continue throughout construction to keep the documents up to date.

1. Additional Data: The Contractor shall maintain the following:
a. Full size marked-up drawings.
b. Survey notes
c. Sketches
d. Nameplate data
e. Pricing information
f. Description and serial number of all equipment

2. Record field data shall be available for inspection by the Contracting Officer whenever requested and shall be jointly inspected for accuracy and completeness by the Contracting Officer and Contractor. Failure to keep record field data current shall be sufficient justification to withhold a retained percentage from the monthly Application for Payment.

D. Submittal of Record Field Data:

1. Submit two sets to the Contracting Officer a minimum of 20 calendar days prior to the date of final inspection.
2. The Contractor shall make all corrections identified during Contractor Officer review and resubmit corrected data within ten (10) calendar days of receipt.
3. When data is accepted as complete, one set of documents will be returned to the Contractor for completion of the Record Documents.

1.3 RECORD ELECTRONIC FILE DOCUMENTS

A. Electronic File Format: No earlier than 30 days after award, the Contracting Officer will provide one set of AutoCAD electronic file format contract drawings to be used for preparation of Record Drawings.

1. Media: ISO – 9660 CD
2. The Contractor shall verify usability of AutoCAD files and notify the Contracting Officer of any discrepancies within 30 calendar days of receipt. Any discrepancies will be corrected and files returned to the Contractor.
3. The Contractor shall incorporate all deviations from the original Contract Documents as recorded in the approved “Record Field Data” as indicated in Paragraph 1.2.C above.
4. The Contractor shall also incorporate all written modifications to the Contract Documents which were issued by amendment or contract modification.
5. All revisions and changes shall be incorporated:
   a. Items marked deleted shall be deleted.
   b. Clouds around new items shall be removed.

B. Electronic File Submittal: Submit a complete set of Record Drawings in AutoCAD electronic file format no later than 30 days after final acceptance. The Record Drawings shall be done in equal quality to the originals, including line work, line weights, lettering and symbols. Identify each drawing with the word “RECORD” in block letters at least 3/8” high above the title block. The date of completion and the words “Revised Record” shall be placed in the revision block above the latest revision notation.

1. Format: AutoCAD Release 2014 ‘DWG’ format. All support files required to display or plot the files in the same manner as they were developed shall be delivered along with the files, including but not limited to:
   a. Font files
b. Menu files

c. Plotter setup

d. Referenced files

2. Layering: Conform to AIA Standard Document, “CAD Layer Guidelines,” latest version. An explanatory list of which layer is used at which drawing and an explanatory list of all layers which do not conform to the standard AIA CAD Layer Guidelines including any user definable fields permitted by the guidelines shall be provided with each submittal.

3. Electronic File Deliverable Media: ISO 9660 Format CD-ROM. Submit three (3) complete sets of disks and one complete set of full size reproducible prints taken from the disks. Each disk shall have a clearly marked label stating the Contractor’s firm name, project name and location, submittal type (record) and date. Each submittal shall be accompanied by a hard copy transmittal sheet that contains the above information along with tabulated information about each file as shown below:

<table>
<thead>
<tr>
<th>Electronic File Name</th>
<th>Plate Number</th>
<th>Drawing Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Include electronic version of the table.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4. Submit one copy of the CD-Rom and one set of full-size Mylar reproducibles of the drawings to (Building Records staff person) at (Post or Base).

1.4 SUBMITTAL OF FINAL RECORD DRAWINGS

A. Complete and return the final record documents and the approved preliminary record documents to the Contracting Officer within 30 calendar days of final acceptance.

1. All drawings from the original contract documents shall be included, including drawings where no changes were made.

2. The drawings will be returned to the Contractor if corrections are necessary.

3. The Contractor shall make all corrections and shall return the drawings to the Contracting Officer within seven (7) calendar days of receipt.

1.5 RECORD DOCUMENT COST

A. All costs incurred by the Contractor in the proportion and furnishing of record documents, including electronic file format, shall be included in the contract price and no separate payment will be made for this work.

1. Approval and acceptance of the final record documents shall be accomplished before final payment is made to the Contractor.

1.6 SYSTEM ACCEPTANCE TESTING

A. Provide one set of marked-up record drawings at the time of system acceptance testing. These record drawings shall be in addition to the submittal of marked-up record drawings specified elsewhere in the contract.

PART 2 – PRODUCTS (NOT USED)
PART 3 – EXECUTION (NOT USED)
### TRANSFER AND ACCEPTANCE OF DoD REAL PROPERTY

The public reporting burden for this collection of information is estimated to average 30 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing the burden, to the Department of Defense, Washington Headquarters Services, Executive Services Directorate, Information Management Division, 1155 Defense Pentagon, Washington, DC 20301-1155 (0704-0188). Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.

**PLEASE DO NOT RETURN YOUR COMPLETED FORM TO THE ABOVE ORGANIZATION.**

<table>
<thead>
<tr>
<th>1. FROM</th>
<th>2. DATE PREPARED</th>
<th>3. PROJECT/JOB NUMBER</th>
<th>4. SERIAL NUMBER</th>
<th>8. TRANSACTION DETAILS</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Organization Name)</td>
<td>(YYYYMMDD)</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>5. TO</th>
<th>6. RPSUID/SITENAME/INSTCODE/INSTNAME</th>
<th>7. CONTRACT NUMBER(S)</th>
<th>7a. PLACED-IN-SERVICE DATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Organization - Installation Code and Name)</td>
<td></td>
<td>(YYYYMMDD)</td>
<td></td>
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</tbody>
</table>

|------------|------------------|------------|------------------|------------------------|----------------|------------------------|------------------|--------------------------|------------------|

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<table>
<thead>
<tr>
<th>23. STATEMENT OF COMPLETION. The facilities listed hereon are in accordance with maps, drawings, and specifications and change orders approved by the authorized representative of the using agency except for the deficiencies listed on the reverse side.</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. TRANSFERRED BY (Typed Name and Signature)</td>
</tr>
<tr>
<td>c. TITLE (Area Engr./Base Engr./DPW/Construction Agent)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>24. ACCEPTED BY (Typed Name and Signature)</th>
<th>b. DATE SIGNED (YYYYMMDD)</th>
</tr>
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<tbody>
<tr>
<td>b. DATE SIGNED (YYYYMMDD)</td>
<td>c. TITLE (DPWRPAO)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>25. PROPERTY VOUCHER NUMBER</th>
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</thead>
</table>

**DD FORM 1354, SEP 2009**

PREVIOUS EDITION IS OBSOLETE.
## 26. CONSTRUCTION DEFICIENCIES

(Attach blank sheet for continuations)

### GENERAL
This form has been designed and issued for use in connection with the transfer of military real property between the military departments and to or from other government agencies. It supersedes ENG Forms 290 and 290B (formerly used by the Army and Air Force) and NAVDOCKS Form 2317 (formerly used by the Navy).

Existing instructions issued by the military departments relative to the preparation of DD Form 1354 are applicable to this revised form to the extent that the various items and columns on the superseded forms have been retained. The military departments may promulgate additional instructions, as appropriate.

For detailed instructions on how to fill out this form, please refer to Unified Facilities Criteria (UFC) 1-300-08, dated 16 April 2009 or later.

### SPECIFIC DATA ITEMS

1. **From.** Name of the transferring agency.
2. **Date Prepared.** Date of actual preparation. Enter all dates in YYYYMMDD format (Example: March 31, 2010 = 20100331).
3. **Project/Job Number.** Project number on a DD Form 1391 or Individual Job Order Number.
4. **Serial Number.** Sequential serial number assigned by the preparing organization (e.g., 2010-0001).
5. **To.** Name and address of the receiving installation, activity, and Service of the Real Property Accountable Officer (RPAO).
6. **RPSUID/SITENAME/INSTCODE/INSTNAME.** Real Property Site Unique Identifier and Site Name or Installation Code and Installation Name where the constructed facility is located.
7. **Contract Number(s).** Contract number(s) for this project.
8. **Placed-In-Service Date.** RPA Placed In Service Date. This is the date the asset is actually placed-in-service.
9. **Transaction Details.**
   a. **Method of Transaction.** Mark (X) as many boxes as apply.
   b. **When/Event.** When or event causing preparation of DD Form 1354. X only one box.
   c. **Type.** Draft, interim, or final DD Form 1354. X only one box.
10. **Item Number.** Use a separate item number for each facility, no item number for additional usages.

## 27. PROJECT REMARKS

(Attach blank sheet for continuations)

### INSTRUCTIONS

10a. **Facility Number.** Assigned in accordance with the Installation/Base Master Numbering Plan.
10b. **RPUID.** Real Property Unique Identifier - Identified in Real Property Inventory.
11. **Category Code.** The category code describes the facility usage.
12. **Catcode Description.** The category code name which describes the facility usage.
13. **Type Code.** Construction Type Code - Type of construction: P for Permanent; S for Semi-permanent; T for Temporary.
14. **Primary Unit Of Measure.** Area unit of measure; use the unit of measure associated with the category code selected in 11.
15. **Primary Unit of Measure Quantity.** The total area for the measure identified in Item 14. Use negative numbers for demolition.
16. **Secondary Unit of Measure.** Unit of Measure 2 is the capacity or other measurement unit (e.g., LF, MB, EA, etc.).
17. **Secondary Unit of Measure Quantity.** The total capacity/other for the measure identified in Item 16.
18. **Cost.** Cost for each facility; for capital improvements to existing facilities, show amount of increase only. If there is no increase for the capital improvement, enter N/A.
19. **Fund Source.** Enter the Fund Source Code for this item.
20. **Funding Organization.** Enter the code for the organization responsible for acquiring this facility.
21. **Interest Code.** RPA Interest Type Code. Enter the code that reflects government interest or ownership in the facility.
22. **Item Remarks.** Remarks pertaining only to the item number identified in Item 9; show cost sharing.
23. **Statement of Completion.** Typed name, signature, title, and date of signature by the responsible transferring individual or agent.
24. **Accepted By.** Typed name, signature, title, and date of signature by the RPAO or accepting official.
25. **Property Voucher Number.** Next sequential number assigned by the RPAO in voucher register.
26. **Construction Deficiencies.** List construction deficiencies in project during contractor turnover inspection.
27. **Project Remarks.** Project level remarks and continuation of blocks.
SUGGESTED INSTRUCTIONS FOR PREPARING DD FORM 1354
(TRANSFER AND ACCEPTANCE OF MILITARY REAL PROPERTY)

1. The page number and the total number of pages comprising each transfer shall be shown in the space provided at the top right-hand part of the form.

2. When two or more pages are required, Items 27 through 29 shall be completed only on the final page. In such cases, the bottom portion of the form shall be torn off of all pages, except the final page, at the line above Items 27 and 28.

ITEM 1 - Self – explanatory

ITEM 2 - Primarily for Navy use, the district number will be assigned by area or district public works office in accordance with coding pattern set forth in NAVEXOS P-1570, par. 3805-7, Item 6. For Army use, enter appropriate Army Engineer district where construction is performed and/or from which the transfer is made. For transfer of construction to the Air Force, enter appropriate Army Engineer district or the district number assigned by area, or Naval district public works office from which the construction transfer is made.

ITEM 4 - For Navy use only, see NAVEXOS P-1570, par. 3805-7, Item 5.

ITEM 5 - Enter date of preparation.

ITEM 6 – For Army use, enter appropriate Army job and directive number. For Air Force use, enter base job number, as appropriate, when form is used for transfer within the Air Force.

ITEM 7 – For Army use, or for transfer of construction to the Air Force, enter separate series of numbers, by fiscal year, for each installation to which real property is transferred; e.g., for FY 1962 show 62-1, 62-2, etc. For Navy use, this serial number will be assigned by respective area or district public works office and will represent the numerical sequence of submissions by respective contract number.

ITEM 8 – Insert appropriate contract number.

ITEM 9 – Self-explanatory.

ITEM 10 – 12: Instructions for Items 2,3 and 4 apply. (not applicable for Air For Use.)

ITEM 13 – For Navy use only. Insert the accounting number assigned to or used by the activity named in accordance with Item 9. See NAVEXOS P-1570, par. 3805-7, Item 10.

ITEM 14 – For Navy use only. Insert the accounting number assigned to the activity performing the official property accounting for the activity shown in Item 9. See NAVCompt Manual, Vol. 2, Chapter 5, for accounting numbers.

ITEM 15 – Insert an “X” in the appropriate box of block (A) to indicate whether the transfer involves new construction, existing facilities or capital improvements to existing facilities. If the “other” category is used, explain in remarks, Item 31. Additionally, insert an “X” in the appropriate box of block (B) to indicate whether transfer is being made at time of beneficial occupancy, physical completion or financial completion (with respect to new construction). If the “other” category is used, explain in remarks, Item 31.

ITEM 16 – Enter the code number assigned to identify the project with the appropriate construction authorization law.

ITEM 17 – Each single entry will be identified as an item number and this item number will be shown in this column.

ITEM 18 – 19: Category Code and Description. Enter the category code and description (see DoD Instruction 4165.3 (reference (a)) or attachment 1 to enclosure 1 to DoD Instruction 4165.14 (reference (b)) that appropriately describes the primary use for which the facility (buildings, structures, utilities) is designed. Not more than one category code (Item 18) will be listed as a line item (Item 17).
ITEM 20 – Number of Units in terms of buildings or other structures.

ITEM 21 – Type – enter type of construction; i.e., “P” for permanent, “S” for semipermanent or “T” for temporary.

ITEM 22 – Enter the unit of measure abbreviation, such as “SF” for square feet, etc. (see attachment 2 to enclosure 1 to DoD Instruction 4165.14 (reference (b)).

ITEM 23 – Enter total quantity as described in Item 22.

ITEM 24 – Indicate by item number, category code, and description the appropriate cost. In those instances where a document is prepared which lists items carrying costs which, in some cases, may be final and in others may be preliminary, each cost figure by line item will carry an alphabetical suffix of (P) for preliminary or (F) for final.


#First amendment (Ch 1, 7/28/67)
## Transfer and Acceptance of Military Real Property

<table>
<thead>
<tr>
<th>ITEM NO.</th>
<th>CATEGORY CODE</th>
<th>FACILITY (category description)</th>
<th>NO. OF UNITS</th>
<th>TYPE</th>
<th>UNIT OF MEAS</th>
<th>TOTAL QUANTITY</th>
<th>COST</th>
<th>DRAWING NUMBERS</th>
<th>REMARKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>17</td>
<td>18</td>
<td></td>
<td>19</td>
<td>20</td>
<td>21</td>
<td>22</td>
<td>23</td>
<td>24</td>
<td>25</td>
</tr>
</tbody>
</table>

27. **Statement of Completion:** The facilities listed hereon are in accordance with maps, drawings, and specifications and change orders approved by the authorized representative of the using agency except for the deficiencies listed on the reverse side.

28. **Accepted By (Signature):**

29. **Property Voucher Number:**

**DD Form 1354**

**SUPERSEDES ENG FORMS 290 AND 290B**

**AND NAVDOCKS FORM 2317**
### 30. CONSTRUCTION DEFICIENCIES

This form has been designed and issued for use in connection with the transfer of military real property between the military departments and to or from other government agencies. It supersedes ENG Forms 290 and 290B (formerly used by the Army and Air Force) and NAVDOCKS Form 2317 (formerly used by the Navy).

Existing instruction issued by the military departments relative to the preparation of the three superseded forms are applicable to this form to the extent that the various items and columns on the superseded forms have been retained. Additional instructions, as appropriate, will be promulgated by the military departments in connection with any new items appearing hereon.

With the issuance of this DD form, it is not intended that the department shall revise and reprint manuals and directives simply to show the number of this DD form. Such action can be accomplished through the normal course of revision for other reasons.

### 31. REMARKS
ITEMS FOR DD FORM 1354

CATEGORY CODES: VERIFY FOR ARMY FACILITIES AND AIR FORCE FACILITIES OF THE SAME DESCRIPTION • • • (ABBREVIATION-NOMENCLATURE)

* DESCRIPTION: ARMY AIR FORCE
SHOPPING CENTER: (EXCH MAIN RETL) : 740-53 (EXCH SALES STORE) 740111
SHOPPETTE (EXCHANGE BRANCH) :740-50 (EXCH BRANCH) 740382
CLASS SIX (CLASS VI) :740-84 (BSE PACKAGE STORE) 740269
CAR CARE CENTER (EXCH SVC STA) :740-52 (EXCH SVC STN) 740383
BURGER KING (POST RESTAURANT) :740-64 (EXCH CAFE SNK BAR) 722345

<table>
<thead>
<tr>
<th>CATEGORY CODE</th>
<th>DESCRIPTION</th>
<th>COST</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. BUILDING SQUARE FOOTAGE:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A. RETAIL AREAS: ______SF</td>
<td>B. ADMIN/EMPLOYEE AREA ______SF</td>
<td></td>
</tr>
<tr>
<td>C. MPA: ______SF</td>
<td>D. SERVICES ACTIVITIES: ______SF</td>
<td></td>
</tr>
<tr>
<td>E. FOOD ACTIVITIES ______SF</td>
<td>F. MALL/PUBLIC TOILETS: ______SF</td>
<td></td>
</tr>
<tr>
<td>G. MERCH. EQUIP. RM ______SF</td>
<td>H. TOTAL BLDG: ______SF</td>
<td></td>
</tr>
<tr>
<td>2. BUILDING</td>
<td>$ ________________</td>
<td></td>
</tr>
<tr>
<td>(TOTAL CONTRACT PRICE LESS THE SUM OF THE FOLLOWING)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. HEATING, VENTILATION &amp; AIR CONDITIONING SYSTEM</td>
<td>$ ________________</td>
<td></td>
</tr>
<tr>
<td>TOTAL: NUMBER OF HEADS__________</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. FIRE PROTECTION SYSTEM (FIRE ALARM SYS)</td>
<td>$ ________________</td>
<td></td>
</tr>
<tr>
<td>AUTOMATIC SPRINKLER SYSTEM</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(AR)826-11 OVER 100 TONS (AC PL OV 110 TN)</td>
<td>(AR)880-50 AUTO SPNLKR SYS</td>
<td></td>
</tr>
<tr>
<td>(AF)826123 OVER 100 TONS (A/C PLT OVET 100 TN)</td>
<td>(AF)880221 AUTO FR DTECTN SYS</td>
<td></td>
</tr>
<tr>
<td>(AR)826-12 26-100 TONS (AC PL-26-100 TN)</td>
<td>TOTAL: NUMBER OF HEADS__________</td>
<td></td>
</tr>
<tr>
<td>(AF)826122 25-100 TONS (A/C PLT 25&lt;100 TN)</td>
<td>FOAM FIRE SPRINKLER SYSTEM</td>
<td></td>
</tr>
<tr>
<td>(AR)826-13 6-25 TONS (AC PL 6-25- TN)</td>
<td>(AR)843-11 FIRE HYDRANTS</td>
<td></td>
</tr>
<tr>
<td>(AF)890121 5-25 TONS (A/C PL 5 TO 25 TN)</td>
<td>(AF)843315 (FR HYDR)</td>
<td></td>
</tr>
<tr>
<td>UNDERGROUND ELECTRICAL SYSTEM (INCLUDE. METER $ ________________</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. UNDERGROUND ELECTRICAL SYSTEM (INCLUDE. METER $ ________________</td>
<td></td>
<td></td>
</tr>
<tr>
<td>UNGD ELEC DISTR)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(AR)812-42 UNGD ELEC DISTR)</td>
<td>(AF) (SEC DISTR LNE UG)</td>
<td></td>
</tr>
<tr>
<td>(AF)890181 (UTIL LNE DUCTS)</td>
<td>TOTAL SERVICE TO BUILDING:_______L.F OF____IN. CONDUIT</td>
<td></td>
</tr>
<tr>
<td>AND________________CONDUCTOR</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CATEGORY CODE</td>
<td>DESCRIPTION</td>
<td>COST</td>
</tr>
<tr>
<td>---------------</td>
<td>-------------</td>
<td>------</td>
</tr>
<tr>
<td>6. ELECTRICAL TRANSFORMER</td>
<td>(TRANSFORMER)</td>
<td>$ ______________________</td>
</tr>
<tr>
<td>(AR)813-60</td>
<td>(PRIM DISTR LNE UG)</td>
<td>PAD MOUNTED TRANSFORMER ___________ KVA</td>
</tr>
<tr>
<td>(AF)812225</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. NATURAL GAS LINE TO BUILDING (INC. METER)</td>
<td>(GAS PIPE LIBE)</td>
<td>$ ______________________</td>
</tr>
<tr>
<td>(AR)824-10</td>
<td>(GAS MAINS)</td>
<td>TOTAL SERVICE TO BUILDING: ___________ L.F. OF ___________ IN. PIPE</td>
</tr>
<tr>
<td>(AF)824464</td>
<td>(MATERIAL: _______________)</td>
<td></td>
</tr>
<tr>
<td>8. UNDERGROUND TELEPHONE</td>
<td>(UNDG TELEPHONE)</td>
<td>$ ______________________</td>
</tr>
<tr>
<td>(AR).....</td>
<td>(TEL DUCT FCLTY)</td>
<td>TOTAL SERVICE TO BUILDING: ___________ L.F. OF ___________ IN. CONDUIT</td>
</tr>
<tr>
<td>(AF)135583</td>
<td>(UTIL LNE DUCTS)</td>
<td></td>
</tr>
<tr>
<td>(AF)890181</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. SANITARY SEWER SYSTEM</td>
<td>(SANITARY SEWER)</td>
<td>$ ______________________</td>
</tr>
<tr>
<td>(AR)832-10</td>
<td>(SAN SEWAGE MAIN)</td>
<td>TOTAL SERVICE TO BUILDING: ___________ L.F. OF ___________ IN. PIPE</td>
</tr>
<tr>
<td>(AF)932267</td>
<td>(MATERIAL: _______________)</td>
<td></td>
</tr>
<tr>
<td>10. GREASE INTERCEPTOR</td>
<td>(LOCAL DESCRIPTION)</td>
<td>$ ______________________</td>
</tr>
<tr>
<td>(AR)833-90</td>
<td>CAPACITY ___________ GALLONS</td>
<td></td>
</tr>
<tr>
<td>11. STORM SEWER SYSTEM</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(AR)871-10</td>
<td>(STRM DRN DSPL)</td>
<td>TOTAL SERVICE TO BUILDING: ___________ L.F. OF ___________ IN. PIPE</td>
</tr>
<tr>
<td>(AF)871183</td>
<td>(MATERIAL: _______________)</td>
<td>TOTAL NUMBER OF DROP INLETS: ___________</td>
</tr>
<tr>
<td>12. DOMESTIC WATER SYSTEM</td>
<td>(WATER PIPE LN P)</td>
<td>$ ______________________</td>
</tr>
<tr>
<td>(AR)842-10</td>
<td>(WTR DISTR MAINS)</td>
<td>TOTAL SERVICE TO BUILDING: ___________ L.F. OF ___________ IN. PIPE</td>
</tr>
<tr>
<td>(AF)842245</td>
<td>(INCLUDING METER &amp; BACK FLOW PREVENTER)</td>
<td></td>
</tr>
<tr>
<td>13. LANDSCAPE IRRIGATION SYSTEM</td>
<td>(IRRIGATION FAC)</td>
<td>$ ______________________</td>
</tr>
<tr>
<td>(AR)871-30</td>
<td>TOTAL NUMBER OF HEADS ___________</td>
<td></td>
</tr>
<tr>
<td>14. DUMPSTER ENCLOSURE</td>
<td>(REFUSE COLL BLD)</td>
<td>$ ______________________</td>
</tr>
<tr>
<td>(AR)833-12</td>
<td>TOTAL AREA: ___________ S.F.</td>
<td></td>
</tr>
</tbody>
</table>
ITEMS FOR DD FORM 1354  (CONTINUED)

<table>
<thead>
<tr>
<th>CATEGORY CODE</th>
<th>DESCRIPTION</th>
<th>COST</th>
</tr>
</thead>
<tbody>
<tr>
<td>15. PAVING (NON ORGANIZATION VEHICLE PARKING)</td>
<td>(NON ORG VEH PRK) (VEH PKING N/ORGN) TOTAL ASPHALT PAVING: ________ S.Y. OF ______ IN. THICK W/ ______ IN. BASE MATERIAL TOTAL CONCRETE PAVING: ________ S.Y. OF ______ IN. THICK W/ ______ IN. BASE MATERIAL</td>
<td>$ ______________________</td>
</tr>
<tr>
<td>16. CONCRETE WALKS, SLABS &amp; PADS</td>
<td>(SIDEWALK) PEDESTRIAN TRAFFIC TOTAL AREA: ________ S.F. (EXCLUDING PAVER TILES)</td>
<td>$ ______________________</td>
</tr>
<tr>
<td>17. CONCRETE CURBS &amp; GUTTERS</td>
<td>(ROADS PAVED) (CURBS &amp; GUTTERS) TOTAL AREA: ________ L.F.</td>
<td>$ ______________________</td>
</tr>
<tr>
<td>18. EXTERIOR SITE LIGHTING (EXT LIGHTING)</td>
<td>(EXT LIGHTING) (EXTERIOR AREA LTG) TOTAL NUMBER OF POLES</td>
<td>$ ______________________</td>
</tr>
<tr>
<td>19. LANDSCAPING (RELATED LAND IMPROV NB)</td>
<td>(RELATED LAND INPROV NB)</td>
<td>$ ______________________</td>
</tr>
<tr>
<td>21. CHAIN LINK FENCING (FENCE OR WALLS)</td>
<td>(FENCE OR WALLS) (FENCE INTERIOR) TOTAL LINEAR FEET: ________ L.F.</td>
<td>$ ______________________</td>
</tr>
<tr>
<td>22. TOTAL CONSTRUCTION COSTS:</td>
<td></td>
<td>$ ______________________</td>
</tr>
</tbody>
</table>
ITEMS FOR DD FORM 1354  (CONTINUED)

ADDITIONAL INFORMATION REQUIRED

MECHANICAL SYSTEMS

H.V.A.C. UNITS

<table>
<thead>
<tr>
<th>#</th>
<th>MANUFACTURER</th>
<th>MODEL #</th>
<th>CAPACITY</th>
<th>SERIAL #</th>
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<tbody>
<tr>
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</table>

EXHAUST FANS

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<tr>
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<th>MODEL #</th>
<th>CAPACITY</th>
<th>SERIAL #</th>
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</thead>
<tbody>
<tr>
<td>1.</td>
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</table>

SUPPLY FANS

<table>
<thead>
<tr>
<th>#</th>
<th>MANUFACTURER</th>
<th>MODEL #</th>
<th>CAPACITY</th>
<th>SERIAL #</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
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<td>2.</td>
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<tr>
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<tr>
<td>4.</td>
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</tr>
</tbody>
</table>

CHILLER

BOILER

HEAT PUMP

ROOFTOP A/C UNITS

DOCK LEVELERS

DOCK SHELTERS

ELECTRICAL

DISTRIBUTION PANELS / LIGHT FIXTURES

<table>
<thead>
<tr>
<th>ITEM NO</th>
<th>MANUFACTURER</th>
<th>MODEL NUMBER</th>
<th>QUANTITY</th>
<th>DESCRIPTION</th>
</tr>
</thead>
</table>

PLUMBING

<table>
<thead>
<tr>
<th>#</th>
<th>MANUFACTURER</th>
<th>MODEL #</th>
<th>CAPACITY</th>
<th>SERIAL #</th>
</tr>
</thead>
</table>
| WATER HEATER
| WATER CLOSET
| WATER CLOSET (H.C.)
| URINAL
| LAVATORY
| LAVATORY (H.C.)
| FLOOR SINKS (#)
| FLOOR DRAINS (#)
| MOP SINK
| ROOF DRAINS (#) |
ITEMS FOR DD FORM 1354 (CONTINUED)

ADDITIONAL INFORMATION REQUIRED

FIRE PROTECTION SYSTEMS FOR FOOD ACTIVITIES

ANSUL CHEMICAL FIRE SUPPRESSION SYSTEM
TYPE OF SYSTEM:____________
TOTAL NUMBER OF:
  HEADS________ AUTOMAN RELEASE________
  REMOTE MANUAL PULL STATIONS________
  SNAP ACTION ASSEMBLIES______________
  MECHANICAL GAS SHUTOFF VALVES______

ITEMS REQUIRED IN CLOSE OUT DOCUMENTS

1. GENERAL CONTRACTOR’S TESTING / TRAINING REPORTS:
   A. TEST AND BALANCE REPORT ON MECHANICAL SYSTEMS
   B. CERTIFICATION OF GROUNDING (RESISTANCE) POWER
   TRANSMISSION
   C. INSTRUCTION / TRAINING SESSIONS ON ALL
      MECH/ELEC/EQUIPMENT (INCLUDING PARTICIPANTS’ ROSTER)
2. GENERAL CONTRACTOR’S WARRANTY
3. ROOF(S) WARRANTY
4. ELECTRIC WARRANTY
5. HVAC WARRANTY
6. GREENHOUSE WARRANTY
7. TERMITE PROTECTION GUARANTEE
8. GENERAL CONTRACTOR’S STATEMENT ON “NO ASBESTOS BEARING
   MATERIALS” USED IN CONSTRUCTION
SECTION 02 08 10

REMOVAL AND DISPOSAL OF ASBESTOS CONTAINING MATERIALS (WPAFB)
2/10

PART 1 - GENERAL

1.01 SECTION INCLUDES   This specification pertains to the removal, handling and disposal of Asbestos Containing Materials (ACM). This includes all labor, materials and equipment required to prevent a release to the environment and protect personnel from exposure to airborne asbestos fibers.

1.02   APPLICABLE PUBLICATIONS: The contractor shall have at least one copy of all applicable publications listed below available at the job site at all times.

   A.  Environmental Protection Agency (EPA)


          2.  Title 40 Code of Federal Regulation, Part 763. Subpart 5, Appendix C, Accreditation Requirements

          3.  EPA 560/5-85-024, Guidance for Controlling Asbestos Containing Materials in Buildings

   B.  Occupational Safety and Health Administration (OSHA)


          2.  Title 29 Code of Federal Regulations, Part 1910 (ALL)

   C.  Department of Transportation (DOT) Title 49, Code of Federal Regulations, Sections 171 and 172, Hazardous Substances Final Rule

   D.  Ohio Revised Code (ORC), Sections 3710.01 through 3710.99

   E.  Ohio Administrative Code (OAC), Chapter 3745-20 and 3701-34

   F.  Underwriters Laboratories, Inc., U.L. 586, High Efficiency, Particulate, Air Filters Units.

1.03   QUALIFICATIONS

   A.  The contractor shall have a current license as an Asbestos Hazard Abatement Contractor issued by the Ohio Department of Health (ODH).

   B.  The designated competent person shall be employed directly by the Contractor and certified as an Asbestos Hazard Abatement Specialist by the ODH. The competent person shall be listed on the ODH notification and on site during all abatement activities.

   C.  The Certified Industrial Hygienist (CIH) shall be currently certified by the American Board of Industrial Hygiene in comprehensive practice.
D. The Industrial Hygiene (IH) technician or Air Monitoring Technician (AMT) shall be certified as an Asbestos Hazard Evaluation Specialist by the ODH.

E. The testing laboratory shall be a current participant in the National Institute of Occupational Safety and Health (NIOSH) Proficiency Analytical Testing (PAT) Program for Asbestos Analysis. The testing laboratory shall also be accredited by the American Industrial Hygiene Association (AIHA) Program for Phase-Contrast Microscopy (PCM) analysis and the National Voluntary Laboratory Association Program (NVLAP) for Transmission Electron Microscopy (TEM) analysis.

F. The landfill used for disposal shall be EPA approved for all friable and category II non-friable ACM. Category I non-friable ACM may be disposed of in a sanitary landfill.

1.04 DEFINITIONS

A. Terms used in the specification section applicable to asbestos abatement work shall be as defined in 29 CFR 1926.1101.b, 40 CFR 61.141, and Ohio Administrative Code 3745-20-01.

B. CIH is defined as an individual certified in comprehensive practice by the American Board of Industrial Hygiene, 6015 West St. Joseph, Suite 102, Lansing, MI 48917 3980.

C. The following terms are defined in the Ohio Revised Code, Section 3710.01 through 3710.99:

1. Asbestos Hazard Abatement Contractor
2. Asbestos Hazard Abatement Specialist
3. Asbestos Hazard Evaluation Specialist
4. License
5. Certificate

D. ACM is any material containing over 1% asbestos. This includes Category I and Category II, regulated and non-regulated, friable and non-friable asbestos.

E. Critical Barrier is defined as an air tight seal over an opening in a floor, wall or ceiling including but not limited to: pipe or duct penetrations, doors, windows, air diffusers, immovable objects and carpeting. Critical barriers are separate from the negative pressure enclosure and shall be sufficient to prevent airborne asbestos in a work area from migrating to an adjacent area. All critical barriers shall be constructed using polyethylene (poly) with a minimum thickness of six mils and sealed with duct tape.

F. Hazardous Material (HAZMAT): Any chemical, substance or material in any quantity or volume as defined by the Occupational Safety and Health Administration in 29 CFR 1910.1200, the EPA in 40 CFR 302 and 261, and the Department of Transportation in 49 CFR Part 172.

G. On-site: Within the immediate working area.

H. RACM is Regulated ACM. This is generally limited to Category II material and/or Category I material that has become friable.

1.05 REQUIREMENTS

A. The contractor shall be responsible for designing the systems listed below in complete conformance to the requirements of 29 CFR 1926.1101 and 40 CFR 61, Subpart M. The contractor shall comply with all non-mandatory appendices unless express written approval to deviate has been received from 88 ABW/CEAN. The contractor shall comply with additional requirements for performance of the work as noted in the specifications and project drawings.
1. Exposure monitoring system shall be approved by the CIH. On-site analysis is prohibited for all air sampling except personal samples. An Asbestos hazard abatement air-monitoring technician or IH as defined by OAC 3701-34-1 shall be required to be on-site during all removal operations and final air sampling. During all Class I and Negative Pressure Enclosure (NPE) removal operations and during background and final air sampling involving Class I and NPEs, an IH meeting the requirements of OAC 3701-34-11 must be on-site.

2. Engineering Control
   a. Engineering controls and work practices shall fully conform to the procedures in Appendix F of 29 CFR 1926.1101 and shall be treated as a mandatory requirement. An NPE as described in 29 CFR 1926.1101 (g)(5)(i) and Appendix F of 29 CFR 1926.1101 is required unless otherwise indicated on drawings and/or approved in writing by 88 ABW/CEAN
   
   b. Prohibit the use of glove-bags outside of an NPE (as described in 29 CFR 1926.1101 (g)(5)(i) and Appendix F of 29 CFR 1926.1101) unless otherwise indicated on drawings and/or approved in writing by 88 ABW/CEAN

3. Hygiene Facilities
   a. Showers shall be portable type, shall comply with OSHA 29 CFR 1910.141.D3 and shall be contiguous both to the equipment room and the clean change room. The decontamination unit shall be contiguous to the containment unless otherwise approved by a representative of 88 ABW/CEAN
   
   b. The clean/change room shall be constructed of six-mil poly, be at least 24 square feet in size with no dimension less than four feet and be equipped with appropriate means for storing street clothes (up off the floor)
   
   c. Contractor shall supply soap, towels, and a warm water supply for decontamination procedures for abatement workers, IH technicians and contract inspectors. Provisions for heated water must be made by contractor as an on-site warm water supply may not be available
   
   d. Provide a positive back flow prevention control device at each hose connection to the facility water supply system
   
   e. Waste water shall pass through a five micron filter before being discharged into the facility sanitary system

4. Personal Protective Equipment
   a. Disposable coveralls, gloves, boots and head covering shall be supplied for abatement workers, IH technicians and contract inspectors
   
   b. Respirators shall be approved/selected per OSHA 29 CFR 1926.1101 (h)

B. All visual inspections and clearance requirements performed by 88 ABW/CEAN shall require a minimum of 24 hours prior appointment. Contractor shall be responsible for setting up an appointment with 88 ABW/CEAN for clearance inspections and review of air sample clearance results through the Civil Engineering Contract Inspector.

1.06 PERFORMANCE REQUIREMENTS
A. The contractor shall be responsible for compliance with all mandatory requirements of EPA 40 CFR Section 61, Subpart M and 29 CFR 1926.1101. All non-mandatory appendices of 40 CFR 61 shall also be complied with unless express written authorization to deviate has been obtained from 88ABW/CEAN.

B. The contractor shall have one copy of all applicable publications listed in paragraph 1.02, copies of the approved work plan, Ohio Environmental Protection Agency (OEPA) and ODH notifications, Wright-Patterson Air Force Base (WPAFB) specification section 02-08-10, current ODH Certifications, medical examinations and respirator fit tests results for all personnel available at the job site at all times.

C. If suspected or presumed ACM not covered by the drawings or specifications are encountered, the contractor shall immediately notify the Contracting Officer and a representative of 88 ABW/CEAN.

D. The contractor shall perform demolition/renovation work without damage or contamination of adjacent work areas. Where such areas do become damaged or contaminated, the work areas shall be restored to its original condition at the Contractor's expense.

E. Non-abatement work shall not be performed in an asbestos regulated area unless otherwise approved by a representative of 88 ABW/CEAN.

F. Daily inspection checklists (provided by the Government) shall be completed and signed for each work shift by the IH technician or competent person when an IH is not required to be on-site.

G. No site work shall begin prior to approval of the pre-abatement submittal requirements, listed in see section 1.08.A of this specification.

1.07 PERMITS AND NOTIFICATIONS

A. The Contractor shall be responsible for obtaining all required permits for removal, transport and disposal of ACM. The Contractor shall also be responsible for complying with the notification requirements of the OEPA Regional Air Pollution Control Agency (RAPCA) and the ODH as the law requires. A copy of all notifications and delivery receipts must be sent to 88 ABW/CEAN at the time notification is given.

1. OEPA
   a. OEPA notifications are sent to the following address by certified mail or hand delivered to: RAPCA, 117 S. Main Street, Dayton, Ohio 45422
      b. A copy of the notification and the certified mail receipt or a copy of the notification with the "Postmark and Date Received" blocks filled in must be submitted to 88 ABW/CEAN concurrent with the notification being submitted to RAPCA

2. ODH
   a. ODH notifications are sent to the following address: Ohio Department of Health, Asbestos Program, 246 North High Street, Columbus, Ohio 43215
      b. A copy of the ODH notification will be sent to 88 ABW/CEAN

   c. If using the ODH Online Notification option, the contractor will make a copy of the completed notification form and submit to 88 ABW/CEAN

1.08 SUBMITTALS
A. Pre-Removal

1. Precise Site Drawings
   a. Scaled site drawing
   b. Regulated area and/or demarcation of the enclosure
   c. Hygiene facilities
   d. Negative pressure system, AFD exhaust port locations, and air flow patterns
   e. Location, size and construction of all critical barriers
   f. All ACM locations identified as "to remain" or "to be removed". Identify the material i.e., 6-inch diameter pipe insulation, 1-inch thick ceiling tile, etc.
   g. Location and size (sq. ft.) of regulated area
      i. Either Bldg. and room number or
      ii. Street names and/or intersections and distance and direction from street centerline for ACM insulation utility lines. See CE Spec 02-08-50 for utility lines
   h. Copy of all asbestos related blueprints

2. Current Qualifications Statements/Licenses
   NOTE: Include only the last 4 digits of individual's SSN. Do not provide complete Social Security Number if included on individual's license or certificate.
   a. Asbestos Hazard Abatement Ohio Contractor License
   b. Asbestos Hazard Abatement Specialist Ohio Certification
   c. Asbestos Abatement Worker Ohio Certifications
   d. Asbestos Hazard Evaluation Specialist Ohio Certification
   e. Certified Industrial Hygienist Ohio Certification
   f. Testing Laboratory Certifications (AIHA and NVLAP)
   g. EPA approved landfill qualifications

3. Performance Procedures
   a. Strategy and frequency of exposure monitoring
   b. Air sampling and analytical procedure
   c. Project Asbestos Abatement Plan including the information listed in OSHA 1926.1101, Appendix F, and Paragraph “Planning the Removal Project”
d. Proposed method to ensure temperatures do not fall below 45 F, when applicable

e. Copies of all OEPA RAPCA, ODH notifications, and receipts as specified in 1.07 above.

4. Other Required Documentation

a. Employee training program (safety, confined spaces, Haz Com, etc.)

b. Respirator training program

c. Medical surveillance program

d. Emergency procedures (breech in enclosure, fire, personal injury, etc.)

e. Insurance Certificates (Asbestos Liability and Workers’ Compensation)

f. Laboratory quality control program (PAT program)

g. Complete list of employees in the medical surveillance program

h. All supporting documentation and data to support a Negative Initial Exposure Assessment when utilizing the NIEA

5. Material Storage and Use:

a. The contractor is required to ensure that HAZMATs are used appropriately, in accordance with the manufacturer’s MSDS and label, so as not to expose government employees or disrupt the work environment (office or building evacuations, etc.)

b. The contractor shall follow manufacturer’s guidelines for control of humidity, temperature, cleanliness, and material handling


d. The contractors will furnish all equipment necessary to manage HAZMATs. This equipment includes, but is not limited to, approved chemical security cabinets, locks, secondary containment, spill response equipment, fire extinguishers, and personal protective equipment, to securely manage HAZMATs at the project site

B. Post-Removal

1. Background (taken prior to set up), personal, daily work area, and final air sampling reports prepared by the IH Technician and certified by the Laboratory Analyst and CIH. All reports shall include name of abatement contractor, building number, room/container number, sampling date, date of analysis and chain of custody for each sample.

2. Daily inspection checklists (provided by the Government) shall be completed and signed for each work shift by the IH Technician and competent person for all Class I work and whenever a NPE is
utilized. For all other Classes of work the daily inspection checklist shall be completed and signed by the competent person.

3. Air pressure differential strip chart recordings

4. WPAFB Asbestos Containing Waste Manifest signed by a representative of 88 ABW/CEAN, the transporter(s) and the disposal site certifying the amount of ACM waste. NOTE: If a contractor generated manifest(s) has already been submitted, provide the WPAFB manifest number(s) for each shipment.

5. Post-abatement submittal requirements listed above, except number 4, shall be submitted within 10 working days from the completion of the asbestos removal portion of the project.

1.09 DISPOSAL OF REGULATED ASBESTOS CONTAINING MATERIAL (RACM)

A. All Regulated ACM and debris resulting from abatement work shall be considered RACM and be handled as such during the removal and transportation process and shall be disposed of as RACM in an EPA approved landfill.

1. RACM may only be stored for consolidation with other RACM for shipment to an EPA approved landfill at a later date with prior written approval from 88 ABW/CEAN.

a. When storing and consolidating small amounts of RACM on WPAFB for shipment at later date a secured and locked transport vehicle or dumpster shall be properly marked with class nine placards while on WPAFB

b. An "Internal Manifest" provided by 88 ABW/CEAN is required when transporting RACM from within any part of the base that requires transport upon a public thoroughfare

c. When storing and consolidating RACM at an "off-base" site for shipment at a later date, a secured and locked transport vehicle or dumpster shall be properly marked with class nine placards while on WPAFB

d. All parts of paragraphs 1.09 B, C and D below apply except as follows:

i. The requirement to return the shipping manifest within 35 days may be waived in writing by 88 ABW/CEAN

ii. The contractor must contact 88 ABW/CEAN to update the waste status in writing at 35 day intervals from date of ACM removal from WPAFB

iii. The original manifest is kept at the off-base site and is presented to the landfill when the waste is finally shipped for disposal

iv. The contractor will notify 88 ABW/CEAN when the RACM is shipped for disposal

v. The contractor will return the original manifest signed by the landfill to 88 ABW/CEAN within 35 days from date of final disposal

B. All RACM shall be sealed in durable leak-tight disposal containers or an approved alternative disposal system in accordance with paragraph (C) of OAC 3745-20-05. The transport vehicle shall be lined with six mil poly equal to the total height of the ACM containers.

C. All asbestos waste containers shall be properly labeled with required OSHA, EPA and DOT information before being transported from the work site. All ACM waste shall be promptly placed in leak tight containers and the work area cleaned at the end of each work shift. Material shall not be left on the
floor during non-work periods. All containerized ACM waste shall be stored in an enclosed, locked
vehicle (truck, dumpster, etc.,) at the end of each work shift. The secured (locked) transport vehicle shall
be properly marked with class nine placards when applicable while on WPAFB.

D. When the Contractor is prepared to transport any ACM from the boundaries of WPAFB, the
Contractor shall first contact 88 ABW/CEAN for an inspection of the transport vehicle and materials to be
transported. Provide a minimum of 24-hour advanced request for inspection with a description of the
material, number and type of containers (bags, drums, pipes etc.,) and the quantity of each in cubic
yards. The asbestos waste shipment record(s) (manifest(s)), provided by a representative of 88
ABW/CEAN, shall accompany all asbestos containing waste to the disposal site. Upon initial
transportation from the boundaries of WPAFB, the Contractor shall be responsible for having the waste
delivered to the approved disposal site identified on the OEPA RAPCA notification within 35 days, except
as noted in section 1.09 A.1.d above. The contractor shall ensure that page one of the original manifest,
signed and dated by all parties (88 ABW/CEAN, waste transporter, and landfill agent), is returned to 88
ABW/CEAN within 35 days of the date initially transported from WPAFB or 10 days after the waste is
received by the approved disposal site, whichever is more stringent.

E. Water used during any part of the abatement project including decontamination procedures, shall
enter the facility sanitary sewer system only after it has first passed through a five micron filter. Do not
introduce any water into the storm system.

PART 2 - PRODUCTS

2.01 MATERIALS

A. All materials and manufactured units utilized in the asbestos removal process shall meet the
requirements of 29 CFR 1926.1101 and its mandatory appendices. Materials must also meet the
recommendation of the non-mandatory appendices unless written authorization to deviate has been
obtained from 88 ABW/CEAN. Any hazardous materials utilized as part of this project shall be managed
in accordance with paragraph 3.9 of section 01 02 20 of the WPAFB Basic Specifications.

B. HEPA filters shall conform to U.L. 586.

C. All poly barriers shall be constructed of minimum 6 mil poly to provide a positive airtight seal for the
duration of the asbestos removal procedures.

PART 3 - EXECUTION

3.01 REMOVAL PROCEDURES

A. All NPE procedures shall conform to the requirements of
40CFR61.M, 29 CFR 1926.1101, and all mandatory appendices and non-mandatory appendices. The
Asbestos Hazard Abatement Specialist shall perform an Initial Exposure Assessment (IEA) IAW 29 CFR
1926.1101(f)(1). The IEA shall be approved by 88 ABW/CEAN for all removal procedures listed in
section 3.01.A. The following requirements for Negative Pressure Enclosures are in addition to and more
stringent than the requirements referenced above:

1. Shut down all HVAC and electrical systems in the work area if possible. HVAC systems shall be
sealed with two layers of 6 mil plastic (poly). All electrical sources shall be supplied from outside the
containment area and have a Ground-Fault-Interrupt system installed. Contractor must contact the
Contract Inspector to coordinate any HVAC or electrical outages.

2. Prior to constructing the NPE, clean and wet-wipe all surfaces and then install the critical
barriers using a minimum of six mil plastic sheeting.
3. Any wall constructed as part of the containment area shall be self-standing and of two by four construction. Other construction methods shall be approved by the on-site inspector prior to set-up. If torching inside the NPE is necessary, materials used shall be flame resistant.

4. Prior to the removal of any ACM, two layers of six mil poly shall be used to cover the floor. The poly shall be flush with the walls at each corner, extend 24 inches up the wall, and sealed with duct tape. Seams of the first and second layer shall offset. All seams shall be sealed with spray glue and duct tape. Two layers of six mil poly shall be hung on walls using nails and furring strips or adhesive and duct tape. The layers shall be hung as to overlap the floor sheets by 24 inches, sealed utilizing spray glue and/or duct tape, and the bottom seams shall offset by at least 12 inches. A viewing window shall be installed in each containment wall, the location of which shall be approved by the on-site inspector.

5. Provide an air pressure differential strip chart recorder to demonstrate that negative pressure (- .02 inches of water) is maintained at all times. Recording device shall have a scale of 0 to -0.25 or -0.50 inch of water and 0.005 or 0.01 inch graduation. Calibrate recording device daily. Additionally, maintain a minimum of four air exchanges per hour in the NPE. The strip chart recordings shall be taken for the duration of the containment and signed daily by the IH Technician. The IH Technician shall record the name of the abatement contractor, building number, containment number (as shown on the pre-inspection checklist), date, and time signed on each strip chart at the end of each work shift.

6. If barriers cannot be completed because of the removal of ceiling materials or asbestos contaminated debris, a preliminary pre-inspection shall be performed by a representative of 88 ABW/CEAN. After the preliminary pre-inspection has been approved, the critical barriers shall be completed and a final pre-inspection is required before gross removal begins.

7. Prior to the removal of any ACM, the set-up shall be approved by a designated representative of 88 ABW/CEAN. All inspections require a minimum of 24-hour notice.

8. Respirator protection shall be selected in accordance with 29 CFR 1926.1101 (h)(2). During gross removal all contract personnel entering the work area shall wear, at a minimum, a full-face Powered Air Purifying Respirator or a respirator with an equivalent protection factor unless 29 CFR 1926.1101 (h)(2) is more stringent.

9. Amended water shall be applied to all ACM before and during removal. The ACM shall remain adequately wet until disposition in the approved landfill.

10. All ACM waste shall be promptly placed in leak tight containers and the work area cleaned at the end of each work shift. Material shall not be left on the floor during non-work periods. All containerized ACM waste shall be stored in an enclosed, locked vehicle (truck, dumpster, etc.,) at the end of each work shift.

11. After the gross removal and cleanup of all suspect materials, a final visual inspection shall be conducted by a representative of 88 ABW/CEAN. Any debris found during the inspection shall be cleaned by the Contractor. Once the final visual inspection passes, all substrate surfaces from which ACM has been removed shall be coated with an approved encapsulant. The area shall be fogged with the encapsulant to lock down any suspended fibers left in the area and allowed to dry. The encapsulant used shall have an adequate tint to easily distinguish between sections encapsulated and not encapsulated. After encapsulation, any person entering the work area shall wear at minimum a negative pressure half-face respirator or a respirator with an equivalent protection factor.

12. Negative pressure glove bag techniques shall only be used inside of a negative pressure enclosure as described in 29 CFR 1926.1101 (g) (5) (i) and Appendix F of 29 CFR 1926.1101 unless otherwise indicated on drawings or approved in writing by 88 ABW/CEAN.
B. The following are removal procedures for Intact, Non-Friable resilient floor covering including the associated adhesive/mastic and backing. All applicable Federal, State and Local regulations as well as applicable sections of specification 02-08-10 will be followed when performing the procedures listed in section 3.01.B. The Asbestos Hazard Abatement Specialist shall perform an Initial Exposure Assessment (IEA). The IEA shall be approved by a representative of 88 ABW/CEAN for all removal procedures listed in section 3.01.B.

1. Work procedures for sheet vinyl removal:
   a. Prior to removal, HEPA vacuum with metal floor attachment
   b. Install splash guards using 6 mil poly, 3 feet high on walls in removal area
   c. Slice floor covering with a knife into 4 to 8 inch wide sections
   d. Roll-up sections
   e. Spray amended water on material where separation from backing occurs during rolling
   f. Place roll into non marked 6 mil bag or other leak tight container
   g. Remove thoroughly-wetted residual felt with a stiff bladed scraper; Place wet scraping into container
   h. HEPA vacuum as removal progresses
   i. HEPA vacuum entire floor after removal and drying
   j. Dispose of non-friable material in a sanitary landfill. Let the landfill know the waste is non-regulated asbestos-containing. 88 ABW/CEAN will provide the non-regulated manifest which shall accompany the waste to the landfill (see section 1.09.D)

2. Work procedures for floor tile and adhesive (mastic) removal.
   a. HEPA vacuum entire floor with metal floor attachment
   b. Install splash guards using 6 mil poly 3 feet high on walls in removal area (if mastic is to be removed)
   c. Pry-up individual tiles using a non-powered stiff-blade scraper or heat tile with a hot-air gun to soften adhesive and facilitate removal
   d. Alternatively, heat tile first (e.g. infrared heat machine) and remove by hand or with non-powered scraper
   e. Put tiles in 6 mil poly bag or other leak tight container without further breakage
   i. Do not use bags marked for regulated ACM unless material has deteriorated to friable condition and concurrence with 88 ABW/CEAN has been obtained
   ii. If material has become or becomes friable during removal, stop work and coordinate all further actions and procedures with 88 ABW/CEAN
f. Remove residual adhesive by wetting and scraping with stiff-bladed non-powered scraper

g. Alternatively, remove residual adhesive by using a removal solution (Citrus Pure or another low-odor, non-toxic substance)

i. If removal solutions are used, unless explicit written authorization from 88 ABW/CEAN and coordination with the facility Real Property Building Manager (RPBM) is obtained, the procedure must take place after working hours or on weekends, with continuous ventilation of the area

ii. Provide a Material Safety Data Sheet (MSDS), as part of the pre-abatement submittal requirements, for all solutions used to remove adhesives.

iii. Coordinate all adhesive removal utilizing removal solution with the facility RPBM and 88 ABW/CEAN

h. Put residual adhesive and/or removal solution in leak tight bags and/or containers. All used removal solution and/or residual adhesive shall be disposed of as a non-liquid by adding absorbent material to congeal all liquid waste

i. HEPA vacuum areas as adhesive is removed

j. HEPA vacuum entire floor after removal and drying

k. Wetting - the requirement to use wet methods or wetting agents (for methods other than heat removal) is satisfied by misting the floor tile with a water/wetting agent, provided the floor tile is removed "intact"

l. Dispose of non-friable material in a sanitary landfill. Let the landfill know the waste is asbestos-containing. A non-regulated manifest, provided by 88 ABW/CEAN, is required.

3. Additional requirements for floor tile, sheet vinyl and adhesive removal.

a. Suits and respirators shall be worn during removal

b. Personal air samples shall be taken during removal by a qualified Asbestos Hazard Abatement Specialist

c. Workers will use HEPA decontamination procedures when leaving the removal area

d. Prior to the removal of any ACM, the set-up shall be approved by a designated representative of 88 ABW/CEAN. After the gross removal and cleanup of all suspect materials, a final visual inspection shall be conducted by a representative of 88 ABW/CEAN. A minimum of 24 hours notice is required for all 88 ABW/CEAN inspections

e. If during removal the contractor causes the floor tile, sheet vinyl or adhesive to become friable or personal air samples exceed the PEL, the contractor shall stop all work and notify the Contracting Officer and a representative of 88 ABW/CEAN. The contractor may be required by regulation or by the Contracting Officer to perform full containment procedures as listed in specification 02 08 10, section 3.01.A

C. The following are removal procedures for Asbestos-Containing Pipe Insulation by the Wrap and Cut Method. All applicable Federal, State and Local regulations as well as applicable sections of specification 02 08 10 will be followed when performing the procedures listed in section 3.01.C. The Asbestos Hazard Abatement Specialist shall conduct an IEA. The IEA shall be approved by a representative of 88 ABW/CEAN for all removal procedures listed in section 3.01.C.
1. Background samples shall be taken in the work area(s) and in adjacent areas of the building prior to disturbing any ACM.

2. Set-up a remote three stage decontamination unit. Location of decontamination unit will be approved by the on-site inspector representing 88 ABW/CEAN. All remote decontamination units shall be under negative pressure by use of air filtration device(s). After final use, a PCM final air clearance sample shall be taken in the dirty room of the remote decontamination unit.

3. Contractor shall demarcate removal area and lay 6 mil poly below all piping that is to be removed.

4. Contractor shall pre-clean any visible or suspected ACM around removal area prior to wrapping the pipe. The contractor shall repair all damaged areas with re-wettable cloth prior to wrapping the pipe.

5. Wet all pipe insulation with amended water before wrapping.

6. Wrap pipe with 2 layers of 6 mil poly and seal with duct tape.

7. If pipe insulation is to be cut into sections, hang negative air glove bags, in accordance with section 3.1.D, to perform removal of the asbestos pipe insulation before cutting. Exposed insulation ends inside the glove bag shall be properly sealed before removal of glove bag.

8. Pipe shall be cut into sections as necessary, properly labeled and placed into locked containers.

9. All wrap and cut removal procedures shall be performed after duty hours or on weekends unless coordinated with facility RPBM and approved by 88 ABW/CEAN.

10. Suits and respirators shall be worn during all abatement operations.

11. Workers shall use double suit procedures from all work areas to remote decontamination unit.

12. Personal air samples shall be taken during all work procedures by a qualified Asbestos Hazard Abatement Specialist.

13. A pre-removal inspection will be performed after glove bags have been installed or before wrapped piping is removed. A final visual inspection will be performed after all removal is complete in each area. All pre-removal and final visual inspections shall be conducted by a representative of 88 ABW/CEAN and require a minimum of 24 hours notice.

14. If any personal air samples exceed the PEL or if any uncontained asbestos is damaged or made friable by the contractor, the contractor will stop work immediately and contact the Contracting Officer and a representative of 88 ABW/CEAN. The contractor may be required by regulation or by the Contracting Officer to perform full containment procedures as listed in specification 02 08 10 section 3.01.A.

D. The following are removal procedures for the use of Negative Air Glove Bags. All applicable Federal, State and Local regulations as well as applicable sections of specification 020810 will be followed when performing the procedures listed in this section. The Asbestos Hazard Abatement Specialist shall perform an IEA. The IEA shall be approved by a representative of 88 ABW/CEAN for all removal procedures listed in this section.
1. Background samples shall be taken in the work area(s) and in adjacent areas of the building prior to disturbing any ACM.

2. Contractor shall demarcate and place 6 mil poly below the removal area.

3. Contractor shall repair any damaged Thermal System Insulation prior to hanging the glove bag.

4. Hang glove bag on removal area.

5. The contractor may use continuous glove bags on straight pipe runs, but each bag will have negative air pressure port. No more than 6 continuous glove bags may be performed for one removal section at a time or continuous glove bags may only be performed between pipe hangers. All fittings (may have several fittings in one bag) will be performed as one singular negative air glove bag. The contractor's work plan submittal shall describe, in detail, all negative air glove bag removal procedures.

6. Contractor will use a three stage remote decontamination unit and workers will use double suit procedures when proceeding to the remote decontamination unit. The dirty room of the remote decontamination unit shall be under negative pressure. Contractor shall take one PCM final air sample in the dirty room of the decontamination unit after final use.

7. A pre-removal inspection shall be performed after glove bag is installed and sealed with duct tape. A final visual inspection will be performed when the glove bag and clean-up is completed. All pre-removal and final visual inspections shall be conducted by a representative of 88 ABW/CEAN and require a minimum of 24 hours notice.

8. Seal exposed ends of asbestos and/or fiber glass insulation with wettable cloth before removing the glove bag. After removal is complete, the end of each glove bag shall be sealed to the bare pipe before the glove bag is removed.

9. Suits and respirators shall be worn during hanging and removal procedures.

10. Personal air samples shall be taken during all negative air glove bag procedures by a qualified Asbestos Hazard Abatement Specialist.

11. All glove bag removal shall be performed after duty hours or weekends, in occupied areas, unless coordinated with the facility RPBM, indicated on drawings and approved by 88 ABW/CEAN.

E. The following are removal procedures for the use of Negative Pressure Mini Enclosures. All applicable Federal, State and Local regulations as well as applicable sections of specification 02 08 10 will be followed when performing the procedures listed in section 3.1.E. The Asbestos Hazard Abatement Specialist shall perform an IEA. The IEA shall be approved by a representative of 88 ABW/CEAN for all removal procedures listed in section 3.1.E.

1. Mini enclosures shall follow all set-up requirements of specification 02 08 10 section 3.1.A, with the exception that only a single air lock shall be attached to the containment.

2. Workers will use double suit procedures to a remote three stage decontamination unit. Mini enclosures can only be used in conjunction with a remote three-stage decontamination unit.

3. Remote decontamination units shall be under negative pressure by use of an air filtration device.

4. After final use, a PCM final air clearance sample shall be taken in the dirty room of the remote decontamination unit.
5. An IH Technician or an AMT is required to take all area, personal and final air clearance samples for mini enclosure operations.

6. Personal air samples may be analyzed on-site by a certified technician. Final air clearance samples shall be analyzed by a laboratory approved by 88 ABW/CEAN.

7. Final air clearance sampling for mini enclosures shall be accomplished in accordance with section 3.2.C of specification 02 08 10.

8. Mini enclosures require a pre-removal inspection and a final visual inspection by a representative of 88 ABW/CEAN. A minimum of 24 hours notice is required for all 88 ABW/CEAN inspections.

F. The following are removal procedures for Non-Friable Transite on Interior Building Surfaces. All applicable Federal, State and Local regulations as well as applicable sections of specification 02 08 10 will be followed when performing the procedures listed in section 3.1.F. The Asbestos Hazard Abatement Specialist shall perform an IEA. The IEA shall be approved by a representative of 88 ABW/CEAN for all removal procedures listed in section 3.1.F.

1. Set-up a three stage decontamination unit in or adjacent to the removal area. All remote decontamination units will be under negative pressure by use of an air filtration device.

2. After final use, a PCM final air clearance sample shall be taken in the dirty room of the remote decontamination unit.

3. Suits and respirators shall be worn during all procedures for transite removal.

4. Personal air samples shall be taken during all work procedures for transite removal by a qualified Asbestos Hazard Abatement Specialist.

5. Contractor shall demarcate the removal area, place critical barriers over all openings in the removal area and lay 6 mil poly on the floor of the removal area.

6. Wet all transite surfaces with amended water.

7. Remove transite in an intact state and wrap in 2 layers of 6 mil poly or place in a leak-tight container.

8. Properly label and store in locked transport vehicle. All transite material shall be disposed of in an EPA approved landfill.

9. If during removal, contractor causes transite to be rendered friable or personal air samples exceed the PEL, the contractor shall stop work immediately and notify the Contracting Officer and a representative 88 ABW/CEAN. The contractor may then be required by regulation or by the Contracting Officer to perform full containment procedures in accordance with section 3.1.A of specification 02 08 10.

10. A pre-removal inspection is required after set-up of the decontamination unit and removal area. A final visual inspection is required after transite removal and clean-up is complete for each area. All pre-removal and final visual inspections shall be conducted by a representative of 88 ABW/CEAN and require a minimum of 24 hours notice.

11. Removal of interior transite will be performed after duty hours or weekends unless otherwise indicated on drawings, coordinated with the facility RPBM and approved by 88 ABW/CEAN.
G. The following are removal procedures for Non-Friable Transite on Exterior Building Surfaces. All applicable Federal, State, and Local regulations as well as applicable sections of specification 02 08 10 will be followed when performing the procedures listed in section 3.1.G. The Asbestos Hazard Abatement Specialist shall perform an IEA. The IEA shall be approved by a representative of 88 ABW/CEAN for all removal procedures listed in section 3.1.G.

1. Set up a three stage decontamination unit adjacent to the removal area. All remote decontamination units will be under negative pressure by use of an air filtration device.

2. Suits and respirators shall be worn during all procedures for transite removal.

3. Personal air samples shall be taken during all work procedures for transite removal by a qualified Asbestos Hazard Abatement Specialist.

4. Contractor shall demarcate the regulated area and place critical barriers over all openings in the removal area. The contractor shall construct a 6 foot high barrier of 6 mil poly around the perimeter of the removal area, to keep unauthorized personnel from entering the regulated area. This barrier shall be a minimum of 10 feet from the removal area.

5. Removal operations will begin at the uppermost section of the existing wall panels on selected building elevation and continue down building face to completion. It is intended for contractor to select one building elevation on which to begin work and continue on that elevation until panel removal is complete.

6. Wet transite panel surfaces with amended water.

7. Remove transite panels in an intact state and wrap in 2 layers of 6 mil poly.

8. Panels will be removed one at a time. Complete removal and lower panel before starting the removal of another panel.

9. Panels are anchored to the building supporting structure using a variety of fasteners. Lightly mist each fastener during removal. Spray the fastener hole with an approved encapsulant.

10. If removal is performed at an elevation greater than 20 ft, each panel shall be lowered to ground level on a support platform such that the panel is not self-supporting. Direct attachment of crane or hoist cable to the transite panel is prohibited.

11. Wet wipe and/or HEPA vacuum all exposed surfaces. Allow surfaces to dry.

12. If a new finish is to be applied to the building after the transite is removed, then the wall shall be protected from the weather. At the completion of wall panel removal each day, construct and install a weather tight poly barrier over building area where wall panels were removed. Contractor is to maintain protective barrier until new wall panels are installed. Barriers are to be removed and opened only for work related to new panel installation.

13. All transite shall be properly wetted, bagged and labeled at the end of each work shift and placed into secured containers. All transite material shall be disposed of in an EPA approved landfill.

14. Contractor is to fabricate and have available on-site a minimum of one movable enclosure for each active work area. The enclosure shall be used in the event a panel is dropped or otherwise damaged during the removal process. Each enclosure shall be large enough to cover the largest panel to be removed or handle a panel at least 4’ x 8’ x 6’ whichever is larger.
15. If during removal, contractor causes transite to be made friable or personal air samples exceed the PEL the contractor shall stop work immediately and notify the Contracting Officer and representative of 88 ABW/CEAN. The contractor may then be required by regulation or by the Contracting Officer to perform containment procedures in accordance with section 3.1.A of specification 02 08 10.

16. A pre-removal inspection is required after set-up of decontamination unit and removal area. A final inspection is required after removal and clean-up is complete for each area. All pre-removal and final visual inspections shall be conducted by a representative of 88 ABW/CEAN and require a minimum of 24 hours notice.

H. The following are removal procedures for all other Non-friable Class II (as defined by 29 CFR 1926.1101(b)) ACM for which specific procedures have not already been listed in section 3.1 of this specification. All applicable Federal, State, and Local regulations as well as applicable sections of specification 02 08 10 will be followed when performing the procedures listed in section 3.1.H. The Asbestos Hazard Abatement Specialist shall perform an IEA. The IEA shall be approved by a representative of 88 ABW/CEAN for all removal procedures listed in section 3.1.H.

1. Suits and respirators shall be worn during all abatement operations.

2. Personal air samples shall be taken during all work procedures.

3. Contractor shall demarcate the regulated area and place critical barriers over all openings in the removal area.

4. Set up a remote three stage decontamination unit unless otherwise indicated on drawings or approved by 88 ABW/CEAN. Location of decontamination unit will be approved by the on-site inspector representing 88 ABW/CEAN. All remote decontamination units shall be under negative pressure by use of an air filtration device. After final use, a PCM final air clearance sample shall be taken in the dirty room of the remote decontamination unit.

5. Workers shall use double suit procedures from all work areas to remote decontamination unit.

6. The material shall be thoroughly wetted with amended water prior to and during its removal.

7. The material shall be removed in an intact state and kept non-friable. Cutting, abrading or breaking the material is prohibited. If during removal the contractor renders the material friable or personal air samples exceed the PEL, the contractor shall stop all work and notify the Contracting Officer and a representative of 88 ABW/CEAN. The contractor may be required by regulation or by the Contracting Officer to perform full containment procedures as listed in specification 02 08 10, section 3.1.A.

8. All ACM removed shall be immediately bagged and/or wrapped, kept wetted and transferred to a closed receptacle no later than the end of the work shift. Material shall not be left on the floor during non-work periods and the work area shall be cleaned at the end of each work shift.

9. A pre-removal inspection is required after set-up of removal area. A final inspection is required after removal and clean-up is complete for each area. All pre-removal and final visual inspections shall be conducted by a representative of 88 ABW/CEAN and require a minimum of 24 hours notice.

10. The landfill used for disposal shall be EPA approved for all friable and category II non-friable (as defined by 40 CFR 61.141) ACM. Category I non-friable ACM shall be disposed of in a sanitary landfill.
I. The following are removal procedures for all Asbestos Containing Roofing materials.

1. OSHA’s 29CFR1926.1101(a)(8) specifically exempts "asbestos-containing asphalt roof coatings, cements and mastics" from this rule, however it is a requirement of this Specification that the contractor performing the work will comply with all other applicable OSHA and EPA requirements. Sections 1.03, except paragraph B, 1.05, 1.06, 1.07, 1.08, 1.09, and 2.01 of this Specification are therefore not applicable to roofing material removal except as noted in paragraph 5 below. The designated competent person as expressed in 1.03 B of this Specification will be on site at all times.

2. Roofing materials as defined in NESHAP regulations that are "Category I nonfriable" are not subject to the requirements of this Specification except as noted Paragraph 5 below.

3. Category II or all friable materials that are covered by the EPA’s 40 CFR Part 61M NESHAP regulations are subject to the requirements of this Specification. Appendix A to Subpart M of 40 CFR Part 61 of the NESHAP regulations apply to all roofing work involving any Category ACM.

4. The contractor performing any repair, removal or disposal of ACM roofing materials will comply with the necessary federal, state, and local requirements without direct oversight or approval recommendations (submittals) from the 88ABW/CEAN office except when the work involved triggers NESHAP/RAPCA notifications for ANY reason. If the materials involved or the methods used are found to trigger NESHAP, the contractor performing the work will stop and notify the contracting office and 88ABW/CEAN office for guidance and procedures to follow.

5. The following are reasons that this office shall exercise direct oversight authority for roofing work performed on WPAFB.

   a. If the work involves any cutter or equipment that damages the Category I nonfriable asbestos-containing roofing material, or the removal of 5580 ft² or more of asbestos-containing roofing material or will create at least 160 ft² of RACM.

   b. When the removal of Category II nonfriable asbestos-containing roofing material is at least 160 ft² and the removal methods will crumble, pulverize, reduce to powder, or contaminate with other RACM, or otherwise becomes subject to the NESHAP.

   c. Whenever the roofing work is done ancillary to or as part of a demolition project.

   d. If the work is being performed in the immediate vicinity of any government employees not directly involved with the project that may become exposed to ACM.

3.02 MONITORING, REPORTING AND CORRECTIVE ACTIONS

A. Background Samples

1. Background samples shall be taken in the work area(s) and in adjacent areas of the building. One sample shall be taken for every 1250 square feet of each enclosure prior to ANY disturbance of the area. Samples shall be taken with 25 mm cassettes by the IH Technician with a minimum volume of 1200 liters and analyzed by PCM. Sample cassettes shall be saved for future reference.
1. Daily samples shall be taken inside the containment area, (in close proximity to gross removal) in the clean room, at the exhaust of the AFDs, all areas adjacent to the work area and on 25% of the workers with the highest expected exposure.

2. All samples shall be taken with 25 mm cassettes by the IH Technician with a minimum volume of 1200 liters (except for personal and work area samples). Air sampling pumps shall be calibrated before and after each sample. Only personal samples shall be analyzed on-site. All other daily samples shall be analyzed in the approved laboratory by PCM within 16 hours and the results shall be reported to the IH Technician. The IH Technician shall post all air monitoring results in an area accessible to building occupants within 24 hours.

3. Each set of samples taken will include 10% field blanks or a minimum of 2 field blanks. These blanks must come from the same lot as the filters used for sample collection. The field blank results shall be averaged and subtracted from the analytical results before reporting. A set consists of any sample or group of samples for which an evaluation for this standard must be made. Any samples represented by a field blank having a fiber count in excess of the detection limit of the method being used shall be rejected.

4. The IH Technician or competent person shall immediately notify 88 ABW/CEAN and the Contracting Officer if any samples show fiber counts exceeding the PEL inside the containment area or exceeding 0.10 fibers per cubic centimeter (f/cc) outside the containment area.

C. Final Clearance Sampling

1. Prior to clearance sampling and encapsulation, 88 ABW/CEAN representatives shall conduct a visual inspection. All surfaces shall be clean and dust free. If any residue is found, the area shall be re-cleaned and re-inspected at the contractor's expense.

2. All final clearance samples shall be taken by the IH Technician with the containment intact and air filtration devices still in operation. Final air clearance shall not begin until encapsulant has set at least two hours after application.

3. Final clearance sampling shall be performed while air is being circulated within the area and after air has been directed at all horizontal surfaces from the exhaust of an electric leaf blower. The following number of final air samples shall be taken per square footage of each negative pressure enclosure or fraction thereof:

   a. For enclosures less than 500 square feet (sq ft), 3 PCMs required
   b. For enclosures 500 sq ft - 3750 sq ft, 3 PCMs and 1 TEM required
   c. For enclosures greater than 3750 sq ft, 1 PCM for every 1250 sq ft of enclosure and 1 TEM required

4. ODH requires a minimum of three samples be analyzed by the PCM method for every NPE. The following requirements are in addition to the ODH requirements for final clearance sampling. One final clearance sample shall be analyzed by the TEM method for every NPE greater than 500 sq ft. If any fiber counts exceed 0.005 structure/cc for samples analyzed by TEM or 0.010 fibers/cc for samples analyzed by PCM the area shall be re-cleaned and re-sampled at the Contractor's expense.

5. All PCM samples shall be conducted in accordance with NIOSH Method 7400, entitled "Fibers," published in the NIOSH Manual of Analytical Methods, 3rd Edition, Second Supplement, August 1987. All pumps shall be calibrated for a maximum flow rate of 600 liters per hour (l/h) for background, area and final air sampling.
6. All TEM samples shall be conducted in accordance with the regulations established by the United States EPA, in 40 CFR, Part 763, Subpart E, Appendix A.

7. Negative pressure enclosure, decontamination units and critical barriers shall only be removed following receipt and approval of the signed written laboratory analysis of the final clearance sampling by 88 ABW/CEAN or 88 ABW/CEAN Representative. The preliminary faxed results shall be signed by the laboratory technician and sent from the performing laboratory. The preliminary report shall also include the name of the abatement contractor, building number, room/containment number, sampling date, and date of analysis.

8. The government shall reserve the right to perform independent final clearance air sampling and adjacent area monitoring to determine compliance with this specification.

3.03 WORK SUSPENSION

A. The Contractor shall be subject to on-site inspection by a Government representative or regulator who may be assisted by safety or health personnel. If work is in violation of specification requirements, the Contracting Representative shall temporarily suspend work and notify the Contracting Officer who may verbally, or in writing, issue a stop work order. Standby time and expenses required to resolve the violation shall be at the Contractor's expense. Examples include but are not limited to:

1. Improper notification
2. Dry removal of ACM
3. Visible emissions
4. Improper disposal
5. Competent person not present
6. Inadequate personal protection
7. Inadequate negative pressure
8. Violation of air monitoring procedures
9. Deviation of the approved work plan
10. IH Technician or AMT not present during removal or final air sampling

END OF SECTION
SECTION 02 08 30

REMOVAL OF PCB AND PCB-CONTAMINATED TRANSFORMERS AND OTHER PCB ITEMS (WPAFB)
05/05

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Prepare and turn in all PCB and PCB contaminated transformers and other PCB items to the Environmental Management Division (88 ABW/CEV), Bldg 479, Area B, Wright-Patterson Air Force Base. Ownership of PCB and PCB contaminated items and liquids shall remain with the Government.

B. Contain and turn in to the CEV all materials containing PCBs that result from performing the work except as indicated in paragraph 1.01.C.

C. Materials containing PCBs that result from cleanup of spills caused by the contractor shall be the full responsibility of the contractor. These materials shall be contained and disposed of at the contractor's expense.

1.02 REFERENCES

A. Environmental Protection Agency, EPA:

1. Title 40 Code of Federal Regulations (CFR), Part 761, 261, 262, 263; all applicable Subparts, the most recent amendments.

B. Occupational Safety and Health Administration, OSHA:

1. Title 29 Code of Federal Regulations (CFR), Part 1910 and Part 1926; all applicable Subparts, the most recent amendments (especially 1910.120, 106, 133, 134, 144).

C. Department of Transportation, DOT:

1. Title 49 Code of Federal Regulations, Part 171, 172, 173, 177 and other applicable parts; the most recent amendments.

1.03 SPILLS

A. Immediately report new or newly discovered existing PCB spills of any size to Environmental Management, 257-7455, Contract Management, 257-2047 and Civil Engineering Service Call, 257-6764.

B. All materials and/or surfaces contaminated with PCB spilled during the work shall be the contractor's responsibility. The contractor shall do the cleanup, test for noncontamination, restore the area to as near original condition, and dispose of the contaminated materials per regulations and specifications; all at no cost to the Government.

1.04 SUBMITTALS
A. Submit a Project Work Plan for approval in accordance with Section 01300. This plan shall include the following:

1. Detailed procedures for the removal and handling of PCB and PCB contaminated items and liquids in compliance with all applicable regulations.

2. A Health and Safety Plan satisfying the criteria of 29 CFR 1910.120.


4. A detailed project schedule indicating the sequence of operations to be performed.

1.05 COORDINATION

A. The contractor shall notify the following in writing at least ten (10) working days prior to starting work at a site:

1. 88 CEG/CECC Contract Management (Project Inspector).

2. 88 ABW/CEVY Environmental Management (Waste Management).

B. All transformers included in the work have been or will be tested for PCB concentrations. Refer to drawings for test results. Prior to removal of any transformer or electrical item containing oil (switches, breakers, capacitors), contact CEV, 257-7152, for PCB analytical results. Provide CEV with manufacturer's serial number of each item being removed.

C. The names of the personnel to be notified will be given to the contractor at the pre-construction meeting.

1.06 PROTECTIVE EQUIPMENT

A. The contractor shall provide and maintain all personal protective equipment required by 29 CFR 1910 to perform PCB spill cleanup operations. This equipment is to be disposable to the extent allowable by regulations.

1. Protective equipment shall include, but not be limited to; gloves, coveralls, boots, and cartridge respirators.

1.07 DEFINITIONS

A. POLYCHLORINATED BIPHENYL (PCB): Any chemical substance that is limited to the biphenyl molecule that has been chlorinated to varying degrees or any combination of substances which contains such substance.

B. PCB ITEM: Any item tested and found to contain 500 or more ppm PCB.

C. PCB CONTAMINATED ITEM: Any item tested and found to contain between 50 and 499 ppm PCB.

D. NON-PCB ITEM: Any item tested and found to contain 49 ppm PCB or less.
E. PCB SPILL: The intentional and/or unintentional spills, leaks, and other uncontrolled discharges where the release results in any quantity of PCB, running off or about to run off the external surface of the equipment; and the contamination resulting from those releases.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

3.01 SECURITY OF SITES

A. Install self-supporting barricades and post PCB spill warning signs at all entrances to work site.

3.02 SPILL CONTAINMENT

A. Provide six mil plastic drop cloths or metallic drip pans where spillage may occur.

B. Secure all floor drains, conduits and other openings.

C. Use absorbent material to prevent contaminant migration under existing devices.

3.03 EQUIPMENT DECONTAMINATION

A. Decontaminate all nondisposable items contaminated with PCB during the cleanup prior to exiting each site. Wipe all contaminated solid surfaces a minimum of three times with an organic solvent and swipe. Do not reuse the swipe. Do not reuse the contaminated solvent.

B. Decontaminate all solid surfaces through a double wash/rinse. Cleanup of PCB will be done with a commercial/industrial liquid cleaner containing limonene as the organic solvent and an emulsifier. Apply with a portable sprayer, scrub the affected surfaces and rinse with clean water. Concurrently capture all free-flowing liquids using a wet vacuum.

3.04 PCB TRANSFORMERS, PCB CONTAMINATED TRANSFORMERS, AND EQUIPMENT

A. Drain unless noted otherwise on the drawings. Perform all draining by pump or siphon. Use drums specified in "PREPARATION FOR TURN-IN" paragraph 3.07.

B. Provide separate hoses and pumps for draining PCB and PCB contaminated oil. Decontaminate between each use per "EQUIPMENT DECONTAMINATION" paragraph 3.03.

3.05 CLEANUP OF SPILLS THAT OCCUR DURING WORK ON THE CONTRACT

A. Ensure notification is made per the "SPILLS" paragraph 1.03. Implement the immediate action requirements contained in 40 CFR 761 and commence cleanup within 24 hours of the spill.

B. Clean to residential/commercial standards in accordance with Subpart G of 40 CFR Part 761. Include all sampling required and formulate cleanup report.

3.06 TEMPORARY STORAGE

A. Coordinate the temporary storage location for PCB and PCB contaminated items with CEV and the Contracting Officer.
B. Individually date all items to show when the item was removed from service or when the drum was filled and placed in temporary storage.

C. Do not have any item in temporary storage for over 30 calendar days. Do not relocate items for the purpose of extending the storage time.

D. Place drip pans or six-mil plastic sheeting to prevent possible seepage into the ground. Protect containers from rainwater.

3.07 PREPARATION FOR TURN-IN

A. Prepare all PCB items for turn-in to CEV, Bldg 479, Area B.

1. Place all PCB and PCB-contaminated transformers, capacitors, and other equipment, if not too large, into DOT approved 17C 55 gallon open head steel drums. The drums shall be in good condition. If items are too large for drums, secure them onto pallets.

2. Contain all liquids in 30 gallon or 55 gallon DOT approved 17E closed head steel shipping drums. Do not fill over 90% of drum capacity. The drums shall be in good condition.

3. Contain all solid PCB material (used absorbent material, disposable clothing, removed soil, disposable tools, etc.) in 30 gallon or 55 gallon DOT approved 17C open head steel shipping drums. The drums shall be in good condition.

B. Do not place non-PCB oils or items in containers with PCB oils or items. Do not place PCB oils or items in containers with PCB-contaminated oils or items.

C. Identify each item individually with the following.

1. The appropriate PCB label per Figure 1, 2 or 3.

2. Date item was removed from service or the date the drum was filled.

3. Contents of the drum, i.e.: debris/ppe, oil, decon liquid.

D. Prepare an EPA Uniform Hazardous Waste Manifest and obtain CEV signature per "DOCUMENTATION FOR TURN-IN" paragraph.

E. The Contractor shall be responsible for repackaging any containers that are considered by CEV to be unsuitable for interstate shipment.

3.08 DOCUMENTATION FOR TURN-IN

A. Contact CEV at 257-7152 at least five (5) working days prior to turning in PCB waste. The name of the person to contact will be provided at the pre-performance meeting. Be prepared to provide the following information on each piece of equipment:

1. The estimated weight, contents, date removed from service or date drum was filled, and quantity of drums and items to be turned in.
B. CEV Certification. CEV will conduct a site inspection required for certification of items to be turned in. CEV will provide an AFLC Form 165, Hazardous Waste Label, to be applied to each item prior to turn-in.

C. The contractor, shall coordinate a turn-in date and time with CEV.

D. Hazardous Waste Manifest. An EPA Uniform Hazardous Waste Manifest is required when transporting more than one (1) pound of PCBs on a public highway that is outside the Wright-Patterson reservation boundary. Coordinate a date and time with CEV for obtaining an CEV representative to sign the manifest prior to transporting.

3.09 TRANSPORT

A. Provide pallets for all items that are to be forklifted and secure these items to pallet with metal banding.

B. Utilize a trucking firm that has an USEPA identification number and is licensed in the State of Ohio for transporting hazardous material if the load contains over one pound of PCBs and the route taken includes a public highway that is outside the Wright-Patterson AFB reservation boundary.

C. The contractor shall unload and move into storage all items in accordance with CEV instructions. The contractor shall provide all equipment necessary (forklift, dolly, etc.)

3.10 LABELING

A. Label (as shown in Figure 1, 2 or 3) all equipment, drums, etc. according to the PCB concentration of the oil, material contained or the oil removed from the item. Affix the label prior to working on or utilizing the item. The following formats shall be used for labeling:

1. PCB and PCB-contaminated items or containers containing PCBs equal to or greater than 50 ppm.

   (a) Large PCB Mark--ML. Mark ML shall be as shown in Figure 1, black letters and striping shall be on a yellow background and shall be sufficiently durable to equal or exceed the life of the PCB Article, Equipment, or Container. The size of the mark shall be at least 15.25 cm (6 inches) on each side. If the PCB Article or Equipment is too small to accommodate this size, the mark may be reduced in size proportionately down to a minimum of 5 cm (2 inches) on each side.

   (b) Small PCB Mark--Ms. Mark Ms shall be as shown in Figure 2, black letters and striping on a yellow background and shall be sufficiently durable to equal or exceed the life of the PCB Article, Equipment, or Container. The mark shall be a rectangle 2.5 by 5 cm (1 inch by 2 inches). If the PCB Article or Equipment is too small to accommodate this size, the mark may be reduced in size proportionately down to a minimum of 1 by 2 cm (0.4 by 0.8 inches).

2. Non-PCB Items containing PCB in concentrations equal to or less than 49 ppm.

   (a) Non-PCB Mark: This mark shall be as shown in Figure 3, white letters and striping on a blue background and shall be sufficiently durable to equal or exceed the life of the article, equipment, or container.
contains PCBs
(Polychlorinated Biphenyls)
A toxic environmental contaminant requiring special handling and disposal in accordance with U.S. Environmental Protection Agency Regulations
40 CFR 761 - For Disposal Information contact the nearest U.S. E.P.A. Office.

In case of accident or spill, call toll free the U.S. Coast Guard National Response Center 1-800-424-8802

Also Contact Tel. No.

Figure 1

 להוסיף PCBs
(Polychlorinated Biphenyls)

FOR PROPER DISPOSAL INFORMATION CONTACT U.S. ENVIRONMENTAL PROTECTION AGENCY

Figure 2

THE DIELECTRIC FLUID IN THIS UNIT HAS BEEN TESTED TO DETERMINE THE AMOUNT OF POLYCHLORINATED BIPHENYL(S) (PCB CONTENT). WE CERTIFY THAT BASED ON THE TEST SAMPLE, THE FLUID CONTAINED LESS THAN 50 PPM PCB AND IS THEREFORE CLASSIFIED A NON-PCB AS DEFINED THE AUG. 25, 1982, VOL. 47. NO. 165 OF THE FEDERAL REGISTER.

Figure 3

D OF SECTION

-- End of Section --
SECTION 02 08 33

REMOVAL OF POLYCHLORINATED BIPHENYL FLUORESCENT LIGHT BALLASTS
(WPAFB)
04/10

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. This section of the specifications outlines detailed instructions on the proper removal and packaging of all fluorescent light ballasts containing polychlorinated biphenyls (PCB) at Wright-Patterson Air Force Base (WPAFB). The Environmental Branch (88 ABW/CEAN) is the office of primary responsibility for this section of the specifications.

B. Materials containing PCBs that result from cleanup of spills caused by the contractor shall be the full responsibility of the contractor. These materials shall be contained, turned into 88 ABW/CEAN, and disposed of at the contractor's expense in accordance with Civil Engineering Specification 02 08 40.

1.02 REFERENCES

A. Environmental Protection Agency (EPA):

1. Title 40 Code of Federal Regulations, Part 761, all applicable Sub parts and amendments.

B. Occupational Safety and Health Administration (OSHA):


C. Department of Transportation (DOT):

1. Title 49 Code of Federal Regulations (CFR), Part 171-180 and other applicable parts and amendments.

1.03 SPILLS

A. Immediately report PCB spills of any size to 88 ABW/CEAN, 257-7152, and Civil Engineering Service Desk, 257-3131. Any PCB spills entering a storm drain, sanitary drain, or any waterway will be immediately reported to the WPAFB Fire Dept. at 257-9111 or 9-911 from an on-base phone.

B. All materials and/or surfaces contaminated with PCBs spilled by the contractor during the work shall be the contractor's responsibility. The contractor shall be responsible for all costs associated with the cleanup, testing for contamination, restoration of area to or near original condition, and disposal of any wastes.

1.04 SUBMITTALS

A. PRE-SUBMITTALS are required when removing 8 or more ballasts for disposal within one 24-hour period.
1. At least forty-eight hours prior to starting ballast removal, the contractor shall contact 88 ABW/CEAN at 257-7152 and provide the scheduled removal start date.

2. Detailed procedures for the removal, inspection, and handling of PCB ballasts.

3. A Health and Safety Plan satisfying the criteria of 29 CFR 1910.120.


5. A detailed project schedule indicating the sequence of operations to be performed.

6. A sketch or drawing showing the locations of the ballasts to be removed and the PCB drum storage area.

B. POST-SUBMITTALS are required whenever paragraph 1.04A of this Specification is in effect.

1. Within twenty-four hours after the contractor has completed ballast removal and containerized the ballast, the contractor shall complete a WPAFB form 1438 and submit it to the contract QAE for coordination. The QAE shall then sign the 1438, submit it to 88 ABW/CEAN and contact 88 ABW/CEAN at 257-7152 to schedule pick-up of the ballasts. The QAE shall ensure at this time the 30-day limit for temporary storage has not been exceeded.

2. Unless otherwise arranged with 88 ABW/CEAN, the government will provide transportation of the ballast.

1.05 PERSONAL PROTECTIVE EQUIPMENT (PPE)

A. PPE shall be provided and maintained for all personnel as required by 29 CFR 1910.120 for ballast removal and PCB spill clean-up operations.

1.06 DEFINITIONS

A. PCB: Any chemical substance that is limited to the biphenyl molecule that has been chlorinated to varying degrees or any combination of substances which contains such substance.

B. FLUORESCENT LIGHT BALLAST: A device that electrically controls fluorescent light fixtures and that includes a capacitor containing 0.1 kg. or less of dielectric.

C. PCB FLUORESCENT LIGHT BALLAST: A light ballast that contains PCBs at a concentration at or above 50 PPM. Fluorescent light ballasts that are NOT marked "No PCBs" and all ballasts manufactured before 1 July 1978 are considered to be PCB containing ballasts. Ballasts manufactured after 1 July 1998 and all electronic ballasts are not considered to be PCB containing ballasts and are excluded from this requirement.

D. NON-PCB BALLAST: A fluorescent light ballast that does not contain PCBs. No fluorescent light ballast manufactured in the U.S. after 1 July 1978 are allowed to contain PCBs. All ballasts manufactured between 1 July 1978 and 1 July 1998 that do not contain PCBs will be marked by the manufacturer as "No PCBs". Ballasts manufactured after 1 July 1998 are not required to be marked "No PCBs" although they do not contain...
PCBs. Note: Non-PCB fluorescent light ballasts may be recycled at the Base recycling Center and are not subject to the requirements of this specification. Contact 88 ABW/CEAN at 257-5535 for more information.

E. Electronic Light Ballast: A Non-PCB light ballast that uses electronics instead of an inductor/capacitor to control a fluorescent light fixture. Electronic light ballasts contain no dielectric and are not subject to the requirements of this specification. Electronic ballasts are generally smaller and lighter than magnetic ballasts and usually are marked "Electronic". When in doubt manage the ballast as defined in 1.06B, 1.06C, or 1.06D as may be applicable.

F. PCB DEBRIS: Any debris, such as light fixtures and PPE, that are contaminated with PCBs.

G. PCB SPILL: The intentional and/or unintentional spill, leak, or other uncontrolled discharges where the release results in any quantity of PCB, running off or about to run off the external surface of the equipment; and the contamination resulting from those releases.

PART 2 - EXECUTION

2.01 SECURITY OF SITES

A. Install physical barriers (i.e. self-supporting barricades, roping, caution tape, etc.) to secure work site where PCB ballasts are being removed and stored.

B. Also see 1.03 above for spills entering drains or waterways.

2.02 SPILL CONTAINMENT

A. The contractor shall install temporary covers (i.e. plastic drop cloths) over surfaces (floor, carpet, tables) that may come in contact with PCB ballasts.

B. Also see 1.03 above for spills entering drains or waterways.

2.03 EQUIPMENT DECONTAMINATION

A. Any non-disposable item contaminated with PCB shall be decontaminated in accordance with 40CFR 761.

2.04 REMOVAL AND PACKAGING

A. Each ballast that is covered by this Specification (see definitions 1.06 above) shall be visually inspected to determine whether or not it is marked "No PCB". If ballasts are not marked "No PCB", treat them as containing PCBs (see exclusions in 1.06C). If it is determined that a ballast is or is presumed to be a PCB fluorescent light ballast, remove the ballast(s) from the fixture. Do not puncture or damage the ballast in any way.

B. Place PCB light ballasts into 30 or 55 gallon open head steel which conforms to UN Std. 1A1 or 1A2.

1. Place no more than one hundred fifty F40 (ballasts from four foot light fixtures) or seventy-five F96 (ballasts from eight foot fixtures) light ballasts into one drum.

2. The gross weight of loaded drums shall not exceed 600 pounds.

3. The contractor is responsible for providing drums that meet all DOT and UN specifications IAW 49 CFR 173.212 and are in good condition.
4. Leaking PCB ballasts shall be wrapped in plastic and may be placed in drums with other non-leaking ballasts.

5. Mark the drums as containing PCB light ballasts, greater than 500PPM (>500) unless documented to have a lower concentration.

6. Mark the facility building number from which the ballasts were removed and the date that the first ballast was placed into the container.

C. Any contaminated portions of the light fixture, resulting from leaking PCB ballasts, shall be cut away and placed into separate 30 or 55 gallon open head steel drums which conform to UN Std. 1A1 or 1A2. Do not mix ballasts and debris. Any contaminated plastic or PPE shall also be placed into these drums for disposal. Mark the drums as containing PCB debris, the facility building number and the date the debris was placed into the container IAW 40 CFR 761.45.

D. At the time of use, the contractor shall mark each container individually with the following:

1. The PCB label, ML, as shown in Figure 1 of 40 CFR 761.45(a).
2. The container accumulation start date (i.e. date removed from service).
3. Contents of container, i.e. light ballasts, debris.
4. The building number from which the ballasts were removed.

E. Ensure that all drum lids are secured and fully tightened with bolt ring pointing downward.

F. The contractor shall be responsible for repackaging any containers that are considered by 88 ABW/CEAN to be unsuitable for shipment.

2.05 TEMPORARY STORAGE

A. The temporary storage location for the drummed PCB ballasts shall be approved by 88 ABW/CEAN. Drums of PCB items shall be stored indoors.

B. The contractor shall not have any PCB light ballasts in temporary storage for over 30 calendar days. Do not relocate items for the purpose of extending the storage time. The contractor shall contact 88 ABW/CEAN at 257-7152 if the thirty-day storage limit will be exceeded.

2.06 GOVERNMENT PROTECTION

A. The contractor shall be liable for all claims, costs, losses, damages and other expenses the government may incur as a result of the contractor's negligence or willful misconduct during the performance of this contract.

END OF SECTION
SECTION 02 08 34

REMOVAL OF MERCURY-CONTAINING LAMPS (WPAFB)

02/10

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. This section of the specifications outlines detailed instructions on the proper removal and packaging of Universal Waste lamps (fluorescent straight, fluorescent U-shaped and circular, compact fluorescent(CFL), mercury vapor, metal halide, high intensity discharge (HID) and high pressure sodium light bulbs) from Wright-Patterson Air Force Base (WPAFB).

1.02 REFERENCES

A. Environmental, Health and Safety Regulations

1. Title 29 Code of Federal Regulations (CFR), Parts 1910.120, 1910.1200 and 1926 - OSHA
2. 40 CFR Subtitle C - Hazardous Waste
3. 49 CFR 171-178 - U.S. Department of Transportation
5. All other applicable state and local laws and regulations

1.03 HAZARD COMMUNICATION/PROTECTIVE EQUIPMENT

A. Universal Waste Lamps are hazardous waste if broken. Refer to 2.01 B for further information.

B. The contractor shall provide hazard communication training, universal waste training and the appropriate personal protective equipment to all employees as required by 29 CFR 1910.120 and 1910.1200 and 40 CFR 273.36.

1.04 DEFINITIONS

A. Mercury-containing lamps include the following:

1. Fluorescent
2. Fluorescent U shape and circular
3. High pressure sodium
4. Metal halide
5. Mercury vapor
6. Compact Fluorescent (CFL)
7. Neon Lamps, incandescent, and Light Emitting Diode (LED) must be evaluated by Natural Resources Management Branch, 88 ABW/CEAN
8. High Intensity Discharge (HID)

1.05 SUBMITTALS

A. PRE-SUBMITTAL
1. At least forty-eight hours prior to starting lamp removal, the contractor shall contact 88 ABW/CEAN at 257-7152 and provide the scheduled removal start date.

B. POST-SUBMITTALS

1. Within twenty-four hours after the contractor has completed lamp removal and containerized the lamps, the contractor shall complete a WPAFB form 1438 and submit it to the contract QAE for coordination. The QAE shall then sign the 1438, submit it to 88 ABW/CEAN and contact 88 ABW/CEAN at 937-257-7152 to schedule pick-up of the lamps. The contractor shall provide the quantity of lamps and number of boxes. The government will provide transportation of the lamps.

PART 2 - EXECUTION

2.01 SPILL CONTAINMENT AND CLEANUP OF BROKEN LAMPS

A. The contractor shall install temporary seals over all floor drains, conduits, and other openings within the lamp removal area where breakage of lamps may occur.

B. In the event lamps are broken, the contractor shall proceed as follows:

1. If more than 8 lamps are broken at the same time, immediately call 88 ABW/CEAN at 937-257-7152, and cordon off and ventilate the area. If 88 ABW/CEAN can not be reached, dial 911 (using a base phone) or fire dispatch at 257-9111 to activate the base fire department for response to a hazardous material release. Broken lamps must immediately be containerized in an air tight container and managed as a hazardous waste.

2. Appropriate hand/eye/respiratory protection shall be worn when cleaning up and handling any quantity of broken lamps. Avoid inhalation of airborne dust. An acceptable cleanup method is sweeping up the broken lamps and all visible powder with a broom.

3. The broken/crushed pieces and powder shall be cleaned up and placed in a separate container and sealed closed (i.e. drum or bucket with lid).

2.02 REMOVAL/PACKAGING/STORAGE OF MERCURY-CONTAINING LAMPS

A. The contractor shall take care to remove mercury-containing lamps from fixtures without damaging or breaking the lamps. Lamps that are shielded (with sleeves or covers) shall be separated from the shields.

B. The lamps shall be packaged in boxes provided by the contractor in the following manner:

1. Lamps of the same type (i.e. HID, U-shape) and length shall be packaged snugly in the box.
2. Write the type of lamps on either END of the box (i.e. 4'fluorescent)
3. Write "Universal Waste Lamps" and the date the first bulb was placed in the box on the end of the box.
4. Tape the box closed (after it is full). A full box will ensure the bulbs are packaged snugly and will prevent breakage when transporting.

C. All boxes containing lamps shall be stored indoors.
In the event a lamp(s) is broken or crushed, that broken lamp and any debris that can be gathered shall be placed in an air-tight container and marked and managed as a hazardous waste. The hazardous waste container with the broken pieces will be removed when the box is removed.

2.03 GOVERNMENT PROTECTION

A. The contractor shall be liable for all claims, costs, losses, damages and other expenses the government may incur as a result of the contractor's negligence or willful misconduct during the performance of this contract.

END OF SECTION
SECTION 02 09 00
REMOVAL AND DISPOSAL OF LEAD CONTAINING MATERIALS INCLUDING
LEAD-BASED PAINT (LBP) (WPAFB)
05/10

PART 1 - GENERAL

1.01 SECTION INCLUDES: Removal, management, temporary storage, and disposal of any lead containing materials, including Lead-Based Paint (LBP) as a part of any abatement, maintenance, demolition, or salvage of base structures or facilities and the cleanup of lead contamination. This section does not apply to Child-Occupied Facilities as defined by the Environmental Protection Agency (EPA) in Title 40 Code of Federal Regulations (CFR) 745.223. See Civil Engineering (CE) Specification 02 09 02.

1.01.01 The Occupational Safety and Health Administration (OSHA) Occupational Health and Environmental Controls for Lead, 29 CFR 1926.62, are in effect at all times that materials containing any amount of lead are disturbed.

1.01.02 The EPA Hazardous Waste (HW) Management System: General, 40 CFR Part 260 through 265 is in effect at any time lead containing materials that meet the definition of HW as defined by Part 262 are collected for disposal.

1.01.03 The Department of Transportation (DOT) Hazardous Materials (HAZMAT) Regulations, 49 CFR Part 171 Subchapter C is in effect when lead containing materials that meet the definition of HW as defined by 40 CFR Part 262 are transported upon any public roadway.

1.02 APPLICABLE PUBLICATIONS: THE PUBLICATIONS LISTED BELOW ARE PART OF THIS SPECIFICATION.

1.02.01 EPA: Title 40 CFR, Parts 260 through 302.

1.02.02 OSHA: Title 29, CFR, Parts 1910.1025 for Construction or Demolition and 1926.62 for all other lead abatement or cleanup activities.

1.02.03 DOT: Title 49, CFR, Sections 171 through 178.


1.02.05 Ohio Administrative Code (OAC) 3701-32 and Ohio Revised Code (ORC) 3742 through 4777 as may be applicable.

1.03 QUALIFICATIONS: This section provides the minimum requirements a contractor must meet to be qualified to perform lead work (cleanup and/or abatement) on Wright Patterson Air Force Base (WPAFB).

1.03.01 The contractor shall have at a minimum, 1 year of documented experience in properly removing LBP and/or lead containing materials in accordance with applicable EPA, OSHA, and OAC standards. This documentation must demonstrate compliance with all applicable parts of 40 CFR, 29 CFR, 49 CFR, and OAC.
1.03.02 Training: Any contractor/employee performing work applicable to this standard will meet, at a minimum, the training requirements as set forth in 29 CFR 1926.62(1).

1.03.03 Any contractor/employee disturbing any LBP coated surfaces must have at a minimum, a current eight hour lead awareness course provided by an accredited provider defined in OAC.

1.03.04 All contractors/workers performing work which involves the disturbance of any lead containing materials including LBP in an occupied facility will be trained and licensed in accordance with OAC 3701.32.

1.04 PERFORMANCE REQUIREMENTS:

1.04.01 All lead work involving the disturbance or removal of any lead containing materials including LBP, in an unoccupied Government facility shall comply with 29 CFR 1926.62.

1.04.02 All lead work involving the disturbance or removal of any lead containing materials including LBP, in an occupied Government facility shall comply with 29 CFR 1926.62 and all parts of ORC 3742.39 through 3742.48 including 3742.49 for Historic Facilities. The proposed work methods are subject to review by 88 ABW/CEAN and/or Base Bioenvironmental Engineering Flight, 88 AMDS/SGPB.

1.04.03 The contractor shall incorporate work methods that insure the containment of all airborne, LBP chips, lead containing dust and/or liquids, and lead-contaminated debris generated as part of this project. These proposed work methods are subject to approval by the Environmental Branch Pollution Prevention and Sustainment Section, 88 ABW/CEANP.

1.04.04 The contractor shall properly manage all HAZMAT used in conjunction with the removal of lead containing materials, in accordance with all EPA, Air Force, and WPAFB specific policies and regulations. See CE Specification 01 02 20 Section 3.9.

1.04.05 The contractor shall be responsible for providing drums/containers for the disposal of all lead waste and debris. All containers must meet the requirements specified in 49 CFR Part 178.

1.04.06 The contractor shall be responsible for the proper collection and storage of all lead-based waste materials. Lead-based waste materials (chips, etc.) shall be stored separately from lead-based disposal debris (absorbent material, disposable clothing and tools, etc.). The contractor will submit a WPAFB Form 1438 to the project inspector for waste pick up by the Environmental Branch, 88 ABW/CEAN. Disposal debris may be disposed of as construction debris.

1.04.07 The contractor will perform demolition work without damage or contamination of adjacent work areas. Where such areas are damaged or contaminated, the contractor will restore the work areas to original conditions at the contractor's expense. When demolition work inadvertently disturbs potential LBP outside the demarcated area in Government occupied facilities, all work must immediately stop and 88 AMDS/SGPB (255-6815) must be contacted for evaluation and potential air monitoring.

1.04.08 The contractor shall have one copy of all applicable publications listed in paragraph 1.02, copies of the approved work plan and WPAFB specification Section 02 09 00 available at the job site at all times.

1.04.09 The contractor must be qualified to wear appropriate personal protective equipment (PPE), will perform necessary monitoring, and will ensure other personnel in the general work area are adequately protected from hazards generated by the contractor.

1.04.10 The contractor must be qualified to handle and manage HW in accordance with the Resource Conservation and Recovery Act (RCRA). A certificate of training is required, see 40 CFR 264.16.
1.05 DEFINITIONS and ACRONYMS: For the purpose of this Specification all definitions are taken from 40 CFR 745.83, 29 CFR 1910.1025(b), 29 CFR 1926.62(b), and OAC 3701-32-01 with the following amendments:

1.05.01 Air Filtration Device (AFD): All AFDs used on WPAFB will meet the requirements of HEPA Filters as defined by U.L.586. See 1.05.08.

1.05.02 Construction and Demolition (C&D) Debris: Those materials that are not hazardous as defined by EPA and can be legally disposed of in a C&D landfill. Lead Containing Materials that are collected separately from the substrate for disposal are NOT C&D material and may be required to be disposed of as RCRA waste.

1.05.03 Certified Industrial Hygienist (CIH): As used in this section, refers to an Industrial Hygienist employed by the Contractor who meets the certification requirements as set forth in ORC 4777.01.

1.05.04 Child-Occupied Facility: A building, or a portion of a building, constructed prior to 1978 that is visited regularly by the same child, six years of age or under. A Child-Occupied Facility for this section as further defined in 40 CFR 745.83. All Base housing within the perimeter fence of the WPAFB are considered Child-Occupied Facilities. This Specification (02 09 00) is not generally applicable to repair or remodeling of Child-Occupied Facilities, see Specification 02 09 02.

1.05.05 Exposure Assessment: As used in this Specification is defined in 29 CFR 1926.62(d). All exposure assessments for lead activities may be reviewed by 88 AMDS/SGPB.

1.05.06 HAZMAT: Hazardous Material(s): See section 2.01 of this Specification for additional information on managing HAZMAT.

1.05.07 HW: Hazardous Waste: As used in this Specification is defined in 40 CFR part 262. All HW generated on WPAFB will be managed by 88 ABW/CEANP.

1.05.08 HEPA: High Energy Particulate Air Filter: As used in this section, all HEPA filtration devices used on WPAFB will meet UL-586 standard. A HEPA vacuum device is defined in 40 CFR 745.83.

1.05.09 In accordance with (IAW): As in "all Lead-Based Material activities on WPAFB will be accomplished IAW this specification and all applicable law."

1.05.10 LBP: Lead-Based Paint: LBP is paint with any detectable amount of lead. For OSHA purposes, all painted surfaces on WPAFB are to be considered LBP unless laboratory analysis proves otherwise. For EPA (RCRA) purposes, LBP collected separately from construction debris must be sampled and analyzed for proper characterization for disposal.

1.05.11 Lead Control Area: An isolated area or structure with full containment to prevent the spread of lead dust, paint chips or debris of lead containing paint removal operations. The lead control area is isolated by physical boundaries to prevent entry of unauthorized personnel.
1.05.12 Personal Monitoring: Air sampling of lead concentrations within the breathing zone of an employee. All employee Personal Monitoring must be IAW 29 CFR 1926.62(d).

1.05.13 Physical Boundary: An area physically partitioned off around an enclosed lead control area to limit entry of unauthorized personnel. Physical Boundaries will be established, when applicable, with coordination from the facility Real Property Building Manager (RPBM) and/or 88 ABW/CEAN and the Technical Support Branch Program Division, 88 ABW/CEP.

1.05.14 Quality Assurance Evaluator (QAE): QAE will usually refer to the field inspector from 88 ABW/CEP or 88 ABW/CEAN although it could include a representative from 88 AMDS/SGPB or any persons so designated by Contracting.

1.05.15 RCRA: Resource Conservation and Recovery Act: See EPA’s 40 CFR 260 for full RCRA info.

1.05.16 RPBM: Real Property Building Manager also referred to as Facility Manager: The RPBM must coordinate on all lead activities occurring within the facility for which they have responsibility when the facility is occupied by Government Employees during the time the activity is occurring.

1.05.17 Toxicity Characteristic Leaching Procedure (TCLP): A procedure used to determine the toxicity of material making up a waste stream. TCLP is performed using EPA’s method 1301.

1.05.18 WPAFB: Wright Patterson Air Force Base: This includes all of Areas A, B and C; the Kitty-Hawk Base Exchange and Dormitory area. This also includes all housing or other facilities outside of the fenced perimeter that is still under the jurisdiction of WPAFB to include those remote fenced in areas for navigational beacons etc.

1.06 QUALITY ASSURANCE:

1.06.01 Medical Examinations: When required by law will comply with 29 CFR 1926.62(j)(3).


1.06.03 Hazard Communication (Haz-Com) Program: Establish and implement a Haz-Com Program as required by 29 CFR 1910.1200 and 29 CFR 1926.59 as may be applicable.

1.06.04 Procedures for waste container management and turn-in when collecting any lead containing materials for disposal separate from C&D debris:

A. Maintain an inventory of waste containers and empty containers.

B. All containers must be labeled in accordance with the following:

1. Each container shall be individually labeled. Labels shall be filled out legibly with a waxed based pencil (note: grease pencil) or other marking pen (note: Sharpie Pen) capable of withstanding diverse climate/weather conditions (Note: pen shall resist fading and streaking). Ball-point pens, pencils and magic markers are not acceptable.
2. All containers shall have one of the following acceptable labels properly filled out and in good condition displayed:

   a. LEAD PAINT ABATEMENT ACCUMULATION CONTAINER (include Sample Date and Sample Number).

   b. EMPTY

3. If a label becomes lost, worn, faded or defaced in any manner, the label shall be immediately replaced. Paper labels exposed to adverse weather conditions should be protected with a plastic overlaying to prevent deterioration.

4. Turn-in: The contractor shall turn-in all HW generated on WPAFB to the 88 ABW/CEANP representative by filling out the following blocks of the WPAFB form 1438: (form furnished by 88 ABW/CEANP).

   1. Name - Contractor Name
   2. Building Number - Facility number where waste was generated
   3. Extension Number - Phone number where HW site manager can be reached to schedule pick-up
   4. Constituents - Constituents and associated percentages
   5. Process Generating Waste - How the waste was generated
   6. Container size - Volume of container
   7. Number of containers - The number of HW containers requiring pick-up
   8. Physical State - Solid / Liquid / Gas Sludge
   9. Flashpoint - Self-explanatory

1.07 SITE SPECIFIC WORK PLAN: This section pertains only to construction, demolition, or renovations disturbing LBP or lead containing materials when it is being performed in occupied government facilities or as part of any lead abatement activities. This site specific work plan is not generally required for normal demolition or renovation where LBP and debris will be disposed of only as C&D material. See checklist in section/para. (1.07.02)

1.07.01 Submit a detailed job-specific plan of the work procedures to be used in the removal of lead containing materials.

   A. The plan shall include a sketch showing the location, size and details of lead control areas, location and details of decontamination rooms, change rooms, shower facilities, hand washing facilities as applicable and mechanical ventilation system.

   B. Include in the plan, eating, drinking, smoking and restroom procedures, interface of trades, sequencing of lead related work, collected waste water and paint debris disposal plan, air sampling plan, respirators, protective equipment and a detailed description of the method of containment of the operation to ensure that lead concentrations do not exceed the airborne PEL as established in 29 CFR 1910.125(c) or 40 microgram per square foot as established by OAC 3701-32-19 outside of the lead control area.

1.07.02 Site Specific Work Plan Checklist; Must be filled out and on-site at all times.
1. **PRECISE SITE DRAWINGS**  
   a. The regulated area(s), show a demarcation of the enclosure  
   b. Hygiene facility included  
   c. Negative pressure system and air flow patterns shown, if applicable  
   d. Location, size and construction of critical barriers shown  
   e. All LBP locations identified and labeled to be removed  
   f. Location (building and room number) and size of enclosure  

2. **QUALIFICATION STATEMENTS:**  
   a. Competent person by name and training certification  
   b. Air Monitoring Technician by name and certification  
   c. Testing laboratory success criteria  
   d. EPA approved landfill  

3. **PERFORMANCE PROCEDURES:**  
   a. Strategy and frequency of exposure monitoring  
   b. Air sampling and analytical procedures  
   c. Lead Abatement Plan (Method)  

4. **OTHER:** Note: Include only last 4 digits of SSNs if used in any documents  
   a. Xerox copy of Workers Lead License  
   b. Employee Training Program for LBP  
   c. Respirator Program  
   d. Medical Surveillance Program  
   e. Emergency Procedures  
   f. Proof of Insurance (certificate)  
   g. Laboratory Quality Control Plan  
   h. List, by name, employees in the Medical Surveillance Program on this project.  
   i. List and identify projects where citations for LBP violations occurred if no violations occurred, so  
   state.  
   j. Haz-Com Program  
   k. Safety Program  
   l. RCRA Training Certification  

   1.07.03 Include all air sampling results when applicable, training and strategy, sampling methodology,  
   frequency, duration of sampling and qualifications of air monitoring personnel in the air sampling portion  
   of the plan. Obtain approval from 88 ABW/CEAN of the plan prior to the start of paint removal work.  

   1.08 Containerizing and Disposing of lead-contaminated waste materials  

   1.08.01 Contain all solid material (used absorbent material, paint chips, removed soil, disposable tools,  
   etc.) in 30 gallons or less open head steel shipping drums. The DOT approved drums shall meet U.N.  
   Specifications UN 1A2/X160/S; UN 1A2/X1.4/250.  

   1.08.02 Prior to adding lead containing waste into drums, contractor will line drum with two six mil poly  
   bags.  

   1.08.03 All drums will be maintained in a secure area approved by QAE and must have bung locks.
1.08.04 All collected waste water will be filtered through a 5 micron filter and tested by TCLP method 6010B. If testing demonstrates water to be non-hazardous and contains less than 6 parts per million lead, water may be disposed of by way of a sanitary drain after receiving approval from the Environmental Branch Environmental Quality Section, 88 ABW/CEANQ.

1.09. PERMITS AND NOTIFICATIONS: The contractor shall be responsible for obtaining all legally required permits or notifications for demolition and renovation, removal and management of any lead containing waste materials, as may be applicable. A copy of all notifications shall be forwarded to 88 ABW/CEANP, Attention: LBP Program Manager.

1.10. POST SUBMITTAL:

1.10.01 Air Monitoring: Submit copies of all air monitoring results, signed by the testing employee performing the air monitoring, the laboratory employee that analyzed the sample and the CIH to 88 ABW/CEAN within 96 hours upon completion of lead abatement activity.

1.10.02 Records:

A. A completed and signed copy of Bill of Lading for all non-hazardous waste shipped from WPAFB will be forwarded to 88 ABW/CEANP.

B. Submit copies of all laboratory analytical reports including chain of custody forms within 96 hours after completion to 88 ABW/CEAN. Analytical reports shall be certified, dated and signed by the laboratory manager/director.

1.11 COORDINATION:

1.11.01 The contractor shall notify the following in writing at least three working days prior to starting any work that could disturb LBPs, lead-based coatings, or any regulated lead containing materials or wastes.

A. 88ABW/CEPT

B. 88 ABW/CEAN

C. 88 AMDS/SGPB - when in an occupied facility

1.11.02 The names of the individuals to be notified will be given to the contractor at the pre construction meeting.

PART 2 - PRODUCT

2.01 MATERIAL STORAGE and USE:
2.01.01 The contractor is required to ensure that HAZMAT is used appropriately, in accordance with the manufacturer's MSDS and label, so as not to expose government employees or disrupt the work environment (office or building evacuations, etc.)

2.01.02 The contractor shall follow manufacturer's guidelines for control of humidity, temperature, cleanliness, and material handling.

2.01.03 The contractor shall procure, use, handle and store all HAZMAT IAW all Federal, State, local, and Air Force laws, policies, regulations and procedures, including: AFI 32-7086 HAZMAT Management, AFI 32 7086_AFMCSUP1 HAZMAT Management, AFI 32-7086_WPAFBSUP1 HAZMAT Management, the WPAFB Installation HAZMAT Management Program (IHMP) Plan, AFI 32-7080 Pollution Prevention, AFJMAN 23-209 Storage and Handling of HAZMAT, and AFI 40-201 Managing Radioactive Materials in the USAF.

2.01.04 The contractors will furnish all equipment necessary to manage HAZMAT. This equipment includes, but is not limited to, approved chemical security cabinets, locks, secondary containment, spill response equipment, fire extinguishers, and PPE, to securely manage HAZMAT at the project site.

PART 3 - EXECUTION

3.01 REMOVAL PROCEDURES: These removal procedures pertain only to construction, demolition, or renovations disturbing LBP or lead containing materials when it is being performed in occupied government facilities or as part of any lead abatement activities. These removal procedures are generally applicable to normal demolition or renovation where LBP and debris will be disposed of only as C&D material.

3.01.01 All procedures shall conform to the requirements of 40 CFR 262, 29 CFR 1926.62 and all mandatory appendices. The recommendations of non-mandatory appendices shall be complied with as mandatory without prior approval from 88 AMDS/SGPB and/or 88 ABW/CEAN as applicable.

3.01.02 Contractor shall be responsible for setting up an appointment with 88 ABW/CEPT for pre-inspections and clearances with a minimum of a 24 hour notice. This pre-inspection is required after setup of abatement area and before removal begins.

3.01.03 PPE: Contractor will furnish all government representatives with complete sets of PPE as required herein, for entry into and inspection of the lead removal activity within the lead controlled area. Furnish all personnel who will be exposed to lead-contaminated dust with appropriate PPE. When air monitoring results are used to reduce the level of personal protection the contractor must notify 88 ABW/CEAN for review. The contractor will submit to 88 ABW/CEAN by task, background information and air monitoring data for approval.

3.01.04 Rental Equipment Notification: If rental equipment is to be used during lead containing materials handling and/or disposal, notify the rental agency in writing concerning the intended use of the equipment. Furnish a copy of the written notification to 88 ABW/CEANP.

3.01.05 Boundary Requirements: Provide physical boundaries around the lead control area by roping off the area or providing curtains, portable partitions or other enclosures to ensure that airborne concentrations of lead will not reach 30 micrograms per cubic meter of air outside of the lead control area.

3.01.06 Heating, Ventilating and Air Conditioning (HVAC) Systems: Shut down, lock out, and isolate HVAC systems that supply, exhaust, that pass through the lead control areas. Seal intake and exhaust vents in the lead control area with 6-mil plastic sheet and tape. Seal seams in HVAC components that
pass through the lead control area. Coordinate all HVAC modifications or shut downs with facility RPBM in occupied facilities.

3.01.07 Change Room, Hand Washing Facility and Shower Facilities: Provide facilities within the physical boundary around the designated lead control area in accordance with requirements of 29 CFR 1926.62. Shower waste water will be filtered through a 5 Micron filter and characterized for lead concentrations before disposal (refer to 1.08.04.).

3.01.08 Mechanical Ventilation System, as may be applicable.

A. Use adequate ventilation to control personnel exposure to lead in accordance with 29 CFR 1926.57.

B. Use fixed local exhaust ventilation connected to HEPA filters or other collection systems. Local exhaust ventilation systems shall be designed, constructed, installed and maintained in accordance with ANSI Z9.2.

C. If air from exhaust ventilation is recirculated into the work place, the system shall have a HEPA filter with back-up filter. Air may only be re-circulated where exhaust to the outside is not feasible and with approval from 88 ABW/CEAN and/or 88 AMDS/SGPB. Coordination with facility RPBM is required.

3.01.09 Warning Signs: Provide warning signs at approaches to lead control areas. Locate signs at such a distance that personnel may read the sign and take the necessary precautions before entering the area. Signs shall comply with the requirements of 29 CFR 1926.62.

3.01.10 Work Procedures: Perform removal of lead containing materials in accordance with approved lead containing materials removal plan. Use procedures and equipment required to limit occupational and environmental exposure to lead when lead containing material is removed in accordance with 29 CFR 1926.62.

3.01.11 Personnel Exiting Procedures: Personnel exiting the lead controlled area shall perform the following procedures and shall not leave the work place wearing any outer clothing or equipment worn during the work day:

A. HEPA Vacuum themselves off, including disposable suits. After vacuuming disposable suits they will be disposed of as construction debris.

B. Remove protective clothing (gloves, coveralls, etc.) in the decontamination room and place them in an approved controlled container.

C. Wash hands and face at a minimum and shower, if applicable, per task, per 29 CFR 1926.62.

D. Change into clean clothes prior to leaving the physical boundary designated around the lead-contaminated job site.

3.01.12 Monitoring: When required, monitoring of airborne concentrations of lead shall be in accordance with 29 CFR 1926. Air monitoring, testing and reporting shall be performed by an Air Monitoring Technician (AMT) or an Industrial Hygienist Technician (IHT).

A. The AMT or IHT shall be on the job site monitoring the lead containing paint removal task to ensure that the requirements of 29 CFR 1926.62 have been satisfied.
B. Initial air monitoring is required on all projects as described in 3.01.12. The use of historical data collected from LBP projects performed outside WPAFB may be acceptable with prior notice from 88 ABW/CEAN. Historical data collected from LBP projects at WPAFB shall be submitted to 88ABW/CEAN for review.

C. Sufficient area monitoring shall be conducted at the physical boundary to ensure unprotected personnel are not exposed above 30 micrograms per cubic meter.

D. Submit lab analysis results of personal air monitoring within 24 hours of sampling completion.

1. Notify the Contracting Officer and 88 ABW/CEAN immediately of exposure to lead at or in excess of the action level of 30 micrograms per cubic meter of air outside of the lead control area.

2. The CIH or Competent Person in consultation with representative from 88 ABW/CEAN shall review the sampling data collected on that day to determine if condition(s) require any further change in work methods.

3. Changes from approved original submittals require addendums or resubmittals and approval before implementation. Removal/abatement work shall resume only after approval is given by 88 ABW/CEAN and work area has been re-inspected by 88 ABW/CEP.

E. For outdoor operations, at least one sample on each shift shall be taken on the downwind side of the lead control area.

3.01.13 Selection: Select LBP removal processes to minimize contamination of work areas with lead-contaminated dust or other lead-contaminated debris/waste. This paint removal process should be described in the lead containing paint removal plan, and approved by 88 ABW/CEAN.

3.02 DAILY CLEANUP: Maintain surfaces of the lead control area free of accumulations of paint chips and dust. Restrict the spread of dust and debris; keep waste from being distributed over the work area. Do not dry sweep or use compressed air to clean up the area. At the end of each shift and when the paint removal operation has been completed, clean the area of visible LBP contamination by vacuuming with a HEPA filtered vacuum cleaner, wet mopping or wiping with water and detergent. Use to the greatest extent possible disposable paper wipes. Dispose of contaminated wipes as construction debris.

3.03 FINAL INSPECTION:

3.03.01 The final visual inspection will be performed by 88 ABW/CEP representative. The contractor must provide a minimum of 24 hour request for all inspections.

3.03.02 Do not remove the lead controlled area barriers, demarcated boundary or warning signs prior to approval from 88 ABW/CEP.

3.03.03 All polyethylene used on the project will be HEPA vacuumed off and wet wiped before disposal as construction debris.
3.03.04 Contractor will wet wipe all surfaces in the lead controlled removal area. Surfaces will be dust free. If the final visual inspection fails the contractor will re-clean the area and reschedule an additional final visual inspection by 88 ABW/CEP Representative.

3.04 WORK STOPPAGE:

3.04.01 The contractor shall be subject at any time without notice to on-site inspection by a government representative who may be assisted by safety or health personnel.

3.04.02 If work is in violation of specification requirements or federal or state regulations, the Contracting Representative shall temporarily suspend work and notify the Contracting Officer who may verbally or in writing, issue a stop work order. Standby time and expenses required to resolve the violation shall be at the contractor's expense. Examples include but are not limited to:

A. Improper notification
B. Visible emissions or escape of lead containing dust beyond lead control area.
C. Improper disposal
D. Competent person not present
E. Inadequate personal protection
F. Deviation of the approved work plan
G. Improper HW management.
H. No Site Specific Work Plan on site or incomplete Site Specific Work Plan.

END OF SECTION
1.1 WORK INCLUDES

1. Recovery of refrigerant, Halon or other ozone depleting substances (ODSs).

2. Containment of recovered Class I ODSs within cylinders approved by the Government or within cylinders provided by the Government. Government recovery cylinders for Class I ODSs are available through the Defense Logistics Agency (DLA) Aviation or by contacting the base Civil Engineer Refrigerant Manager, 88ABW/CEOEM, at 937-904-2464. Call the DLA Aviation Representative at 804-279-5203 for more information.

3. Transfer mission critical ODSs cylinders to Base Supply, building 247, Area A through the HAZMAT Cell, 88 ABW/CEIEC at 937-257-7152. Mission critical Class I ODSs include but are not limited to: Solvent: CFC-113, Halon: 1202, 1211, and 1301; and Refrigerant: R-11, R-12 R-114, R-500, and R-502.

4. All refrigerant work must be performed by a Certified Refrigerant Technician using Certified Recovery of Recycling Equipment. For the purposes of this work, "Certified Refrigerant Technician" is defined in Section 608 of the Clean Air Act as a facility that uses laboratory protocol set forth in the Air Conditioning, Heating, and Refrigeration Institute (AHRI) Standard 740-1998 and has obtained certification from the Section 608 Recycling Program Manager.

5. For Class I ODSs the contractor shall recover and transfer cylinders directly to the WPAFB refrigerant program manager. Any questions about turn-in can be directed to the Civil Engineer Refrigerant Manager, 88 ABW/CEOEM, 937-904-2464. At least two weeks’ notice needs to be given to the Refrigerant Manager so recovery cylinders can be obtained.

6. For Class II ODSs the contractor shall recover and transfer cylinders directly to the Civil Engineer Refrigerant Manager on any equipment with 20lbs or more refrigerant. Any questions about turn-in can be directed to the Civil Engineer Refrigerant Manager, 88 ABW/CEOEM, 937-904-2464. Class II refrigerants include R-22 and R-123. At least two weeks’ notice needs to be given to the Refrigerant Manager so recovery cylinders can be obtained. For any equipment with less than 20 lbs refrigerant, the contractor doing the recovery will be required to dispose of the material.

7. For any refrigerant (i.e. hydrofluorocarbon (HFC)) not a Class I or Class II, the contractor shall recover and take ownership of the material unless other plans are made with the original owning shop.

8. Certain Halon containing cylinders have a small explosive charge installed on the valve of the cylinder. Disarmament of the Halon cylinder valve charge is a requirement before turning over to the appropriate shop for turn-in. Questions relating to this requirement may be sent to 88 ABW/SEW (937-904-3189).

9. Contractor shall verify that ODSs have been recovered from all ODS equipment before disposal of the equipment in accordance with 40 CFR 82.156(a)(3) and all associated regulations.
1.2 REFERENCES

A. MILSTRIP Regulation DoD 4000.25-1-M, Chapter 9.
B. 49 CFR 173.301 "Requirements for the Shipment of Compressed Gas Cylinders".
C. Section 608 of the Clean Air Act.
D. 40 CFR Part 82 "Protection of Stratospheric Ozone; Refrigerant Recycling.
E. Defense Logistics Agency (DLA): DLA Aviation 804-279-5203
F. 88 ABW/CEIEC: 937-257-7152

1.3 QUALITY ASSURANCE

A. Qualifications of Technicians/Recovery Equipment
   1. Technicians must be certified by the Environmental Protection Agency (EPA) under Section 608 of the Clean Air Act.
   2. Recovery equipment must be tested by an approved EPA testing organization to ensure that it meets requirements under Section 608 of the Clean Air Act.
   3. Knowingly venting ODSs into the atmosphere is prohibited under the Clean Air Act. Technicians releasing "de minimis" quantities of ODSs in the course of making good faith attempts to recapture, recycle or dispose of ODSs are not subject to the prohibition

1.4 SUBMITTALS

A. The following shall be submitted in accordance with Section 01 33 00SUBMITTAL PROCEDURES:

   SD-01 Preconstruction Submittals
   Work Plan; G

   SD-07 Certificates
   Certified Refrigerant Technician; G
   Certified Recovery of Recycling Equipment; G
   Form 1471; G

B. WPAFB IMT 1471, Appliance Input, shall be submitted for any HVAC equipment removed or installed that contains Ozone Depleting Substance - refrigerant.

PART 2 PRODUCTS

NOT USED
PART 3 EXECUTION

3.1 CONTRACTOR SHALL

1. Identify the pressure conditions under which the refrigerator unit or equipment was designed to operate and ensure that technicians have received the appropriate certification (i.e., Type I, Type II, Type III, and/or Universal Technician) that corresponds with the equipment from which ODS is to be recovered.

2. Identify the appropriate type of recovery/recycle equipment and ensure that equipment rating is maintained in accordance with Section 608 of the Clean Air Act relative to:

   a. Liquid Refrigerant Recovery
   b. Vapor Refrigerant Recovery
   c. Final Recovery Vacuum
   d. Refrigerant Loss due to Non-Condensable Purging

3. Ensure refrigerant recovery is performed in compliance with all applicable regulations.

4. Prepare cylinders containing recovered refrigerant for shipping in accordance with all applicable regulations.

5. Transfer cylinders for shipment as described in Part I of this specification.

6. Be liable for all claims, costs, losses, damages and other expenses the government may incur as a result of the contractor's negligence or willful misconduct during the performance of this contract.

7. Prepare the WPAFB IMT FORM 1471 in accordance with provided instructions. Form and instructions can be obtained from 88CEN Design Manager through the Contracting officer.

END OF SECTION
SECTION 02 41 16

SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Demolition and removal of selected portions of a building.
2. Demolition and removal of selected site elements.
3. Removal of selected interior finishes in areas to be modernized.
4. Patching and repairs.
5. Salvage existing items to be reused or recycled.

B. Work by Others: Elements of selective demolition will be accomplished by EXCHANGE or the Army Air Force Exchange Service under separate contracts:

1. Fixture removal/relocation.

C. Related Sections: The following Sections contain requirements that relate to this Section:

1. Division 1 Section "Summary of Project" for use of the building and phasing requirements.
2. Division 1 Section " Temporary Facilities, Barriers and Controls" for temporary utilities, temporary construction and support facilities, temporary security and protection facilities, and environmental protection measures for selective demolition operations.
3. Division 21 Sections for cutting, patching, or relocating Fire Suppression items.
4. Division 22 Sections for cutting, patching, or relocating Plumbing items.
5. Division 23 Sections for cutting, patching, or relocating HVAC items.
6. Division 26 Sections for cutting, patching, or relocating Electrical items.

1.3 DEFINITIONS

A. Remove: Remove and legally dispose of items except those indicated to be reinstalled, salvaged, or to remain EXCHANGE property.

B. Remove and Salvage: Items indicated to be removed and salvaged remain EXCHANGE property. Remove, clean, and pack or crate items to protect against damage. Identify contents of containers and deliver to EXCHANGE designated storage area.

C. Remove and Reinstall: Remove items indicated; clean, service, and otherwise prepare them for reuse; store and protect against damage. Reinstall items in the same locations or in locations indicated.
D. Existing to Remain: Protect construction indicated to remain against damage and soiling
during selective demolition. When permitted by the Contracting Officer, items may be
removed to a suitable, protected storage location during selective demolition and then cleaned
and reinstalled in their original locations.

1.4 MATERIALS OWNERSHIP

A. Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise
indicated to remain EXCHANGE property, demolished materials shall become the
Contractor's property and shall be removed from the site and legal disposed of off Installation.

1. See Section 01 13 01.

1.5 SUBMITTALS

A. General: Submit each item in this Article according to the Conditions of the Contract and
Division 1 Specification Sections, for information only, unless otherwise indicated.

B. Schedule of selective demolition activities indicating the following:

1. Detailed sequence of selective demolition and removal work, with starting and ending
dates for each activity.
2. Interruption of utility services.
3. Coordination for shutoff, capping, and continuation of utility services.
4. Detailed sequence of selective demolition and removal work to ensure uninterrupted
   progress of EXCHANGE' on-site operations.
5. Coordination of EXCHANGE' continuing occupancy of portions of existing building and
   of EXCHANGE' partial occupancy of completed Work.

C. Photographs or videotape, sufficiently detailed, of existing conditions of adjoining construction
and site improvements that might be misconstrued as damage caused by selective demolition
operations.

D. Record drawings at Project close-out according to Division 1 Section "Closeout Procedures."

1. Identify and accurately locate capped utilities and other subsurface structural, electrical,
or mechanical conditions.

1.6 PROJECT CONDITIONS

A. EXCHANGE will occupy portions of the building immediately adjacent to selective demolition
area. Conduct selective demolition so that EXCHANGE' operations will not be disrupted.
Provide not less than 72 hours' notice to EXCHANGE of activities that will affect EXCHANGE' operations.

B. EXCHANGE assumes no responsibility for actual condition of buildings to be selectively
demolished.

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

C. Hazardous Materials: Asbestos is known to be present in areas of demolition. Refer to
Hazardous Material Survey and Specifications.
PART 2 - PRODUCTS

2.1 REPAIR MATERIALS

A. Use repair materials identical to existing materials.

1. Where identical materials are unavailable or cannot be used for exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible.
2. Use materials whose installed performance equals or surpasses that of existing materials.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that utilities have been disconnected and capped.

B. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.

C. When unanticipated mechanical, electrical, or structural elements that conflict with the intended function or design are encountered, investigate and measure the nature and extent of the conflict. Promptly submit a written report to the Contracting Officer.

D. Survey the condition of the building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of the structure or adjacent structures during selective demolition.

E. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.

3.2 UTILITY SERVICES

A. Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.

1. Do not interrupt existing utilities serving occupied or operating facilities, except when authorized in writing by EXCHANGE and authorities having jurisdiction. Provide temporary services during interruptions to existing utilities, as acceptable to EXCHANGE and to governing authorities.

   a. Provide not less than 72 hours’ notice to EXCHANGE if shutdown of service is required during changeover.

B. Utility Requirements: Locate, identify, disconnect, and seal or cap off indicated utility services serving building to be selectively demolished.

   1. Arrange to shut off indicated utilities with utility companies.
2. Where utility services are required to be removed, relocated, or abandoned, provide bypass connections to maintain continuity of service to other parts of the building before proceeding with selective demolition.

3. Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal the remaining portion of pipe or conduit after bypassing.

C. Utility Requirements: Refer to Divisions 21, 22, 23, and 26 Sections for shutting off, disconnecting, removing, and sealing or capping utility services. Do not start selective demolition work until utility disconnecting and sealing have been completed and verified in writing.

3.3 PREPARATION

A. Drain, purge, or otherwise remove, collect, and dispose of chemicals, gases, explosives, acids, flammables, or other dangerous materials before proceeding with selective demolition operations.

B. Conduct demolition operations and remove debris to ensure minimum interference with roads, streets, walks, and other adjacent occupied and used facilities.

1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from EXCHANGE and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.

C. Conduct demolition operations to prevent injury to people and damage to adjacent buildings and facilities to remain. Ensure safe passage of people around selective demolition area.

1. Erect temporary protection, such as walks, fences, railings, canopies, and covered passageways, where required by authorities having jurisdiction.
2. Protect existing site improvements, appurtenances, and landscaping to remain.
3. Erect a plainly visible fence around drip line of individual trees or around perimeter drip line of groups of trees to remain.
4. Provide temporary weather protection, during interval between demolition and removal of existing construction, on exterior surfaces and new construction to ensure that no water leakage or damage occurs to structure or interior areas.
5. Protect walls, ceilings, floors, and other existing finish work that are to remain and are exposed during selective demolition operations.
6. Cover and protect furniture, furnishings, and equipment that have not been removed.

D. Erect and maintain dustproof partitions and temporary enclosures to limit dust and dirt migration and to separate areas from fumes and noise.

1. Construct dustproof partitions of not less than nominal 4-inch (100-mm) studs, 5/8-inch (16-mm) gypsum wallboard with joints taped on occupied side, and 1/2-inch (13-mm) fire-retardant plywood on the demolition side.
2. Insulate partition to provide noise protection to occupied areas.
3. Seal joints and perimeter. Equip partitions with dustproof doors and security locks.
4. Protect air-handling equipment.
5. Weatherstrip openings.

E. Provide and maintain interior and exterior shoring, bracing, or structural support to preserve stability and prevent movement, settlement, or collapse of building to be selectively demolished.
1. Strengthen or add new supports when required during progress of selective demolition.

3.4 POLLUTION CONTROLS

A. Use water mist, temporary enclosures, and other suitable methods to limit the spread of dust and dirt. Comply with governing environmental protection regulations.

1. Do not use water when it may damage existing construction or create hazardous or objectionable conditions, such as ice, flooding, and pollution.

B. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

1. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level.

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

3.5 SELECTIVE DEMOLITION

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

1. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. To minimize disturbance of adjacent surfaces, use hand or small power tools designed for sawing or grinding, not hammering and chopping. Temporarily cover openings to remain.

2. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.

3. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.

4. Maintain adequate ventilation when using cutting torches.

5. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.

6. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.

7. Locate selective demolition equipment throughout the structure and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.

8. Dispose of demolished items and materials promptly. On-site storage or sale of removed items is prohibited.

9. Return elements of construction and surfaces to remain to condition existing before start of selective demolition operations.

B. Demolish concrete and masonry in small sections. Cut concrete and masonry at junctures with construction to remain, using power-driven masonry saw or hand tools; do not use power-driven impact tools.

C. Break up and remove concrete slabs on grade, unless otherwise shown to remain.
D. Remove resilient floor coverings and adhesive according to recommendations of the Resilient Floor Covering Institute's (RFCI) "Recommended Work Practices for the Removal of Resilient Floor Coverings" and Addendum. Refer to specifications for removal of Asbestos containing adhesives.

1. Remove residual adhesive and prepare substrate for new floor coverings by one of the methods recommended by RFCI.

3.6 PATCHING AND REPAIRS

A. Promptly patch and repair holes and damaged surfaces caused to adjacent construction by selective demolition operations.

B. Patching is specified in Division 1 Section "Cutting and Patching."

C. Where repairs to existing surfaces are required, patch to produce surfaces suitable for new materials.

D. Restore exposed finishes of patched areas and extend finish restoration into adjoining construction to remain in a manner that eliminates evidence of patching and refinishing.

E. Patch and repair floor and wall surfaces in the new space where demolished walls or partitions extend one finished area into another. Provide a flush and even surface of uniform color and appearance.

1. Closely match texture and finish of existing adjacent surface.
2. Patch with durable seams that are as invisible as possible. Comply with specified tolerances.
3. Where patching smooth painted surfaces, extend final paint coat over entire unbroken surface containing the patch after the surface has received primer and second coat.
4. Remove existing floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
5. Inspect and test patched areas to demonstrate integrity of the installation, where feasible.

F. Patch, repair, or rehang existing ceilings as necessary to provide an even-plane surface of uniform appearance.

3.7 DISPOSAL OF DEMOLISHED MATERIALS

A. General: Promptly dispose of demolished materials. Do not allow demolished materials to accumulate on-site.

B. Burning: Do not burn demolished materials.

C. Disposal: Transport demolished materials off EXCHANGE' property and legally dispose of them. Dispose all contaminated materials to an approved disposal site.

3.8 CLEANING

A. Sweep the building broom clean on completion of selective demolition operation.

B. Change filters on air-handling equipment on completion of selective demolition operations.
END OF SECTION 02 41 16
SECTION 03 35 36
EXISTING POLISHED CONCRETE FLOOR FINISH

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Installation of polished concrete floor system for existing interior concrete floors by dry grinding, application of concrete densifier, and polishing with various size grit metal-bonded and resin-bonded diamonds to the scheduled specified minimum local and overall gloss values.

B. Removal of existing epoxy, ceramic, carpet, and/or vinyl composite tile floor finish, and all underlayment products where shown on drawings.

1.2 RELATED SECTIONS

A. Section 01 33 00 – Submittal Procedures.

B. Section 03 35 40 – Interior Concrete Slab Repairs and Joint Filler Replacement.

C. Division 09 – Finishes

D. Section 00 32 10 Hazardous Material Survey

E. Section 02 08 10 Removal and Disposal of Asbestos Containing Materials

1.3 REFERENCES


B. ACI 310 “A Guide to Decorative Concrete”.

1.4 SUBMITTALS

A. Comply with Section 01 33 00 – Submittal Procedures.

B. Product Data:

1. Provide manufacturer’s equipment product data sheets for:
   a. Planetary grinder polishing equipment
   b. Planetary grinder HEPA dust collection equipment
   c. Hand tools
   d. Hand tool dust collection equipment
   e. Diamond tooling
   f. High speed propane burnisher
   g. Polyurea pump
   h. Joint cutting saw

2. Manufacturer’s chemical and product data sheets for:
   a. Liquid reactive surface densifier
   b. Liquid stain guard treatment
   c. Joint filler
d. Crack and spall repair product  
e. Polishable overlay product  
f. Grout coat, pin hole and small defect surface treatment  
g. Acrylic Sealer if required

C. Installer’s Certification:
1. Provide list of 5 projects performed with last three years of similar type, size and complexity. Submit project names, addresses, contacts and phone numbers for each project. General Contractor is to validate references and polisher’s capabilities prior to submitting bid to AAFES.
2. Applicator Qualifications: Submit letter of certification from each of the following manufacturers of products and equipment specified herein, stating that the applicator is a certified applicator of the system and is familiar with proper procedures and installation methods as required by the manufacturer.
   a. Planetary grinder system  
   b. Liquid reactive surface densifier and stain guard treatment  
   c. Joint filler, crack and spall repair products

D. Pre-Certified Installers

All bidding contractors must have completed our in house certification for this project. Below is a list of pre-approved applicators.

<table>
<thead>
<tr>
<th>Company Name</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) American Concrete Inc.</td>
<td>877-775-0030</td>
</tr>
<tr>
<td>2) Budget Maintenance Concrete</td>
<td>610-323-7702</td>
</tr>
<tr>
<td>3) Diama-Shield</td>
<td>888-730-4075</td>
</tr>
<tr>
<td>4) Industrial Restoration &amp; Coatings</td>
<td>801-866-9896</td>
</tr>
<tr>
<td>5) Jeffco Concrete Contractors</td>
<td>800-226-2668</td>
</tr>
<tr>
<td>6) K &amp; J Concrete Polishing</td>
<td>865-971-1760</td>
</tr>
<tr>
<td>7) Pacific Decorative Concrete</td>
<td>888-776-1111</td>
</tr>
<tr>
<td>8) Perfect Polish Inc.</td>
<td>877-917-4463</td>
</tr>
<tr>
<td>9) Preferred Global</td>
<td>800-317-2450</td>
</tr>
<tr>
<td>10) Premier Concrete Construction</td>
<td>603-654-2471</td>
</tr>
</tbody>
</table>

**Refer to specifications Division 1 for substitution qualifications. Any potential contractor substitution must have their complete submittal package submitted in writing through a General Contractor a minimum of 10 days prior to bid date to the AAFES Contracting Officer for review and approval.

1.5 QUALITY ASSURANCE

A. Regulatory Requirements:
1. Accessibility Requirements: Comply with applicable requirements of the Americans with Disabilities Act Accessibility Guidelines (ADAAGs) for Buildings and Facilities; Final Guidelines, revisions, and updates for static coefficient of friction for walkway surfaces.
2. Environmental Requirements: Comply with current Federal and local toxicity and air quality regulations and with Federal requirements on content of lead, mercury, and other heavy metals. Do not use solvents in floor polish products that contribute to air pollution or impact food quality.

B. Pre-installation Meeting:
1. General contractor shall schedule and convene a pre-installation meeting at the project site at the start of installation of polished concrete floor system.

2. Meeting to occur only after review and approval of required Sub-contractor submittals and completion of test panel mock-up, including specified grinding, polishing and dye, joint filling, spall and crack repairs, and specified overall gloss values.

3. Require attendance of parties directly affecting work of this section, including:
   a. AAFES Project Manager
   b. AAFES Store Manager of Assistant Manager
   c. Project Architect
   d. Owner’s Polishing Consultant
   e. General Contractor
   f. Polishing Subcontractor including Project Manager and Foreman

4. Meeting agenda to include (but not limited to): Review of existing conditions, surface preparation, system installations, field quality control, protection, environmental requirements, coordination with other work, controls to limit damage from dust and field quality control methods and reporting.

5. No work other than the sample may be started prior to approval of the sample area by the AAFES project manager or the owners Polishing Consultant.

1.6 MOCK-UP
   A. Provide polished concrete floor finish mock-up, a minimum of 250 square feet, illustrating completed finish including dye, all specified liquid surface treatments and specified gloss levels.

   Mock-up will include properly joint treatment and correctly repaired surface spalls and slab edge treatments per specification section 033540.

   Half of the sample area should include completed stain protection application and half should be without stain protection for testing purposes.

   The sample should also include edge finishing treatments for the purpose of review per specifications.

   B. Locate mock-up where directed by AAFES Project Manager.

   C. Accepted mock-up will serve as standard to judge quality and workmanship of completed polished concrete floor finish.

   D. Accepted mock-up shall remain as part of finished product.

1.7 PROJECT CONDITIONS
   A. Sequence application of concrete polishing after completion of other construction activities that would be damaging to the completed polished concrete finish.

   B. Close areas to traffic during and after floor application for time period recommended in writing by manufacturer.

   C. Polished Concrete should be sequenced to complete after final lighting is in operation to allow for a proper installation.

PART 2 PRODUCTS AND EQUIPMENT
2.1 EQUIPMENT TO BE USED FOR INSTALLATION

A. Floor Grinder:
   1. Machinery manufacturer will be HTC, SASE, Concrete Polishing Solutions, Husqvarna, Diamatic or PrepMaster.
   2. Type: Multi-orbital, planetary-action, opposing-rotational, 3 or 4 diamond-headed floor grinders.
   3. Weight: 850 pounds or more.

B. Dust Extraction System and pre-separator for grinding/polishing:
   Heavy-duty industrial HEPA filtration vacuum system, suitable for extracting and containing large quantities of fine concrete dust (minimum 350 CFM air flow) in conjunction with manufacturer recommended pre-separator:
   1. HTC 80ID
   2. Pullman-Ermator S36
   3. SASE Bull 50
   4. Substitutions by Approval Only

C. Diamond Tooling for Coating Removal, Initial Grinding, and Preparing Floor for Polishing: Tooling manufacturer subject to submittal review prior to approval.
   1. Metal Bonded Diamonds
      a. Grit Size: 40, 80, and 150.
      *Reference Section 3.3 C

D. Diamond Tooling for Polishing Concrete:
   1. Resin Bonded, Phenolic Diamonds
      a. Grit Size: 100, 200, 400, 800 and 1500 or equivalent.

E. Grinding / Polishing Pads for Edges
   1. Grit Size: 80, 100, 120, 200, 400, 800, 1500 and 3000.

F. Hand Grinder with dust extraction attachment and pads.

G. Joint cutting saw with dust extraction attachment
   1. The Mongoose, by Engrave-a-Crete
   2. Dust Buggy, by US Saws
   3. Hump Back, by Joe Due
   4. Substitutions by Approval Only

H. Self-propelled shaver/leveler for slab surface demolition and leveling.
   1. SuperShaver, by CPS
   2. BMC 335 Shaver, by Diamatic
   3. Substitutions by Approval Only

I. High speed propane burnisher
   1. Minimum 27 inch head generating pad speeds of 2,500 RPM or higher.

J. Diamond Impregnated Burnisher Pads
   1. Twister Diamond Cleaning System Pads, by HTC
   2. Diamond Polishing Pads, by Norton
3. SpinFlex Diamond Polishing Pads, by CPS
4. Substitutions by Approval Only

2.3 MATERIALS

A. Penetrating Hardener/Densifier: Clear liquid reactive lithium-silicate based.
1. Retroplate 99 by Advanced Floor Products.
3. FGS Permashine by L&M Construction Chemicals.
4. 3DHS Densifier by AmeriPolish
5. Substitutions by Approval Only

B. Protective Surface Treatment (Stain Guard):
1. Retro Guard by Advanced Floor Products
2. Consolideck LS Guard, by Prosoco.
3. FGS Stain Protection by L&M Construction Chemicals.
4. SR2 Stain Protector by AmeriPolish.
5. Substitutions by Approval Only

C. Solvent Based dye (where needed for repairs or per plans)
1. AmeriPolish Acetone Solvent Based Dye
2. Prosoco GemTone Dye (Applied with Acetone ONLY)
2. No Substitutions

D. Joint Filler
1. SL/65 Polyurea in complementary color to match Polished Concrete, by VersaFlex Inc.
2. RS65 Polyurea in complementary color to match Polished Concrete, by Metzger McGuire
3. HT-PE65 Polyurea in complementary color to match Polished Concrete, by Hi-Tech Systems
4. Colors to be matched as closely as possible using a chip set match provided by the owners polishing consultant. Manufacturer to produce product to match this color selection.

E. Low Viscosity Crack and Spall Repair
1. Quick-Mender in complementary matching color, by VersaFlex Incorporated
2. Rapid Refloor in complementary matching color, by Metzger McGuire
3. Substitutions be Approval Only
4. Colors to be reviewed and approved by AAFES Project Manager or Polished Concrete Consultant in mock-up.

F. Wide Area Surface Repairs
1. PC-5614 Polishable Overlay by Diamatic,
2. NewTop Polishable Overlay by DecoPrep Surface Solutions
3. Color of the overlay after application of Specified Dye to be reviewed and approved by AAFES Project Manager or owners Polished Concrete Consultant in mock-up

G. Pin Hole and Surface Pitting Grout Coat
1. GM 3000, by Husqvarna Construction Products
2. RSG, by Diamatic Inc.
3. Versa-Grout, by VersaFlex
4. NTG by DecoPrep Surface Solutions
5. Approved Equal
6. Color after application to be reviewed and approved by AAFES Project Manager or Polished Concrete Consultant in mock-up.
PART 3 EXECUTION

3.1 EXAMINATION

A. Examine floor to receive polished concrete floor system.

B. Notify the Project Manager of conditions that would adversely affect installation or subsequent use prior to commencement of polishing.

C. Do not begin surface preparation or installation until conditions are corrected and approved.

3.2 SURFACE PREPARATION

A. Protection: Protect surrounding areas and adjacent surfaces from the following:
   1. Minimal accumulation of dust from grinding and polishing.
   2. Contact with overspray of penetrating hardener / densifier.
   3. Contact with overspray of protective surface treatment (stain guard)
   4. Contact with joint filler, crack or spall repair materials

B. Completely remove existing flooring, mastics, adhesives, self-leveling underlayment fillers and other foreign matter in accordance with Section 02 08 10 & 02 09 00.

C. Remove the top ½ of an inch of existing joint material and replace with approved joint filler and crack repair products.

D. Clean Surfaces: Remove dirt, dust, debris, oil, grease, curing agents, bond breakers, paint, coatings, and other surface contaminants which could adversely affect installation of polished concrete floor system.

E. Fill concrete joints in accordance with Section 07900.

F. Repair all slab defects and joints in accordance with Section 03 35 40

G. For areas to be prepped and sealed per plans perform one 40 grit grind to remove all glue, mastic or underlayment’s on the surface. Clean the surface well prior to installation of sealer.

3.3 INSTALLATION

A. Install polished concrete floor system in accordance with manufacturer’s instructions at locations indicated on the Drawings.

B. Aggregate Exposure:

C. Polished Concrete Floor System
   1. Open Slab Surface:

H. Acrylic Sealer
   1. CSS Emulsion (25% solids) by Elite Crete
   2. H&C Clear Solvent Based Acrylic (25% solids) by Sherwin Williams
   3. Approved Equal
a. As required to provide a uniform final polish or removal of existing floor coatings, begin grinding with 40 or 80-grit metal bond. Bids shall be based on starting initial cut with 40-grit metal diamonds. Expose coarse concrete aggregate when required to reach lows spots within floor surface.

b. Review condition of floor with AAFES Project Manager. Obtain approval from AAFES Project Manager if large coarse aggregate is required to be exposed to remove existing coatings, floor underlayment or slab deficiencies. Variations to the precise grinding, densifying, polishing and stain guard application are anticipated, but must be discussed and approved in writing by the AAFES Project Manager prior to executing the work.

c. Progressive edge grinding will be necessary with ½’’ of all vertical abutments, including walls, cases, columns, posts and racking systems.

d. Joint filler shall be flush with surface after grinding and polishing steps. Additional passes along curled joints may be necessary to even the surfaces and remove joint filler chatter.

2. Remove metal-bonded diamond scratches by grinding with progressively finer metal-bonded diamonds, up to metal bond 150-grit.

3. Apply densifier
   a. Apply to the point of rejection to ensure complete acceptance of the densifier product at the recommended step per manufacturer’s recommendations.

4. Floor Polishing:
   a. Remove 150-grit metal-bonded diamond scratches by grinding with a transitional diamond per manufacturers recommendation.
   b. Remove transitional resin-bonded diamond scratches by grinding with 100-grit resin-bonded diamonds.
   c. Remove 100-grit resin-bonded diamond scratches by grinding with 200-grit resin-bonded diamonds.
   d. Remove 200-grit resin-bonded diamond scratches by grinding with 400-grit resin-bonded diamonds.
   e. Remove 400-grit resin-bonded diamond scratches by grinding with 800-grit resin-bonded diamonds.
   f. Remove 800-grit resin-bonded diamond scratches by grinding with 1500-grit resin-bonded diamonds.

5. Apply stain guard
   a. Apply in accordance with manufacturer’s published instructions.
   b. Apply first coat per manufacturer’s recommendation (DO NOT OVER APPLY).
   c. Use applicator pad, pre-wetted with stain guard, to pull material out to create a thin film prior to drying.
   d. Remove product completely from areas of over application, as evidenced by surface streaking, and replace with unused stain guard.
   e. Apply second coat of stain guard at all high traffic areas identified on the drawings per manufacturers instructions.

6. High speed burnish:
   a. After each application of stain guard is dry, burnish surface.
   b. Burnish using approved pads, at a slow movement pace using high speed machine with 400 or 800 grit diamond impregnated pads as required to achieve specified gloss requirements.
   c. Burnish with several passes. Make each progressive pass at 90 degrees from previous pass.
d. Burnishing, pad type, and pace of forward movement shall combine to develop a minimum floor surface temperature of 91-degrees F directly below the burnishing pad as continuously measured by the operator during installation.

7. Clean & Seal:
   In areas designated per plans to be clean and seal only, remove all surface glue, mastics and any underlayment’s. Fill joints and then seal the floor using two coats of an acrylic solvent based sealer with 25% solids. Insure that there are no roller marks are patterns in the sealer placement. Contact the architect or the owners consultant if you have any additional questions.

D. Penetrating Dye
   1. Mix dye in accordance with manufacturer’s instructions for use in blending and matching patches.

E. Exchange Logo
   1. Where indicated on drawings install a dyed Exchange logo. Colors are to be as follows
      a. Blue area is to be AmeriPolish Classic Patriot Blue
      b. Red 1 is to be AmeriPolish Classic Sepia
      c. Red 2 is to be sprayed with two colors. First is a 20% strength AmeriPolish Classic Black. The second color is to be 100% strength AmeriPolish Classic Sepia.
   2. The logo is to be laid out using a stencil to allow for color change without the use of decorative score lines.
      a. Approved stencil manufacturer is FloorMap Stencil Design.
   3. All color transitions are to be installed with clean lines and no bleed.

3.4 FIELD QUALITY CONTROL

A. Inspect completed polished concrete floor system with the Concrete Consultant, Contractor, and Installer.

B. Review procedures with Contracting Officer to correct unacceptable areas of completed polished concrete floor system.

C. Specular Gloss/Reflectance, ASTM D 523:
   1. Perform polishing and burnishing work necessary to produce a Specified Overall Gloss Value (SOGV) ≥ 50 prior to applying protective surface treatment, SOGV ≥ 60 after applying protective surface treatment, Minimum Local Gloss Value (MLGV) ≥ 40 after applying protective surface treatment as measured using a Horiba IG-320 60 Degree Gloss Checker.
   2. Gloss shall be considered as a quantitative value that expresses the degree of reflection when light hits the concrete floor surface. Gloss measurements will be taken independent of ambient lighting and will be taken within a sealed measurement window located beneath the test unit.
   3. Collects 12 readings minimum, throw out low and high measurements and average remaining measurements. Average shall exceed SOGV. No single measurement shall be less than MLGV.

3.5 PROTECTION

A. Protect completed polished concrete floor system from damage until Substantial Completion.
   1. Do not allow vehicle and pedestrian traffic on unprotected floor.
   2. Do not allow construction materials, equipment, and tools on unprotected floor.
   4. If construction equipment must be used for application, diaper components that might drip oil, hydraulic fluid, or other liquids.
5. No tire embedments (rocks, nails, screws, etc.) that will scratch or pit slab surface.
6. Prohibit pipe cutting using pipe cutting machinery on concrete slab.
7. Prohibit temporary placement and storage of steel members on concrete slab.
8. Prohibit acids and acidic detergents from contacting concrete surfaces.
9. Cover concrete floors with drop cloths or use breathable drop cloths during painting. If paint is spilled on concrete floor, remove paint immediately.
10. Protect slab surface from standing moisture for 72 hours to prevent re-emulsification of surface treatment prior to cure

B. Immediately remove mortar splatter, spilled liquids, oil, grease, paint, coatings, and other surface contaminants which could adversely affect completed polished concrete floor system.

C. Repair damaged areas of completed polished concrete floor system to satisfaction of Contracting Officer.

END OF SECTION
SECTION 03 35 40

INTERIOR CONCRETE SLAB REPAIRS AND JOINT FILLER REPLACEMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Joint filler removal and replacement, with or without metal keyway.
   2. Spalled joint repair or joint with metal keyway (less than 3/4”)
   3. Spalled joint repair, joint with metal keyway or self-leveling compound removal (greater than 3/4”)
   5. Surface defect repair, including pop-outs, spalls, and gouges.
   6. Surface embed repair, including cleanouts, in-floor electrical outlets and Walker Duct access holes.
   7. Large area surface repair, existing underlayment removal/replacement and delamination repair.
   8. Grout coat surface enhancement, including air voids, micro-pin holes, pitting and other shallow surface deficiencies.
   9. Full Grind, Densify and Polish portions of the project not currently indicated on the drawings.
   10. Unit Price Repair Worksheet for estimating and bidding purposes. All prospective bidders must include a completed worksheet included at the end of this specification as part of their bid package. Any bid provided without a completed worksheet may be subject to rejection.

1.2 SUBMITTALS

A. Section 01330 - Submittal Procedures: Procedures for Submittals.

B. Joint Filler Installer Qualification Certification:
   1. Submit letter of certification, identifying specific individuals that are currently certified installers of the specified materials and are familiar with proper procedures and installation methods as required by the specified product manufacturers.

C. Product data for:
   1. All products used for repair of existing concrete slab defects.

1.3 QUALITY ASSURANCE

A. AAFES reserves the right to engage the services of a Concrete Consultant to review, observe and inspect the work in progress.
1.4 ENVIRONMENTAL REQUIREMENTS

A. Limit and control damage from excessive dust caused by demolition, preparation, and installation of all Work.

B. Limit and control damage from moisture.

C. All replaced concrete shall be cured a minimum of 21 calendar days prior to joint filler installation.

D. Concrete repair area shall be closed to traffic during preparation and repair for a time as recommended by manufacturer.

PART 2 - PRODUCTS and EQUIPMENT

2.1 MATERIALS

A. Polyurea Joint Filler: Rapid setting, two-component polyurea polymer liquid of 100% solids content, Shore hardness 60 - 65, compatible with construction materials in contact.
   1. SL/60 Polyurea in complementary color to match Polished Concrete, by VersaFlex Incorporated
   2. RS65 Polyurea in complementary color to match Polished Concrete, by Metzger/McGuire.
   3. HT-PE65 Polyurea in complementary color to match Polished Concrete, by Hi-Tech Systems
   4. Colors to be reviewed and approved by AAFES Project Manager or owners Concrete Consultant in mock-up.

B. Joint Filler Stain Preventing Film:
   1. SPF by Metzger/McGuire.

C. Low Viscosity Crack and Spall Repair:
   1. Quick-Mender in complementary matching color, by VersaFlex Incorporated
   2. Rapid ReFloor in complementary matching color, by Metzger/McGuire.
   3. Colors to be reviewed and approved by AAFES Project Manager or owners Concrete Consultant in mock-up.

D. Wide Area Surface Repairs
   1. PC-5614 Polishable Overlay by Diamatic,
   2. NewTop by DecoPrep Surface Solutions
   3. No Substitutions
   4. Color after installation to be reviewed and approved by AAFES Project Manager or owners Concrete Consultant in mock-up.

E. Pin Hole and Surface Pitting Grout Coat
   1. RSG, by Diamatic Inc.
   2. GM 3000, by Husqvarna Construction Products
   3. NTG by DecoPrep Surface Solutions
   4. Versa-Grout, by VersaFlex
   5. Pit-Grout by Metzger McGuire
   6. Color after application to be reviewed and approved by AAFES Project Manager or owners Concrete Consultant in mock-up.
2.2 EQUIPMENT

A. Dust extraction system for grinding/sawing:
   1. HEPA filtration vacuum, designed for use with all hand tools when grinding or sawing concrete (minimum 125CFM air flow).
   2. Provide one of the following:
      a. 80ID, by HTC.
      b. S36, by Pullman-Ermator.
      d. Approved equal.

B. Joint Filler Removal and Preparation
   1. The Mongoose, by Engrave-a-Crete
   2. Humpback Cutter Complete, by Joe Due.
   3. Dust Buggy, by U.S. Saws.
   4. Approved equal.

C. Crack Repair:
   1. Crack Attacker, by Joe Due.
   2. SawTec Crac-Vac, by U.S.Saws.
   3. Approved equal.

D. Surface Grinder: Handheld 4"-7" electric surface grinder with dustless shroud/housing.
   1. Dust Avenger by Joe Due.
   2. SawTec Grinder Vac, by U.S. Saws.
   3. Approved equal.

PART 3 - EXECUTION

3.1 EXAMINATION

A. An evaluation of the existing floor slab shall be conducted, identifying all defects. Scope of repairs shall be confirmed by the AAFES Project Manager, Architect of Record, or owners Concrete Consultant prior to commencement of work. Identify scope of work on Floor Polishing Plan specified in other section(s) of Division 3 – Concrete.

B. Repairs are not to be conducted until Unit Price in attached Worksheet has been reviewed and approved by the AAFES Contracting Officer.

C. Repairs exceeding the Estimated Scope of Repairs developed in the attached Worksheet and included in the Base Bid must be approved by the AAFES Contracting Officer prior to executing the work in any new Phase.
3.2 PREPARATION

A. Protect surface of slab immediately adjacent to defect under repair.

3.3 JOINT MILLING AND CAP FILLER REPLACEMENT

A. If existing joint filler is sound and resting on top of saw cut shelf, mill top 1/2” of material and refill with specified Polyurea joint filler.
   1. Re-saw the joint to a minimum depth of 1/2” with a dry-cut, vacuum-equipped saw using a slightly oversized blade. The blade width should be sufficient to encapsulate the widest spall along a given contraction joint segment to produce a sharp corner on each side of the joint with a minimum of two passes through the joint.
   2. Refill with polyurea joint filler material from the bottom up, taking care not to entrap large air bubbles per manufacturer’s recommendation. Slightly overfill and shave flush to the surface after the grinding process has been completed.
   3. Ensure that after grinding, the joint is cut smooth and flush with the finish floor surface, without concave or intermittent, darkened profile.

3.4 FULL DEPTH JOINT FILLER REPLACEMENT

A. If existing joint filler is loose, easily removed, or able to be forced downward with a hand tool, remove all filler material from joint and refill.
   1. Re-saw joint full depth with a dry-cut, vacuum-equipped saw using a slightly oversized blade. The blade width should be sufficient to encapsulate the widest spall along a given contraction...
joint segment to produce a sharp corner on each side of the joint with a minimum of two passes through the joint. Remove all filler material, debris, and laitance.

2. Refill with polyurea joint filler material from the bottom up, taking care not to entrap large air bubbles per manufacturer's recommendation. Slightly overfill and shave flush to the surface prior to grinding process.

3. Ensure that after grinding, the joint is cut smooth and flush with the finish floor surface, without concave or intermittent, darkened profile.

3.5 NARROW SPALLED JOINT REPAIR OR JOINT WITH METAL KEYWAY (LESS THAN 3/4")

A. For joints that are spalled, are constructed with metal keys or have radius tooled edges not exceeding 3/4" in width at slab surface.

1. Re-saw the joint edge to a minimum depth of 3/4" with a dry-cut, vacuum-equipped saw allowing removal of the widest spall (or top of radius) along a given joint segment to produce a sharp corner on each side of the joint with a minimum of two passes through joint.

2. Clean joint of loose concrete, metal key fragments, joint filler, laitance, dirt, debris, backer rod, etc.

3. Joints must be free of all visible moisture.

4. Ensure filler penetrates the irregular aggregate interlock portion of the sawn contraction joint as shown below, re-establishing the aggregate interlock that may have been lost due to shrinkage, curling, and lack of reinforcement.

5. Fill joint cavity with specified Polyurea joint filler per manufacturer's instructions, taking care not to entrap large air bubbles. Overfill joint slightly and shave flush to slab surface after the grinding process has been completed.

3.6 WIDE SPALLED JOINT REPAIR (GREATER THAN 3/4")
A. For joints that are spalled, contain metal key or self-leveling floor material that exceeds 3/4" in width at slab surface.
   1. Re-saw the joint edge to a minimum depth of 1/4" with a dry-cut, vacuum-equipped shaver/leveler allowing removal of the widest spall or non-linear keyway along a given joint segment to produce a sharp corner on each side of the joint with a minimum of two passes through joint. Maintain consistent width of repair to within 1/2 inch in 10 feet.
   2. Overfill repair cavity with overlay material per manufacturer's instructions and grind flush to slab surface.
   3. After repair has cured, and prior to any traffic on patched surface, re-saw original slab joint(s) ¾” in depth to honor joint and fill full depth with Polyurea joint filler per manufacturer’s instructions.
3.7 CRACK REPAIR

A. Crack width less than 1/32” without surface spalling.
   1. Do not repair.
   2. Grout coat may be used to fill thin hairline deficiencies.

B. Cracks from 1/32” to 1/4” in width.
   1. Clean crack cavity.
   2. Remove loose concrete, dirt and debris from crack with a wire brush or hand grinder with twisted wire wheel attachment, 1/2” minimum depth, insuring crack sidewall is clean.
   3. Remove any loose segments, including islands formed by crack, with sharp tool.
   4. Use methods that will not widen existing crack.
   5. Vacuum crack to remove all dirt, debris and other laitance.
   6. Mask slab surface along crack as necessary to minimize overfill.
   7. Choose material color that closely matches the adjacent floor.
   8. Install low viscosity crack and spall repair material in accordance with manufacturer’s instructions.
   9. Repeat until all voids are filled and material crowns slab surface.
      a. Do not flood area around crack.
      b. Watch for bubble formation and out gassing.
      c. Do not allow material to gel before adding additional material.
   10. Shave or grind material flush to surface as stipulated by manufacturer.

3.8 SURFACE SPALLING REPAIR
A. For slab surface that is chipped and spalled, where the deficiency is 1/2" in length or width up to 3" in length or width, by 1/2" in depth.
1. Route edge of spall to provide 1/8" deep square edge or 30° edge (consult manufacturer’s data sheet for specific surface preparation instructions).
2. Use small hand grinder with maximum 5” diameter dry diamond blade and vacuum system attachment.
3. Do not overcut slots into existing slab surface.
4. Clean and prep spalled cavity.
5. Wire brush spalled surface to remove all dirt and laitance.
6. Mask slab at perimeter of spall with tape.
7. Install Low Viscosity Crack and Spall Repair material.
8. Polish over repair area with diamond disks to blend surface.
9. Feather filler material into the adjacent concrete floor surface.
10. With 2000 grit disk and firm pressure, add a few burn marks to mottle surface to blend with adjacent floor surface.
   a. NOTE: For inconsistent, varying spalled joints that comply with the measurements in this section, a form material may be needed to temporarily form and support the vertical face of spalled joint edge. Ensure that the repair material will not adhere to the form and the rigid repair material does not fuse the joint together.
11. For cleanouts, in-floor electric outlets and Walker Duct access plates, over-core around perimeter of existing embed by 1/2" in width and depth, then install Low Viscosity Crack and Spall Repair Material.

3.9 BOLT HOLE, CONDUIT REPAIR

A. For slab surfaces containing surface or sub-surface bolts, bolt-hole voids, conduit or subsurface conduit.
1. Recess steel bolt or conduit a minimum of 1/2” below finish floor by either punching or cutting.
   a. Check with General Contractor prior to cutting into active electrical or communication conduit.
2. For spall fractured edges less than 30 degrees, square edge to a minimum 1/8” depth with either a drill bit, chisel or edge grinder.
3. Clean cavity of all debris and laitance with drill activated, brass wire wheel. Vacuum hole to remove all dirt, debris and other laitance.
4. Dispense Low Viscosity Crack and Spall Repair at moderate pace using steady pressure. Dispense material into void, refilling as necessary to produce slight crown.
5. Grind material flush to slab surface per manufacturer’s instructions.

3.10 LARGE SURFACE REPAIR, UNDERLAYMENT REMOVAL AND REPLACEMENT

A. For slab surfaces containing wide-area irregular rough surfaces greater than 3” in width and length such as irregular coarse aggregate surfaces or surfaces with existing tile or carpet underlayment’s > 1/4” in thickness or surface paste delaminations.
1. Define edge perimeter with diamond masonry wheel or shaver/leveler to produce sharp edge, at least 3/8” deep.
2. For delaminations test to determine the extent of the delaminated area. From the current edge extend repair 6” in all directions. Define a square or rectangular repair area and create an edge perimeter. Do not overcut into surrounding surface.
3. Roughen base surface using shaver/leveler to ICRI CSP 3 – 5 and vacuum clean.
4. Wire brush to remove any small loose material and vacuum again.
5. Mix and install overlay material in accordance with manufacturer’s instructions.
6. Place repair material in floor surface defect, float level or leave slightly proud of existing floor.

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7. Grind, densify and polish to match adjacent concrete.
8. Re-establish original concrete slab joints by sawing completely through patch and re-filling with Polyurea joint filler prior to exposure to traffic.
3.11 SMALL SURFACE PITTING, PINHOLE REPAIR, GROUT COAT

A. For surfaces consisting of micro-deficiencies, pin holes, hairline cracks and other surface clutter that impedes the achievement of the specified overall gloss values
   1. Clean pitted sections with 90-degree angle grinder equipped with wire wheel to remove all dirt/laitance. Wheel should be run over defect in multiple directions to ensure proper cleaning.
   2. Vacuum prepared pitted sections.
   3. Install and disperse grout coat using approved product in accordance with manufacturer’s directions.
   4. Ensure a thin, uniform layer of repair material covers the pitted areas. Refill any low spots as needed.
   5. Grind or polish flush with metal or resin-bond diamonds, ensuring repair material is flush with slab surface.
   6. Repeat repairs in areas as required if repair material pulls out of defects.
   7. Apply required applications and polish smooth to meet specified overall gloss values.

3.12 PROTECTION

A. Protect surfaces of finished floor.

B. Prohibit traffic until floor repairs have received final approval by Owner.

**The Worksheet Below is to be included in the bid.**

END OF SECTION
**SHOPPING CENTER IMAGE UPDATE**
**INTERIOR CONCRETE SLAB REPAIRS & JOINT FILLER**

**WRIGHT-PATTERSON AFB**    **PN 2090-16-001**
**SOLICITATION ISSUE**    **25 JUL 2017**

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**ENTR**
**TOTAL AREA TO BE POLISHED:** ______________ **SQUARE FEET**

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**.... SAMPLE CALCULATION .... NOT PART OF BID ....**

**.... DO NOT INCLUDE SAMPLE CALCULATION COST IN BID ....**

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**SHOPPING CENTER IMAGE UPDATE**
**INTERIOR CONCRETE SLAB REPAIRS & JOINT FILLER**

**WRIGHT-PATTERSON AFB**    **PN 2090-16-001**
**SOLICITATION ISSUE**    **25 JUL 2017**
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Totals $________
SECTION 03 49 00

GLASS FIBER REINFORCED CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes glass fiber reinforced concrete (GFRC) panels, consisting of GFRC, panel frames, anchors, and connection hardware.

1. GFRC panels include all items indicated on contract documents as GFRC.

2. The existing project facility is constructed of vertically-ribbed GFRC and pre-cast concrete wall panels. The new GFRC panels are replacements for existing GFRC panels that are in poor condition. The face profile, texture, finish and color of the new GFRC panels shall match the existing panels.

B. Related Sections include the following:

1. Division 07 Section “Joint Sealants.

1.3 DEFINITIONS

A. Design Reference Sample: Sample of approved GFRC profile, texture, finish and color preapproved by the Contracting Officer’s Representative.

1.4 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide GFRC panels, including panel frames, anchors, and connections, capable of withstanding the following design loads, as well as the effects of thermal- and moisture-induced volume changes, according to load factors and combinations established in PCI MNL 128, "Recommended Practice for Glass Fiber Reinforced Concrete Panel."

1. Deflection: Design panel frames to withstand design loads without lateral deflections greater than 1/240 of wall span.

2. Thermal Movements: Provide for thermal movements resulting from annual ambient temperature changes of 100 Degrees.

3. Design panel frames and connections to accommodate deflections and other building movements.

4. Design panel frames to transfer wind loads to existing building structure.
1.5 SUBMITTALS

A. Product Data: For each type of product indicated. Include GFRC design mixes.

B. Shop Drawings: Show fabrication and installation details for GFRC panels, including the following:

1. Structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation
2. Panel elevations, sections, and dimensions.
3. Thickness of facing mix, GFRC backing, and bonding pads for typical panels.
4. Finishes.
5. Joint and connection details.
7. Panel frame details for typical panels, including sizes, spacings, thicknesses, and yield strengths of various members.
8. Locations and details of connection hardware attached to structure.
9. Size, location, and details of flex, gravity, and seismic anchors for typical panels.
10. Other items sprayed into panels.
11. Erection sequence for special conditions.
12. Relationship to adjacent materials.
13. Descriptions of loose, cast-in, and field hardware.

C. Samples: Representative of finished exposed face of GFRC showing the full range of colors and textures expected, 10 x 10 inches and of actual thickness.

D. Welding certificates.

E. Steel Sheet Certification. For steel sheet used in cold-formed steel panel framing.

F. Mill Certificates: For structural-steel shapes and hollow structural sections used in panel framing.

G. Qualification Data: For GFRC manufacturer, including proof of current PCI Plant Certification.

H. Source Quality-Control Program: For GFRC manufacturer.

I. Source Quality-Control Test Reports: For GFRC, inserts, and anchors.

J. Submittal List:

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<td>Steel Sheet Certification</td>
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<td>Mill Certificates</td>
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<td>Source Quality-Control Program</td>
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<td>1.3I</td>
<td>Source Quality-Control Test Reports</td>
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X Submit quantity specified in Division 01 Section Administrative Requirements.
Review each submittal, mark to indicate action taken, and return.
Submittal is for information or record purposes only. No action will be taken.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified manufacturer who participates in PCI's Plant Certification Program and is designated a PCI-Certified Plant for Group G, Glass Fiber Reinforced Concrete.

1. Structural Manufacturer's responsibility includes fabricating GFRC panels and providing professional engineering services needed to assume engineering responsibility for GFRC panels.
2. Engineering responsibility includes preparation of Shop Drawings and comprehensive engineering analysis, based on GFRC production test values, by a qualified professional engineer experienced in GFRC design.

B. Steel Sheet Certifications: Obtain mill certificates, signed by manufacturers of steel sheet or test reports from a qualified testing agency indicating steel sheet used in cold-formed metal panel framing complies with requirements, including uncoated steel thickness, yield strength, tensile strength, total elongation, chemical requirements, and galvanized-coating thickness.

C. Mill Certificates: Obtain certified mill test report from manufacturer of structural-steel shapes and hollow structural sections used in panel framing indicating compliance of these products with requirements.

D. Source Limitations: Obtain GFRC panels through one source from a single manufacturer.


F. AISI Specifications: Comply with AISI's "Specification for the Design of Cold-Formed Steel Structural Members.

G. PCI Manuals: Comply with requirements and recommendations in the following PCI manuals, unless more stringent requirements are indicated:

1. PCI MNL 128, "Recommended Practice for Glass Fiber Reinforced Concrete Panels."
2. PCI MNL 130, "Manual for Quality Control for Plants and Production of Glass Fiber Reinforced Concrete Products."

1.7 DELIVERY, STORAGE AND HANDLING

A. Handle and transport GFRC panels to avoid damage.

1. Deflection: Place non-staining resilient spacers between panels.
2. Support panels during shipment on non-staining material.
3. Protect panels from dirt and damage during handling and transport.

B. Store GFRC panels to protect from contact with soil, staining, and physical damage.

1. Store panels with non-staining resilient supports in same positions as when transported.
2. Store panels on firm, level, and smooth surfaces.
3. Place stored panels so identification marks are clearly visible.

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:

1. GFRC Cladding Systems, LLC Garland TX 972-494-9000
2. Clark Pacific Fontana, CA 909-823-1433
3. Walter & Wolfe Precast, CA 510-226-5162

2.2 MOLD MATERIALS

A. Molds: Rigid, dimensionally stable, non-absorbent material, warp and buckle free, that will provide continuous and true GFRC surfaces; nonreactive with GFRC and capable of producing required finish surfaces.

1. Mold-Release Agent: Commercially produced liquid-release agent that will not bond with, stain, or adversely affect GFRC surfaces and will not impair subsequent surface or joint treatments of GFRC.

2.3 GFRC MATERIALS

A. Portland Cement: ASTM C150, Type I, II, or III.
B. Glass Fibers: Alkali resistant, with a minimum zirconia content of 16 percent, 1 ½” long, specifically produced for use in GFRC, and complying with PCI MNL 130.
C. Sand: Washed and dried silica, complying with composition requirements of ASTM C144; passing No. 20 (0.85-mm) sieve with a maximum of 2 percent passing No. 100 (0.15-mm) sieve.
D. Facing Aggregate: ASTM C33, except for gradation, and PCI MNL 130, 1/4-inch (6-mm) maximum size.

1. Aggregates: Selected, hard, and durable; free of material that reacts with cement or causes staining; to match sample.
E. Coloring Admixture: ASTM C979, synthetic mineral-oxide pigments or colored water-reducing admixtures, temperature stable, nonfading, and alkali resistant.
F. Water: Potable; free from deleterious material that may affect color stability, setting, or strength of GFRC and complying with chemical limits of PCI MNL 130.
G. Polymer Curing Admixture: Acrylic thermoplastic copolymer dispersion complying with PCI MNL 130.
H. Chemical Admixtures: ASTM C494/C494M, containing not more than 0.1 percent chloride ions.

2.4 ANCHORS, CONNECTORS AND MISCELLANEOUS MATERIALS

A. Carbon-Steel Shapes and Plates: ASTM A36/A36M. Finish steel shapes and plates less than 3/16 inch (4.76 mm) thick as follows:

1. Finish: Zinc coated by hot-dip process according to ASTM A123/A123M, after fabrication, or ASTM A153/A153M, as applicable electro deposition according to ASTM B633, SC3.
2. Finish: Shop primed with Sherwin Williams Universal Primer on surfaces prepared to comply with SSPC-SP2, "Hand Tool Cleaning," or better.

B. Carbon-Steel Bars: ASTM A108, AISI Grade 1018. Finish steel bars less than 3/16 inch (4.76 mm) thick as follows:

1. Finish: Zinc coated by hot dip process according to ASTM A123/A123M, after fabrication, or ASTM A153/A153M, as applicable electro deposition according to ASTM B633, SC3.
2. Finish: Shop primed with SSPC-SP2, "Hand Tool Cleaning," or better.

C. Malleable-Iron Castings: ASTM A47/A47M, Grade 32510 (Grade 22010).

D. Carbon-Steel Castings: ASTM A27/A27M, Grade 60-30 (Grade 415-205).

E. Bolts: ASTM A307 or ASTM A325 (ASTM F568M or ASTM A325M).

F. Reglets: PVC extrusions or FRY C.O. Reglet.

2.5 PANEL FRAME MATERIALS

A. Hollow Structural Sections: Steel tubing, ASTM A500, Grade B, or ASTM A513. Finish hollow structural sections with wall thickness less than 3/16 inch (4.76 mm) as follows:

1. Primer: SSPC-Paint 25 on surfaces prepared to comply with SSPC-SP 2, Hand Tool Cleaning," or better.

B. Steel Channels and Angles: ASTM A36/A36M, finished as follows:

1. Primer: SSPC-Paint 25] on surfaces prepared to comply with SSPC-SP 2, "Hand Tool Cleaning," or better.

2.6 GFRC MIXES

A. Backing Mix: Proportion backing mix of portland cement, glass fibers, sand, and admixtures to comply with design requirements. Provide nominal glass-fiber content of not less than 5 percent by weight of total mix.

B. Face Mix: Proportion face mix of portland cement, fine and coarse aggregates, and admixtures to comply with design requirements.
C. Mist Coat Mix: Portland cement, sand slurry, and admixtures, of same proportions as backing mix without glass fibers.

D. Polymer Curing Admixture: 6 to 7 percent by weight of polymer curing admixture solids to dry portland cement.

E. Coloring Admixture: Not to exceed 5 percent of cement weight.

2.7 PANEL FRAME FABRICATION

A. Fabricate panel frames and accessories plumb, square, true to line, and with components securely fastened, according to Shop Drawings and requirements in this Section.

1. Fabricate panel frames using jigs or templates.
2. Cut cold-formed metal framing members by sawing or shearing; do not torch cut.
3. Fasten cold-formed metal framing members by welding. Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
4. Fasten framing members of hollow structural sections, steel channels, or steel angles by welding. Comply with AWS D1.1 requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
5. Weld flex, gravity, and seismic anchors to panel frames.

B. Reinforce, stiffen, and brace framing assemblies, if necessary, to withstand handling, delivery, and erection stresses. Lift fabricated assemblies in a manner that prevents damage or significant distortion.

C. Galvanizing Repair: Touch up accessible damaged galvanized surfaces according to ASTM A780.

D. Painting Repair: Touch up accessible damaged painted surfaces using same primer.

2.8 MOLD FABRICATION

A. Construct molds that will result in finished GFRC complying with profiles, dimensions, and tolerances indicated, without damaging GFRC during stripping. Construct molds to prevent water leakage and loss of cement paste.


B. Locate, place and secure flashing reglets accurately.

2.9 GFRC FABRICATION

A. Proportioning and Mixing: For backing mix, meter sand/cement slurry and glass fibers to spray head at rates to achieve design mix proportions and glass-fiber content according to PCI MNL 130 procedures.

B. Spray Application: Comply with general procedures as follows:
1. Spray mist coat over molds to a nominal thickness of 1/8 inch (3 mm) on planar surfaces.
2. Spray or place face mix in thickness indicated on Shop Drawings.
3. Proceed with spraying backing mix using procedures that produce a uniform thickness and even distribution of glass fibers and matrix.
4. Consolidate backing mix by rolling or other technique to achieve complete encapsulation of glass fibers and compaction.
5. Measure thickness with a pin gage or other acceptable method at least once for each 5 sq. ft. (0.5 sq. m) of panel surface. Take not less than six measurements per panel.

C. Hand form and consolidate intricate details, incorporate formers or infill materials, and over spray before material reaches initial set to ensure complete bonding.

D. Attach panel frame to GFRC before initial set of GFRC backing, maintaining a minimum clearance of 1/2 inch (13 mm) from GFRC backing, and without anchors protruding into GFRC backing.

E. Build up homogeneous GFRC bonding pads over anchor feet, maintaining a minimum thickness of 1/2 inch (13 mm) over top of anchor foot, before initial set of GFRC backing.

F. Inserts and Embedments: Build up homogeneous GFRC bosses or bonding pads over inserts and embedments to provide sufficient anchorage and embedment to comply with design requirements.

G. Curing: Employ initial curing method that will ensure sufficient strength for removing units from mold.
   1. After initial curing, remove panel from mold and place in a controlled curing environment.
   2. Keep GFRC panels continuously moist for a minimum of seven days, unless polymer curing admixture was used. Maintain temperature between 60 and 120 degF (16 and 49 degC) during this period.

H. Panel Identification: Mark each GFRC panel to correspond with identification mark on Shop Drawings. Mark each panel with its casting date.

2.10 FABRICATION TOLERANCES

A. Manufacturing Tolerances: Manufacture GFRC panels so each finished unit complies with PCI MNL 130 for dimension, position, and tolerances.

B. Manufacturing Tolerances: Manufacture GFRC panels so each finished unit complies with the following dimensional tolerances. For dimensional tolerances not listed below, comply with PCI MNL 130.

1. Overall Height and Width of Units, Measured at the Face Adjacent to Mold: As follows:
   a. 10 feet (3 m) or under, plus or minus 1/8 inch (3 mm).
   b. More than 10 feet (3 m), plus or minus 1/8 inch per 10 feet (3 mm per 3 m); 1/4 inch (6 mm) maximum

2. Edge Return Thickness: Plus 1/2 inch (13 mm), minus 0 inch (0 mm).
3. Architectural Facing Thickness: Plus 1/8 inch (3 mm), minus 0 inch (0 mm).
4. Backing Thickness: Plus 1/4 inch (6 mm), minus 0 inch (0 mm).
5. Panel Depth from Face of Skin to Back of Panel Frame or Integral Rib: Plus 3/8 inch (10 mm), minus 1/4 inch (6 mm).
6. Angular Variation of Plane of Side Mold: Plus or minus 1/32 inch per 3 inches (0.8 mm per 75 mm) of depth or plus or minus 1/16 inch (1.5 mm) total, whichever is greater.
7. Variation from Square or Designated Skew (Difference in Length of Two Diagonal Measurements): Plus or minus 1/8 inch per 72 inches (3 mm per 1800 mm) or plus or minus 1/4 inch (6 mm) total, whichever is greater.
8. Local Smoothness: 1/4 inch per 10 feet (6 mm per 3 m).
9. Bowing: Not to exceed L/240 unless unit meets erection tolerances using connection adjustments.
10. Length and Width of Blockouts and Openings within One Unit: Plus or minus 1/4 inch (6 mm).
11. Location of Window Opening within Panel: Plus or minus 1/4 inch (6 mm).
12. Maximum Permissible Warpage of One Corner out of the Plane of the Other Three: 1/16 inch per 12 inches (1.5 mm per 300 mm) of distance from nearest adjacent corner.

C. Position Tolerances: Measured from datum line locations, as indicated on Shop Drawings.

1. Panel Frame and Track: Plus or minus 1/4 inch (6 mm).
2. Flashing Reglets at Edge of Panel: Plus or minus 1/4 inch (6 mm).
3. Inserts: Plus or minus 1/2 inch (13 mm).
4. Special Handling Devices: Plus or minus 3 inches (75 mm).
5. Location of Bearing Devices: Plus or minus 1/4 inch (6 mm).

D. Panel Frame Tolerances: As follows:

1. Vertical and Horizontal Alignment: 1/4 inch per 10 feet (6 mm per 3 m).
2. Spacing of Framing Member: Plus or minus 3/8 inch (10 mm).
4. Overall Size of Frame: Plus or minus 3/8 inch (10 mm).

2.11 FINISHES

A. Finish exposed-face surfaces of GFRC as follows to match approved sample. Panel faces shall be free of joint marks, grain, or other obvious defects.

1. Smooth-Surface Finish: Provide free of sand streaks, honeycombs, and excessive air voids, with uniform color and texture.
2. Textured-Surface Finish: Impart by form liners to provide surfaces free of sand streaks, honeycombs, and excessive air voids, with uniform color and texture.
3. Retarded Finish: Use chemical-retarding agents applied to concrete forms and washing and brushing procedures to expose aggregate and surrounding matrix surfaces after form removal.
4. Sand- or Abrasive-Blast Finish: Use abrasive grit, equipment, application techniques, and cleaning procedures to expose aggregate and surrounding matrix surfaces.
5. Acid-Etched Finish: Use acid and hot-water solution equipment, application techniques, and cleaning procedures to expose aggregate and surrounding matrix surfaces.

2.12 SOURCE QUALITY CONTROL
A. Quality-Control Testing: Establish and maintain a quality-control program for manufacturing GFRC panels according to PCI MNL 130.

1. Test materials and inspect production techniques.
2. Quality-control program shall monitor glass fiber content, spray rate, unit weight, product physical properties, anchor pull-off and shear strength, and curing period and conditions.
3. Prepare test specimens and test according to ASTM C1228, PCI MNL 128, and PCI MNL 130 procedures.
4. Produce test boards at a rate not less than one per work shift machine and for each mix design. For each test board, determine glass fiber content according to ASTM C1229, and flexural yield and ultimate strength according to ASTM C947.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine structure and conditions for compliance with requirements for installation tolerances, true and level bearing surfaces, and other conditions affecting performance.

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

3.2 ERECTION

A. Install clips, hangers, and other accessories required for connecting GFRC panels to supporting members and backup materials.

B. Lift GFRC panels and install without damage.

C. Install GFRC panels level, plumb, square, and in alignment. Provide temporary supports and bracing as required to maintain position, stability, and alignment of panels until permanent connections are completed.

1. Maintain horizontal and vertical joint alignment and uniform joint width.
2. Remove projecting hoisting devices.

D. Connect GFRC panels in position by bolting or welding, or both, as indicated on Shop Drawings. Remove temporary shims, wedges, and spacers as soon as possible after connecting is completed.

E. Welding: Comply with applicable AWS D1.1 and AWS D1.3 requirements for welding, appearance, quality of welds, and methods used in correcting welding work.

1. Protect GFRC panels from damage by field welding or cutting operations, and provide noncombustible shields as required.

F. At bolted connections, use lock washers or other acceptable means to prevent loosening of nuts.
3.3 ERECTION TOLERANCES

A. Erect GFRC panels to comply with the following noncumulative tolerances:

1. Plan Location from Building Grid Datum: Plus or minus 1/2 inch (13 mm).
2. Top Elevation from Nominal Top Elevation: As follows:
   a. Exposed Individual Panel: Plus or minus 1/4 inch (6 mm).
   b. Nonexposed Individual Panel: Plus or minus 1/2 inch (13 mm).
   c. Exposed Panel relative to Adjacent Panel: 1/4 inch (6 mm).
   d. Nonexposed Panel relative to Adjacent Panel: 1/2 inch (13 mm).

3. Support Elevation from Nominal Elevation: As follows:
   a. Maximum Low: 1/2 inch (13 mm).
   b. Maximum High: 1/4 inch (6 mm).

4. Maximum Plumb Variation over the Lesser of Height of Structure or 100 Feet (30 m): 1 inch (25 mm).
5. Plumb in Any 10 Feet (3 m) of Element Height: 1/4 inch (6 mm).
8. Face Width of Joint: As follows (governs over joint taper):
   a. Panel Dimension 20 Feet (6 m) or Less: Plus or minus 1/4 inch (6 mm).
   b. Panel Dimension More Than 20 Feet (6 m): Plus or minus 5/16 inch (8 mm).

10. Joint Taper in 10 Feet (3 m): 1/4 inch (6 mm).
11. Differential Bowing, as Erected, between Adjacent Members of Same Design: 1/4 inch (6 mm).

3.4 REPAIRS

A. Repairs will be permitted provided structural adequacy of GFRC panel and appearance are not impaired, as approved by the Contracting Officer's Representative.
B. Mix patching materials and repair GFRC so cured patches blend with color, texture, and uniformity of adjacent exposed surfaces.
C. Prepare and repair accessible damaged galvanized coatings with galvanizing repair paint according to ASTM A780.
D. Remove and replace damaged GFRC panels when repairs do not comply with requirements.

3.5 CLEANING AND PROTECTION

A. Perform cleaning procedures, if necessary, according to GFRC manufacturer's written instructions. Clean soiled GFRC surfaces with detergent and water, using soft fiber brushes and sponges, and rinse with clean water. Prevent damage to GFRC surfaces and staining of adjacent materials.

END OF SECTION
PART 1 - GENERAL

1.1 SUMMARY
   A. Section Includes:
      1. Structural steel.
      2. Grout.

1.2 SUBMITTALS
   A. Product Data:
      1. For each type of product specified.
   B. Shop Drawings:
      1. Detailing fabrication of structural steel components.
         a. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
         b. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld.
         c. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify high-strength bolted slip-critical, direct-tension, or tensioned shear/bearing connections.
   C. Welding Certificates.
   D. Material Test Reports:
      1. Structural steel including chemical and physical properties.
      2. Bolts, nuts, and washers including mechanical properties and chemical analysis.
      3. Direct-tension indicators.
      4. Shop primers.
      5. Anchor Rods and Threaded Rods
   E. Manufacturer’s Certifications.
   F. Special Inspection reports on shop and field bolted connections, and welded connections.
   G. Submittal List:
1.2 Reference | Submittal Item | Quantity | Action  
--- | --- | --- | ---  
1.2A | Product Data | X | R  
1.2B | Shop Drawings | X | R  
1.2C | Welding Certificates | X | R  
1.2D | Material Test Reports | X | I  
1.2E | Manufacturer's Certifications | X | I  
1.2F | Special Inspection Reports | X | R  

**X** Submit quantity specified in Division 01 Section Administrative Requirements.  
**R** Review each submittal, mark to indicate action taken, and return.  
**I** Submittal is for information or record purposes only. No action will be taken.

1.3 QUALITY ASSURANCE  

A. Erector Qualifications:  

1. Engage an experienced Erector who has completed structural steel work similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.

B. Comply with applicable provisions of the following specifications and documents:  

1. AISC360 "Specification for Structural Steel Buildings"  
2. AISC 341 "Seismic Provisions for Structural Steel Buildings"  
3. AISC 303 "Code of Standard Practice for Steel Buildings and Bridges"  
4. ASTM A 6 "Specification for General Requirements for Rolled Steel Plates, Shapes, Sheet Piling, and Bars for Structural Use"  
5. Research Council on Structural Connections' (RCSC) "Specification for Structural Joints Using High-Strength Bolts"

C. Welding: Qualifications:  

1. Qualify procedures and personnel according to AWS D1.1 "Structural Welding Code--Steel".

D. Special Inspector Qualifications:  

1. Special Inspections for bolted and welded connections and steel details shall be performed under the direct supervision of a Professional Engineer registered in the State in which the project is located. The personnel performing the inspections shall be ICC-certified Structural Steel and Welding Special Inspection or an equivalent certification program, as approved by the Contracting Officer.

1.4 DELIVERY, STORAGE, AND HANDLING  

A. Delivery:  

1. Deliver structural steel to Project site in such quantities and at such times to ensure continuity of installation.
B. Storage and Handling:

1. Store materials to permit easy access for inspection and identification. Keep steel members off ground by using pallets, platforms, or other supports. Protect steel members and packaged materials from erosion and deterioration.
2. Store fasteners in a protected place. Clean and relubricate bolts and nuts that become dry or rusty before use. Comply with manufacturers’ written recommendations for cleaning and lubricating ASTM F 1852 fasteners and for retesting fasteners after lubrication.
3. Do not store materials on structure in a manner that might cause distortion or damage to members or supporting structures. Repair or replace damaged materials or structures as directed.

1.5 SEQUENCING

A. Supply anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, templates, instructions, and directions, as required, for installation.

PART 2 - PRODUCTS

2.1 STRUCTURAL-STEEL MATERIALS

A. Channels, Angles-Shapes: ASTM A 36 or ASTM A572 Grade 50.
B. Plate and Bar: ASTM A 36 or ASTM A572 Grade 50.
C. Cold-Formed Hollow Structural Sections: ASTM A 500, Grade B, structural tubing or ASTM A1085.
D. Welding Electrodes:
   1. Comply with AWS requirements.

2.2 BOLTS, CONNECTORS, AND ANCHORS

A. Unheaded Anchor Rods: ASTM F1554, Grade 36.
   2. Washers: ASTM F 436, Type 1, hardened carbon steel.
   2. Washers: ASTM F 436, Type 1, hardened carbon steel.
C. Non-High-Strength Bolts, Anchor Bolts, Nuts, and Washers: ASTM A 307, Grade A.
1. Carbon-steel, hex-head bolts; carbon-steel nuts; and flat, unhardened steel washers.
2. Finish: Plain, uncoated.

D. High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1.
1. Heavy hex structural bolts, heavy hex carbon-steel nuts, ASTM A 563, Grade C, and hardened carbon-steel washers, ASTM F 436 Type 1.
2. Direct-Tension Indicators: ASTM F 959, Type 325 compressible-washer type with plain finish.
3. Finish: Plain, uncoated.
4. Tension-Control, High Strength Bolt-Nut-Washer Assemblies: ASTM 1852, Type 1, Heavy Hex head assemblies consisting of steel structural bolts with splined ends, heavy-hex carbon-steel nuts, and hardened carbon-steel washers.

2.3 PRIMER
A. Comply with MPI#79.
1. Lead- and chromate-free, rust inhibiting primer compatible with field applied topcoat indicated.
2. Where field applied topcoat is not indicated provide fabricator's standard lead- and chromate-free, rust inhibiting primer.
3. Do not use asphaltic primers or primers containing red oxide.

2.4 FABRICATION
A. General:
1. Fabricate and assemble structural steel in shop to greatest extent possible. Fabricate structural steel according to AISC specifications referenced in this Section and in Shop Drawings.
   a. Identify high-strength structural steel according to ASTM A 6 and maintain markings until steel has been erected.
   b. Mark and match-mark materials for field assembly.
   c. Fabricate for delivery a sequence that will expedite erection and minimize field handling of structural steel.
   d. Complete structural steel assemblies, including welding of units, before starting shop-priming operations.
B. Thermal Cutting:
1. Perform thermal cutting by machine to greatest extent possible.
2. Plane thermally cut edges to be welded.
C. Finishing:
1. Accurately mill ends of columns and other members transmitting loads in bearing.
D. Holes:

1. Provide holes required for securing other work to structural steel framing and for passage of other work through steel framing members, as shown on Shop Drawings.
2. Cut, drill, or punch holes perpendicular to metal surfaces. Do not flame-cut holes or enlarge holes by burning. Drill holes in bearing plates.
3. Weld threaded nuts to framing and other specialty items as indicated to receive other work.

2.5 SHOP CONNECTIONS

A. General:

1. Shop install and tighten non-high-strength bolts, except where high-strength bolts are indicated.
2. Shop install and tighten high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 High Strength Bolts," for type of bolt and type of joint specified.
   a. Bolts: ASTM A 325 high-strength bolts, unless otherwise indicated.
   b. Connection Joint Type(s): tensioned shear/bearing connections snug-tightened.

B. Weld Connections:

1. Comply with AWS D1.1 for procedures, appearance and quality of welds, and methods used in correcting welding work.
2. Assemble and weld built-up sections by methods that will maintain true alignment of axes without warp.

2.6 SHOP PRIMING

A. Shop prime steel surfaces, except the following:

1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches.
2. Surfaces to be field welded.

B. Surface Preparation:


C. Primer Application:

1. Apply 1-coat primer in accordance with SSPC-PS Guide 7.00, "Painting System Guide 7.00: Guide for Selecting One-Coat Shop Painting Systems," to provide a dry film thickness of not less than 1.5 mils.
PART 3 - EXECUTION

3.1 EXAMINATION
A. Before erection proceeds, and with the steel erector present, verify elevations of concrete and masonry bearing surfaces and locations of anchorages for compliance with requirements. Do not proceed with erection until unsatisfactory conditions have been corrected.

3.2 PREPARATION
A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place, unless otherwise indicated.

3.3 ERECTION
A. General:
   1. Set structural steel accurately in locations and to elevations indicated and according to AISC specifications referenced in this Section.
B. Base and Bearing Plates:
      a. Set base and bearing plates for structural members on wedges, shims, or setting nuts as required.
      b. Tighten anchor bolts after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of base or bearing plate prior to packing with grout.
      c. Pack grout solidly between bearing surfaces and plates so no voids remain. Finish exposed surfaces, protect installed materials, and allow to cure.
         1) Comply with manufacturer's instructions for proprietary grout materials.
C. Erection Tolerances:
D. Alignment:
   1. Align and adjust various members forming part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
2. Level and plumb individual members of structure.
3. Establish required leveling and plumbing measurements on mean operating temperature of structure. Make allowances for difference between temperature at time of erection and mean temperature at which structure will be when completed and in service.

E. Modifications:

1. Splice members only where indicated.
2. Do not use thermal cutting during erection.
3. Do not enlarge holes in members by burning or by using drift pins. Ream holes that must be enlarged to admit bolts.

3.4 FIELD CONNECTIONS

A. General:

1. Install and tighten non-high-strength bolts, except where high-strength bolts are indicated.
2. Install and tighten high-strength bolts according to RCSC's "Specification for Structural Joints Using High-Strength Bolts".
   a. Bolts: ASTM A 325 high-strength bolts, unless otherwise indicated.
   b. Joint Type(s): snug-tightened.

B. Weld Connections:

1. Comply with AWS D1.1 for procedures, appearance and quality of welds, and methods used in correcting welding work.
2. Comply with AISC specifications referenced in this Section for bearing, adequacy of temporary connections, alignment, and removal of paint on surfaces adjacent to field welds.
3. Assemble and weld built-up sections by methods that will maintain true alignment of axes without warp.
4. Verify that weld sizes, fabrication sequence, and equipment used for architecturally exposed structural steel will limit distortions to allowable tolerances. Prevent surface bleeding of back-side welding on exposed steel surfaces. Grind smooth exposed fillet welds 1/2 inch and larger. Grind flush butt welds. Dress exposed welds.
5. Remove backing bars or runoff tabs where indicated, back gouge, and grind steel smooth.

3.5 QUALITY CONTROL

A. Quality Control Compliance:

1. Field quality control shall be in accordance with the Quality Control Plan.

B. Testing and Inspection:

1. Engage a special Inspector to perform field inspections and tests, as required in IBC Chapter 17, AISC 360 and and to prepare test reports.
2. Testing agency will conduct and interpret tests and state in each report whether tested Work complies with or deviates from requirements.
3. Correct deficiencies in or remove and replace structural steel that inspections and test reports indicate do not comply with specified requirements.
4. Additional testing, at Contractor's expense, will be performed to determine compliance of corrected Work with specified requirements.
5. Field-bolted connections will be tested and inspected according to RCSC's "Specification for Structural Joints Using High-Strength Bolts".
6. In addition to visual inspection, any required full penetration field-welded connections will be inspected and tested according to AWS D1.1 and the inspection procedures listed below, at Special Inspector's option.
   a. Liquid Penetrant Inspection: ASTM E 165.
   b. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
   c. Radiographic Inspection: ASTM E 94 and ASTM E 142; minimum quality level "2-2T".
   d. Ultrasonic Inspection: ASTM E 164.

3.6 CLEANING

A. Touchup Painting:
   1. Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint. Apply paint to exposed areas using same material as used for shop painting.
   2. Apply by brush or spray to provide a minimum dry film thickness of 1.5 mils.

END OF SECTION
SECTION 055013
METAL FABRICATIONS

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes

a. Steel framing and supports for mechanical and electrical equipment.
b. Steel framing and supports for applications where framing and supports are not specified in other Sections.
c. Loose bearing and leveling plates.
d. Steel weld plates and angles for casting into concrete not specified in other Sections.

1.1.2. Products furnished, but not installed, under this Section include the following:

a. Loose steel lintels.
b. Anchor bolts and wedge-type inserts indicated to be cast into concrete or built into unit masonry.

1.2 PERFORMANCE REQUIREMENTS

1.2.1. Thermal Movements

a. Provide exterior metal fabrications that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

(1) Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

1.3 SUBMITTALS

1.3.1. Shop Drawings

a. Show fabrication and installation details for metal fabrications.

(1) Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.
(2) Provide templates for anchors and bolts specified for installation under other Sections.

1.3.2. Welding Certificates.

1.3.3. Submittal List:

<table>
<thead>
<tr>
<th>Reference</th>
<th>Submittal Item</th>
<th>Quantity</th>
<th>Action</th>
</tr>
</thead>
</table>
1.3.1 Shop Drawings X R
1.3.2 Welding Certificates X R

X Submit quantity specified in Division 1 Section “Submittals.”
R Review each submittal, mark to indicate action taken, and return.
I Submittal is for information or record purposes only. No action will be taken.

1.4 QUALITY ASSURANCE
1.4.1. Welding
   a. Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel."

1.5 PROJECT CONDITIONS
1.5.1. Field Measurements
   a. Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication and indicate measurements on Shop Drawings.

1.6 COORDINATION
Coordinate installation of anchorages for metal fabrications. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.1 METALS, GENERAL
2.1.1. Metal Surfaces
   a. Provide materials with smooth, flat surfaces, unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

2.2 FERROUS METALS
2.2.1. Steel Plates, Shapes, and Bars ASTM A 36/A 36M.
2.2.2. Steel Pipe ASTM A 53/A 53M
   a. Standard weight (Schedule 40), unless another weight is indicated or required by structural loads.

2.3 FASTENERS
2.3.1. General
   a. Unless otherwise indicated, provide Type 304 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633, Class Fe/Zn 5, at exterior walls. Provide stainless-steel fasteners for fastening aluminum. Select fasteners for type, grade, and class required.

2.4 MISCELLANEOUS MATERIALS

2.4.1. Welding Rods and Bare Electrodes
   a. Select according to AWS specifications for metal alloy welded.

2.4.2. Shop Primers
   a. Provide primers that comply with Division 9 painting Sections.

2.4.3. Universal Shop Primer
   a. Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.
   b. Use primer with a VOC content of 420 g/L (3.5 lb/gal.) or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
   c. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.

2.4.4. Zinc-Rich Primer
   a. Complying with SSPC-Paint 20 or SSPC-Paint 29 and compatible with topcoat.
   b. Use primer with a VOC content of 420 g/L (3.5 lb/gal.) or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.4.5. Galvanizing Repair Paint
   a. High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

2.4.6. Bituminous Paint
   a. Cold-applied asphalt emulsion complying with ASTM D 1187.

2.4.7. Nonshrink, Nonmetallic Grout
   a. Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.

2.4.8. Concrete Materials and Properties
   a. Comply with requirements in Division 3 Section "Cast-in-Place Concrete" for normal-weight, air-entrained, ready-mix concrete with a minimum 28-day compressive strength of 3000 psi, unless otherwise indicated.

2.5 FABRICATION, GENERAL
2.5.1. Shop Assembly

a. Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

b. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch, unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

c. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

d. Form exposed work true to line and level with accurate angles and surfaces and straight edges.

e. Weld corners and seams continuously to comply with the following:

(1) Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
(2) Obtain fusion without undercut or overlap.
(3) Remove welding flux immediately.
(4) At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

f. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) screws or bolts, unless otherwise indicated. Locate joints where least conspicuous.

g. Fabricate seams and other connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

h. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.

i. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.

(1) Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, 1/8 by 1-1/2 inches, with a minimum 6-inch embedment and 2-inch hook, not less than 8 inches from ends and corners of units and 24 inches o.c., unless otherwise indicated.

2.6 MISCELLANEOUS FRAMING AND SUPPORTS

2.6.1. General

a. Provide steel framing and supports not specified in other Sections as needed to complete the Work.

b. Fabricate units from steel shapes, plates, and bars of welded construction, unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction retained by framing and supports. Cut, drill, and tap units to receive hardware, hangers, and similar items.

c. Furnish inserts if units are installed after concrete is placed.

d. Galvanize miscellaneous framing and supports where indicated.

2.7 LOOSE STEEL LINTELS

2.7.1. Fabrication
a. Fabricate loose steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated. Weld adjoining members together to form a single unit where indicated.
b. Size loose lintels to provide bearing length at each side of openings equal to 1/12 of clear span but not less than 8 inches, unless otherwise indicated.
c. Galvanize loose steel lintels located in exterior walls.

2.8 LOOSE BEARING AND LEVELING PLATES

Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction. Drill plates to receive anchor bolts and for grouting. Prime plates with zinc-rich primer.

2.9 STEEL WELD PLATES AND ANGLES

Provide steel weld plates and angles not specified in other Sections, for items supported from concrete construction as needed to complete the Work. Provide each unit with not less than two integrally welded steel strap anchors for embedding in concrete.

2.10 MISCELLANEOUS STEEL TRIM

2.10.1. General

a. Unless otherwise indicated, fabricate units from steel shapes, plates, and bars of profiles shown with continuously welded joints and smooth exposed edges. Miter corners and use concealed field splices where possible.

2.10.2. Fabrication

a. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work.
b. Provide with integrally welded steel strap anchors for embedding in concrete or masonry construction.
c. Unless otherwise indicated provide anchors 1/8 thick by 2 inches wide, with a minimum 6-inch embedment and 2-inch hook for securing steel trim into adjoining concrete or masonry. Weld anchors to steel trim no more than 12 inches from ends of opening, and space anchors not more than 16 inches apart.

2.11 FINISHES, GENERAL

2.11.1. Metal Finishes

a. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
b. Finish metal fabrications after assembly.

2.12 STEEL AND IRON FINISHES

2.12.1. Galvanizing

a. Hot-dip galvanize items as indicated to comply with applicable standard listed below:
b. ASTM A 123/A 123M, for galvanizing steel and iron products.
c. ASTM A 153/A 153M, for galvanizing steel and iron hardware.

2.12.2. Preparation for Shop Priming

a. Prepare uncoated ferrous-metal surfaces to comply with minimum requirements indicated below for SSPC surface preparation specifications and environmental exposure conditions of installed metal fabrications:

b. Interiors (SSPC Zone 1A): SSPC-SP 3, "Power Tool Cleaning."

2.12.3. Shop Priming

a. Apply shop primer to uncoated surfaces of metal fabrications, except those with galvanized finishes and those to be embedded in concrete, sprayed-on fireproofing, or masonry, unless otherwise indicated. Comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

b. Stripe paint corners, crevices, bolts, welds, and sharp edges.

PART 3 - EXECUTION

3.1 INSTALLATION

3.1.1. General

a. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
b. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.

3.1.2. Field Welding

a. Comply with the following requirements:

(1) Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
(2) Obtain fusion without undercut or overlap.
(3) Remove welding flux immediately.
(4) At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

3.1.3. Fastening to In-Place Construction

a. Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag bolts, wood screws, and other connectors.

3.1.4. Built-In Construction
a. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

3.2 INSTALLING MISCELLANEOUS FRAMING AND SUPPORTS

3.2.1. General

a. Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.

b. Anchor supports for operable partitions securely to and rigidly brace from building structure.

3.3 INSTALLING BEARING AND LEVELING PLATES

3.3.1. Preparation


3.3.2. Setting

a. Set bearing and leveling plates on wedges, shims, or leveling nuts. After bearing members have been positioned and plumbed, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with grout. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

3.4 QUALITY CONTROL

3.4.1. Quality Control Compliance

a. Field quality control shall be in accordance with the Quality Control Plan.

3.4.2. Testing and Inspection

a. AAFES will engage a special Inspector to perform field inspections and tests and to prepare test reports.

b. Field and shop welds will be subject to testing and inspecting.

c. Testing agency will report test results promptly and in writing to Contractor and Contracting Officer.

d. Remove and replace work where test results indicate that it does not comply with specified requirements.

e. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.5 ADJUSTING AND CLEANING

3.5.1. Touchup Painting

a. Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
b. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.

3.5.2. Galvanized Surfaces

a. Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

END OF SECTION
SECTION 06 10 00
ROUGH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Wood furring, grounds, nailers, and blocking.
2. Miscellaneous lumber.

1.2 DELIVERY, STORAGE, AND HANDLING

A. General:

1. Keep materials under cover and dry. Protect from weather and contact with damp or wet surfaces. Stack lumber, plywood, and other panels. Provide for air circulation within and around stacks and under temporary coverings.
2. For lumber and plywood pressure treated with waterborne chemicals, place spacers between each bundle to provide air circulation.

1.3 SUBMITTALS

A. Product Data:

1. For each type of process and factory-fabricated product.
   
a. Include data for wood-preservative and fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements.

B. Submittal List:

<table>
<thead>
<tr>
<th>Reference</th>
<th>Submittal Item</th>
<th>Quantity</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.3A</td>
<td>Product Data</td>
<td>X</td>
<td>R</td>
</tr>
</tbody>
</table>

X  Submit quantity specified in Division 01 Section Administrative Requirements.
R  Review each submittal, mark to indicate action taken, and return.
I  Submittal is for information or record purposes only. No action will be taken.
PART 2 - PRODUCTS

2.1 LUMBER, GENERAL

A. Lumber Standards:


B. Inspection Agencies: Inspection agencies and the abbreviations used to reference them with lumber grades and species include the following:

1. RIS - Redwood Inspection Service.
2. NLGA - National Lumber Grades Authority (Canadian).
3. SPIB - Southern Pine Inspection Bureau
4. WCLIB - West Coast Lumber Inspection Bureau.
5. WWPA - Western Wood Products Association.

C. Grade Stamps: Provide lumber with each piece factory-marked with grade stamp of inspection agency evidencing compliance with grading rule requirements and identifying grading agency, grade, species, moisture content at time of surfacing, and mill.

1. For exposed lumber furnish pieces with grade stamps applied to ends or back of each piece; or omit grade stamps entirely and provide certificates of grade compliance issued by inspection agency.

D. Sizes:

1. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
2. Provide dressed lumber, S4S, unless otherwise indicated.
3. Provide dry lumber with 19 percent maximum moisture content at time of dressing for 2-inch nominal thickness or less, unless otherwise indicated.

E. Engineered Wood Products: Provide 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: Provide engineered wood products with allowable design stresses, as published by manufacturer, that meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

2.2 WOOD-PRESERVATIVE-TREATED MATERIALS

A. General:
1. Where lumber or plywood is indicated as preservative treated or is specified to be treated, comply with applicable requirements of AWPA C2 (lumber) - Category UC3b for exterior construction not in contact with the ground. and AWPA C9 (plywood). Mark each treated item with the Quality Mark Requirements of an inspection agency approved by ALSC's Board of Review.

2. Do not use chemicals containing chromium or arsenic.

B. Pressure Treatment:

1. Pressure treat aboveground items with waterborne preservatives to a minimum retention of 0.25 lb/cu. ft. After treatment, kiln-dry lumber and plywood to a maximum moisture content of 19 and 15 percent, respectively. Treat indicated items and the following:
   a. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing.
   b. Wood blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.

C. 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.
2. Wood blocking, and similar concealed members in contact with masonry or concrete.
3. Wood floor plates that are installed over concrete slabs-on-grade.

2.3 MISCELLANEOUS LUMBER

A. General:

1. Provide lumber for support or attachment of other construction, including rooftop equipment curbs and support bases, cant strips, bucks, nailers, blocking, furring, grounds, stripping, and similar members.
2. Fabricate miscellaneous lumber from dimension lumber of sizes indicated and into shapes shown.
3. Moisture Content: 19 percent maximum for lumber items are not specified to receive wood preservative treatment.
4. Grade: For dimension lumber sizes, provide No. 3 or Standard grade lumber per ALSC's NGRs of any species. For board-size lumber, provide No. 3 Common grade per NELMA, NLGA, or WWPA; No. 2 grade per SPIB; or Standard grade per NLGA, WCLIB or WWPA of any approved species.

2.4 FASTENERS

A. General:

1. Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture.
a. Where carpentry is exposed to weather, in ground contact, pressure-preservative
   treated, or in area of high relative humidity, provide fasteners with hot-dip zinc
   coating complying with ASTM A 153 or of Type 304 or Type 316 stainless steel.


D. Wood Screws: ASME B18.6.1.

E. Lag Bolts: ASME B18.2.1.

F. Bolts: Steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where
   indicated, flat washers.

G. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with
   capability to sustain, without failure, a load equal to 6 times the load imposed when installed in
   unit masonry assemblies and equal to 4 times the load imposed when installed in concrete as
   determined by testing per ASTM E 488 conducted by a qualified independent testing and
   inspecting agency.
   1. Material: Carbon-steel components, zinc plated to comply with ASTM B 633,
      Class Fe/Zn 5 for interior applications.
   2. Material: Stainless steel with bolts and nuts complying with ASTM F 593 and
      ASTM F 594, Alloy Group 1 or 2 for exterior applications.

H. Screws for Fastening to Cold-Formed Metal Framing, Unless Otherwise Indicated:
   ASTM C 954.
   1. Except with wafer heads and reamer wings.
   2. Length as recommended by screw manufacturer for material being fastened.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General:
   1. Discard units of material with defects that impair quality of carpentry and that are too
      small to use with minimum number of joints or optimum joint arrangement.
   2. Set carpentry to required levels and lines, with members plumb, true to line, cut, and
      fitted.
   3. Fit carpentry to other construction; scribe and cope as required for accurate fit. Correlate
      location of furring, nailers, blocking, grounds, and similar supports to allow attachment of
      other construction.
   4. Where wood-preservative-treated lumber is installed adjacent to metal decking, install
      continuous flexible flashing separator between wood and metal decking.
   5. Apply field treatment complying with AWPA M4 to cut surfaces of preservative-treated
      lumber and plywood.
6. Securely attach carpentry work as indicated and according to applicable codes and recognized standards.
7. Countersink nail heads on exposed carpentry work and fill holes with wood filler.
8. Use fasteners of appropriate type and length. Predrill members when necessary to avoid splitting wood.

3.2 WOOD GROUNDS, NAILERS, BLOCKING, AND SLEEPERS

A. General:

1. Install where shown and where required for screeding or attaching other work. Cut and shape to required size. Coordinate locations with other work involved.
2. Attach to substrates to support applied loading. Recess bolts and nuts flush with surfaces, unless otherwise indicated.
3. Anchor wood nailers for roofing system work as follows:
   a. Wood nailer to metal deck: Provide No. 10 cadmium plated sheet metal screws with 5/8 inch diameter galvanized washers. Install in two rows. Space 2 feet 0 inches on center in each row except at corners space screws 1 foot 0 inches on center from corner for a distance of 8 feet 0 inches. Stagger spacing between rows.
   b. Wood member to wood nailer: Provide 10d threaded nail by length required for 1-1/2 inches penetration into nailer. Install in two rows. Space 2 feet 0 inches on center in each row except at corners space nails 1 foot 0 inches on center from corner for a distance of 8 feet 0 inches. Stagger spacing between rows.
   c. Wood nailer to metal stud: Provide No. 10 cadmium plated sheet metal screws with 5/8 inch diameter galvanized washers. Anchor 2 feet 0 inches on center except at corners space screws 1 foot 0 inches on center from corner for a distance of 8 feet 0 inches.

3.3 WOOD FURRING

A. General:

1. Install plumb and level with closure strips at edges and openings. Shim with wood as required for tolerance of finish work.

END OF SECTION
SECTION 061600
SHEATHING

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes

a. Wall sheathing.

1.2 SUBMITTALS

1.2.1. Product Data

a. For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1.2.2. Submittal List

<table>
<thead>
<tr>
<th>Reference</th>
<th>Submittal Item</th>
<th>Quantity</th>
<th>Action</th>
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<tr>
<td>1.2.1</td>
<td>Product Data</td>
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<td>R</td>
</tr>
</tbody>
</table>

X Submit quantity specified in Division 1 Section “Submittals.”
R Review each submittal, mark to indicate action taken, and return.

PART 2 - PRODUCTS

2.1 LUMBER, GENERAL

2.1.1. Lumber Standards


2.1.2. Sizes

a. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
   b. Provide dressed lumber, S4S, unless otherwise indicated.
   c. Provide dry lumber with 19 percent maximum moisture content at time of dressing for 2-inch nominal thickness or less, unless otherwise indicated.
2.2  WOOD-PRESERVATIVE-TREATED MATERIALS

2.2.1.  General

a. Where lumber or plywood is indicated as preservative treated or is specified to be treated, comply with applicable requirements of AWPA C2 (lumber) and AWPA C9 (plywood). Mark each treated item with the Quality Mark Requirements of an inspection agency approved by ALSC's Board of Review.
b. Do not use chemicals containing chromium or arsenic.

2.2.2.  Pressure Treatment

a. Pressure treat aboveground items with waterborne preservatives to a minimum retention of 0.25 lb/cu. Ft.. After treatment, kiln-dry lumber and plywood to a maximum moisture content of 19 and 15 percent, respectively. Treat indicated items and the following:
   (1) Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing.
   (2) Wood blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.

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

a. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
b. Wood blocking, and similar concealed members in contact with masonry or concrete.
c. Wood framing and furring attached directly to the interior of below-grade exterior masonry or concrete walls.
d. Wood framing members that are less than 18 inches above the ground in crawl spaces or unexcavated areas.
e. Wood floor plates that are installed over concrete slabs-on-grade.

2.3  WALL SHEATHING

2.3.1.  Plywood Sheathing: Exterior, Structural I sheathing.

2.3.2.  Glass-Mat Gypsum Sheathing Board

b. ASTM C 1177/C 1177M.
c. Type: Regular, 1/2 inch thick.
d. Size: 48 by 96 inches, minimum, for vertical installation.

2.4  FASTENERS

2.4.1.  General

a. Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture.
b. For wall sheathing, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.

2.4.2. Screws for Fastening Gypsum Sheathing to Cold-Formed Metal Framing

a. Steel drill screws, in length recommended by sheathing manufacturer for thickness of sheathing board to be attached, with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B 117.

(1) For steel framing less than 0.0329 inch thick, attach sheathing to comply with ASTM C 1002.
(2) For steel framing from 0.033 to 0.112 inch thick, attach sheathing to comply with ASTM C 954.

2.5 SHEATHING JOINT-AND-PENETRATION TREATMENT MATERIALS

2.5.1. Sheathing Tape for Foam-Plastic Sheathing: Pressure-sensitive plastic tape recommended by sheathing manufacturer for sealing joints and penetrations in sheathing.

PART 3 - EXECUTION

3.1 INSTALLATION

3.1.1. General

a. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement.

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

c. Securely attach to substrate by fastening as indicated.

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

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

f. Coordinate sheathing installation with installation of materials installed over sheathing so sheathing is not exposed to precipitation or left exposed at end of the workday when rain is forecast.

3.2 GYPSUM SHEATHING INSTALLATION

3.2.1. General

a. Comply with GA-253 and with manufacturer's written instructions.

b. Fasten gypsum sheathing to cold-formed metal framing with screws.

c. Install boards with a 3/8-inch gap where non-load-bearing construction abuts structural elements.

d. Install boards with a 1/4-inch gap where they abut masonry or similar materials that might retain moisture, to prevent wicking.

e. Apply fasteners so heads bear tightly against face of sheathing boards but do not cut into facing.
3.2.2. Horizontal Installation

a. Install sheathing with V-grooved edge down and tongue edge up. Interlock tongue with groove to bring long edges in contact with edges of adjacent boards without forcing. Abut ends of boards over centers of studs, and stagger end joints of adjacent boards not less than one stud spacing. Attach boards at perimeter and within field of board to each steel stud.

b. Space fasteners approximately 8 inches o.c. and set back a minimum of 3/8 inch from edges and ends of boards.

3.2.3. Vertical Installation

a. Install board vertical edges centered over studs. Abut ends and edges of each board with those of adjacent boards. Attach boards at perimeter and within field of board to each stud.

b. Space fasteners approximately 8 inches o.c. and set back a minimum of 3/8 inch from edges and ends of boards.

3.3 SHEATHING JOINT-AND- PENETRATION TREATMENT

3.3.1. Apply glass-fiber sheathing tape to glass-mat gypsum sheathing board joints. Seal other penetrations and openings.

END OF SECTION
SECTION 06 40 23
INTERIOR ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Engineered wood flooring and trim
2. Solid-surfacing-material countertops.
5. Hardware and accessory materials.

B. Related Sections:

1. Division 6 Section "Rough Carpentry" for wood furring, blocking, shims, and hanging strips required for installing cabinets and concealed within other construction before cabinet installation.

1.2 DEFINITIONS

A. Interior architectural woodwork includes wood furring, blocking, shims, and hanging strips for installing woodwork items unless concealed within other construction prior to woodwork installation.

1.3 SUBMITTALS

A. Product Data:

1. For each type of product indicated, including cabinet hardware and accessories, and finishing materials and processes.

B. Shop Drawings:

1. Dimensioned plans, elevations, and large scale details showing location of each cabinet, attachment devices, and other components.

C. Samples For Verification:

1. Standing and running trim with transparent finish, 12 inches long, for each species and cut, finished on one side and one edge.
2. Plastic-laminate and solid-surfacing material color, pattern, and texture selected.
D. Submittal List:

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X Submit quantity specified in Division 01 Section Administrative Requirements.
R Review each submittal, mark to indicate action taken, and return.
I Submittal is for information or record purposes only. No action will be taken.

1.4 QUALITY ASSURANCE

A. Fabricator Qualifications:

1. Firm experienced in producing architectural woodwork that employs skilled workers who custom fabricate products similar to that indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units without delaying the Work.

B. Installer Qualifications:

1. Arrange for interior architectural woodwork installation by a firm that can demonstrate successful experience in installing architectural woodwork items similar in type and quality to those required for this Project.

C. Quality Standard:

1. Except as otherwise indicated, comply with the following standard:

   a. “Architectural Woodwork Standards” for grades of interior architectural woodwork, construction, finishes, installation, and other requirements.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Protect woodwork during transit, delivery, storage, and handling to prevent damage, soilage, and deterioration. Do not deliver woodwork until painting and similar operations that could damage, soil, or deteriorate woodwork have been completed in installation areas. If woodwork must be stored in other than installation areas, store only in areas whose environmental conditions meet requirements specified in "Project Conditions."

1.6 PROJECT CONDITIONS

A. Environmental Limitations:

1. Do not deliver or install woodwork until building is enclosed, wet-work is completed, and HVAC system is operating and will maintain temperature and relative humidity at occupancy levels during the remainder of the construction period.
B. Field Measurements:

1. Where woodwork is indicated to be fitted to other construction, check actual dimensions of other construction by accurate field measurements before fabrication, and show recorded measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work. Fabricate to allow trimming at site and coordinate construction to ensure that actual dimensions correspond to established dimensions.

2. Verify locations of concealed framing, blocking, reinforcements, and furring that support woodwork by accurate field measurements before being enclosed. Record measurements on final Shop Drawings.

1.7 COORDINATION

A. General:

1. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that interior architectural woodwork can be supported and installed as indicated.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Products: To establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other manufacturers, a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation. Subject to compliance with requirements, provide either the named products or equal products.

2.2 MATERIALS

A. General:

1. Provide materials that comply with requirements of referenced quality standard for each type of woodwork and quality grade specified unless otherwise indicated and, where the following products are part of interior woodwork, with requirements of the referenced product standards that apply to product characteristics indicated:

   b. Medium-Density Fiberboard: ANSI A208.2, Grade 130, made with binder containing no urea formaldehyde.
   c. Particleboard: ANSI A208.1, Grade M-2, made with binder containing no urea formaldehyde.
   e. Veneer-Faced Panel Products (Hardwood Plywood): HPVA HP-1, made with adhesive containing no urea formaldehyde.
2. Solid-Surfacing Material: Homogeneous solid sheets of filled plastic resin complying with ISSFA-2. Nd material and performance requirements in ANSI Z124.3, for Type 5 or Type 6, without a precoated finish. Basis-of-Design Products: Corian; DuPont Polymers.

3. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated, or if not indicated, as required by woodwork quality standard.

2.3 HARDWARE AND ACCESSORY MATERIALS

A. General:
   1. Provide accessory materials associated with interior architectural woodwork.

B. Hardware Standard:
   1. Comply with BHMA A156.9 for items indicated by reference to BHMA numbers or referenced to this standard.

C. Exposed Hardware Finishes:
   1. For exposed hardware, provide finish that complies with BHMA A156.18 for BHMA code number indicated.
      a. Satin Chromium Plated Steel, BHMA 652.

D. Concealed Hardware Finishes:
   1. For concealed hardware provide manufacturer's standard finish that complies with product class requirements of BHMA A156.9.

E. Hardware:
   a. Hinges: B01602, 95 degree opening.
   b. Pulls: B02011, 5/16 inch diameter wire pull, 4-inch centers, 1-5/16-inch projection.
   c. Shelf Supports: B04013.
   d. Adjustable Shelf Standards: B04102, 1-1/4-inch wide by ½ inch, double slot.
   e. Adjustable Knife Brackets: B04112, double knife bracket.
   f. Drawer Slides: B05011.

2. Locks for Reveal Overlay On Face Frame Type Cabinet:
   b. Provide lock cylinder, keying, and finish as specified in Division 8 Section “Door Hardware;” interchangeable core, key projects and retracts dead bolt, key may be withdrawn in locked or unlocked position.
   c. Key locks of cabinets in same room alike unless otherwise indicated.

F. Veneer-faced Panel accessories:
   1. Where indicated on drawings, aluminum trim shall be installed on wood planking;
      a. Fry Reglet - JPM-75 J-Trim
b. Fry Reglet - PCM -75-75 Y-Corner

c. Material: Extruded aluminum, 6063 T5 with chemical conversion coating, clear anodized aluminum.

d. Stainless Steel Base: 6” High 304 stainless steel, 18 gauge – 2B finish

2.4 INSTALLATION MATERIALS

A. Furring, Blocking, Shims, and Hanging Strips:

1. Softwood or hardwood lumber, kiln dried to less than 15 percent moisture content.

B. Screws:

1. Select material, type, size, and finish required for each use. Comply with ASME B18.6.1 for applicable requirements. For metal framing supports, provide screws as recommended by metal-framing manufacturer.

C. Nails:

1. Select material, type, size, and finish required for each use. Comply with FS FF-N-105 for applicable requirements.

D. Anchors:

1. Select material, type, size, and finish required for each substrate for secure anchorage. Provide nonferrous metal or hot-dip galvanized anchors and inserts on inside face of exterior walls and elsewhere as required for corrosion resistance. Provide toothed steel or lead expansion bolt devices for drilled-in-place anchors.

2.5 FABRICATION, GENERAL

A. Interior Woodwork Grade:

1. Provide interior woodwork complying with the referenced quality standard and of the following grade:

   a. Grade: Premium.

B. Wood Moisture Content:

1. Comply with requirements of referenced quality standard for wood moisture content in relation to relative humidity conditions existing during time of fabrication and in installation areas.

C. Fabrication:

1. Fabricate woodwork to dimensions, profiles, and details indicated. Ease edges to radius indicated for the following:
a. Corners of cabinets and edges of solid-wood (lumber) members 3/4 inch thick or less: 1/16 inch.

b. Edges of rails and similar members more than 3/4 inch thick: 1/8 inch.

2. Complete fabrication, including assembly, finishing, and hardware application, before shipment to Project site to maximum extent possible. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.

3. Shop-cut openings, to maximum extent possible, to receive hardware, appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Smooth edges of cutouts and, where located in countertops and similar exposures, seal edges with a water-resistant coating.

2.6 ENGINEERED WOOD FLOORING (INSTALLED AS WALL PANELING)

A. Quality Standard:

1. Armstrong Commercial – Century Farm – Hickory, GCH452TMLGZ
2. Material: 5 inch high, 1/2 inch thick horizontal wood planking.
3. Colors, Patterns, and Finishes: Prefinished, TUMBLEWEED

   a. Color, pattern, and finish as selected in finish schedule.

B. Fabrication:

   1. Fabricate in as few pieces as reasonable shop-applied edges, unless otherwise indicated.

2.7 SOLID-SURFACING-MATERIAL COUNTERTOPS

A. Quality Standard:

1. Comply with requirements of referenced standard for solid-surface countertops.
2. Grade: Premium.
4. Colors, Patterns, and Finishes: Provide materials and products that result in colors of solid-surfacing material complying with the following requirements:

   a. Match color, pattern, and finish as selected in finish schedule.

B. Fabrication:

   1. Fabricate tops in one or as few pieces as reasonable shop-applied edges, unless otherwise indicated. Comply with solid-surfacing-material manufacturer's written recommendations for adhesives, sealers, fabrication, and finishing.
2.8 PLASTIC-LAMINATE CABINETS

A. Quality Standard

1. Comply with AWI Section 400 requirements for laminate cabinets.
   a. Grade: Premium.

B. AWI Type of Cabinet Construction

   a. Reveal overlay on face frame.
   b. Reveal Dimension: 1/2 inch.

C. Laminate Cladding for Exposed Surfaces

   1. High-pressure decorative laminate complying with the following requirements:
      a. Horizontal Surfaces Other Than Tops: HGS.
      b. Postformed Surfaces: HGP.
      c. Vertical Surfaces: VGS.
      d. Edges: HGS.

D. Materials for Semi-exposed Surfaces:

   1. Surfaces Other Than Drawer Bodies: Thermoset decorative panels.
      a. For semiexposed backs of panels with exposed plastic-laminate surfaces, provide surface of high-pressure decorative laminate, Grade VGS.
      b. Drawer Sides and Backs: Thermoset decorative panels.
      c. Drawer Bottoms: Thermoset decorative panels.

E. Concealed Backs of Panels with Exposed Plastic Laminate Surfaces

   a. High-pressure decorative laminate, Grade BKL.

F. Colors, Patterns, and Finishes

   1. Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:
      a. Match color, pattern, and finish as indicated by laminate manufacturer's designations for these characteristics.

2.9 PLASTIC-LAMINATE COUNTERTOPS

A. Quality Standard

1. Comply with AWI Section 400 requirements for high-pressure decorative laminate countertops.
2. Grade: Premium.
3. High-Pressure Decorative Laminate Grade: HGS.
4. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:
   a. Match color, pattern, and finish as indicated by manufacturer's designations for these characteristics.
5. Grain Direction: Parallel to cabinet fronts.
6. Edge Treatment: Same as laminate cladding on horizontal surfaces.
7. Core Material: Industrial grade medium-density particleboard.

PART 3 - EXECUTION

3.1 PREPARATION

A. General
   1. Condition woodwork to average prevailing humidity conditions in installation areas before installing.
   2. Before installing architectural woodwork, examine shop-fabricated work for completion and complete work as required, including back priming and removal of packing.

3.2 INSTALLATION

A. General
   1. Quality Standard: Install woodwork to comply with AWI Section 1700 for the same grade specified in Part 2 of this Section for type of woodwork involved.
   2. Install woodwork plumb, level, true, and straight with no distortions. Shim as required with concealed shims. Install to a tolerance of 1/8 inch in 96 inches for plumb and level (including tops).
   3. Scribe and cut woodwork to fit adjoining work and refinish cut surfaces or repair damaged finish at cuts.
   4. Anchor woodwork to anchors or blocking built in or directly attached to substrates. Secure to grounds, stripping and blocking with countersunk, concealed fasteners and blind nailing as required for complete installation. Use fine finishing nails for exposed nailing, countersunk and filled flush with woodwork and matching final finish where transparent finish is indicated.
   5. Cabinets: Install without distortion so that doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete the installation of hardware and accessory items as indicated.
      a. Install cabinets with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.
      b. Maintain veneer sequence matching of cabinets with transparent finish.
6. Tops: Anchor securely to base units and other support systems as indicated. Calk space between backsplash and wall with specified sealant.
   a. Install countertops with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.
   b. Secure backsplashes to tops with concealed metal brackets at 16 inches o.c.

7. Complete the finishing work specified in this Section to the extent not completed at shop or before installation of woodwork. Fill nail holes with matching filler where exposed. Apply specified finish coats, including stains and paste fillers if any, to exposed surfaces where only sealer/prime coats were applied in the shop.

8. Refer to Division 9 Sections for final finishing of installed architectural woodwork.

3.3 ADJUSTING AND CLEANING

A. General

1. Repair damaged and defective woodwork where possible to eliminate functional and visual defects; where not possible to repair, replace woodwork. Adjust joinery for uniform appearance.
2. Clean, lubricate, and adjust hardware.
3. Clean woodwork on exposed and semiexposed surfaces. Touch up shop-applied finishes to restore damaged or soiled areas.

3.4 PROTECTION

1. Provide final protection and maintain conditions in a manner acceptable to fabricator and Installer that ensures that woodwork is without damage or deterioration at the time of final acceptance.

END OF SECTION 06 40 23
SECTION 06 83 16
FIBERGLASS REINFORCED PANELING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Glass-fiber reinforced plastic (FRP) wall paneling and trim accessories

1.2 SUBMITTALS

A. Product Data:

1. Manufacturer’s data sheets on each product to be used, including:

   a. Preparation instructions and recommendations.
   b. Storage and handling requirements and recommendations.
   c. Installation methods.

B. Submittal List:

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X Submit quantity specified in Division 01 Section Administrative Requirements.
R Review each submittal, mark to indicate action taken, and return.
I Submittal is for information or record purposes only. No action will be taken.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Products: To establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other manufacturers, a specific manufacturer's product is named and accompanied by the words “basis-of-design”, including make or model number or other designation. Subject to compliance with requirements, provide either the named products or equal products.

2.2 WALL PANELS

A. Basis-of-Design Product:
1. Marlite, S 100 S/2/S/ White.

B. Materials:

1. Fiberglass reinforced polyester plastic sheets: Sheets shall comply with fire-test-response characteristics specified, be chemical and stain resistant, and be USDA acceptable for incidental food contact. Provide manufacturer's standard matching moldings and trim as indicated.
2. Size: 4 feet by 10 feet.
3. Thickness: 0.09 inch.
4. Do not furnish material in roll form.

C. Fire Classification:

1. NFPA Class A interior finish in accordance with ASTM E 84.
2. Flame spread: 0 to 25.
3. Smoke development: 0 to 450.

D. Panel Finish:


E. Accessories:

1. Moldings: Manufacturer's standard one-piece white, extruded polyvinyl chloride plastic designed to retain and cover edges of panels. Provide division bars, inside corners, outside corners, and caps as needed to conceal edges.
2. Adhesive: Manufacturer's approved adhesive for substrate to which panels are applied.
   a. VOC Content: 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
3. Exposed Fasteners: Nylon drive rivets recommended by panel manufacturer.
4. Sealant: Provide silicone type sealant specified in Division 07 Section Joint Sealants for joints between panels occurring in rooms exposed to moisture.
   a. VOC Content: 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

PART 3 - EXECUTION

3.1 INSPECTION

A. General:

1. Ensure surfaces to receive wall paneling are clean, true and free of irregularities.
2. Clean substrates of substances that could impair bond of adhesive, including oil, grease, dirt, and dust.
3. Ensure wall surface flatness tolerance do not vary more than 1/8 inch in 10 feet.
4. Schedule installation of panels as late as possible to prevent damage during construction and movement of materials.

3.2 WALL PANEL INSTALLATION

A. General:

1. Handle and apply wall panels in accordance with manufacturer's written instructions.
2. Install panels in a full spread of adhesive.
3. Where fasteners are required for additional support use noncorroding fasteners where concealed and Nylon drive rivets where exposed. Install in accordance with manufacturer's written instructions allowing for expansion and contraction of panels.
4. Install with edges inserted into moldings. Allow clearance for expansion and contraction of panels when fitting into moldings.
5. Install trim accessories with adhesive. Do not fasten through panels.
6. Apply a continuous bead of sealant into molding slots prior to insertion of panels.

3.3 CLEANING

A. Clean panels after installation with materials recommended by panel manufacturer.

END OF SECTION 06 83 16
SECTION 07 42 13
ALUMINUM COMPOSITE WALL PANELS

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes

   a. Section includes aluminum composite wall panels.

1.2 DEFINITIONS

1.2.1. Aluminum Composite Wall Panel Assembly

   a. Aluminum composite wall panels, attachment system components, miscellaneous metal framing, and accessories necessary for a complete weathertight wall system.

1.3 PERFORMANCE REQUIREMENTS

1.3.1. General Performance: Aluminum composite wall panel assemblies shall comply with performance requirements without failure due to defective manufacture, fabrication, installation, or other defects in construction. Panel system shall be tested per AAMA 509-09.

1.3.2. Structural Performance

   a. Provide aluminum composite wall panel assemblies capable of withstanding the effects of the following loads and stresses within limits and under conditions indicated, based on testing according to ASTM E 330:

     (1) Wind Loads: Determine loads based on the following minimum design wind pressures:

        (a) Uniform pressure of 20 lbf/sq. ft., acting inward or outward

     (2) Deflection Limits: Aluminum composite wall panel assemblies shall withstand wind loads with horizontal deflections no greater than 1/175 of the span at the perimeter and 1/60 of the span anywhere in the panel.

1.3.3. Thermal Movements

   a. Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
(1) Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

1.4 SUBMITTALS

1.4.1. Product Data

a. For each type of product indicated.

1.4.2. Shop Drawings

a. Include fabrication and installation layouts of aluminum composite material panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment assembly, trim, flashings, closures, and accessories; and special details. Distinguish among factory-, shop-, and field-assembled work.

1.4.3. Samples for Verification

a. For each type of exposed finish required, prepared on Samples of size indicated below:

(1) Aluminum Composite Wall Panels: Minimum 12 x 12 inches. Include fasteners, closures, and other metal composite wall panel accessories.

1.4.4. Sample Warranties: For special warranties.

1.4.5. Submittal List

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X Submit quantity specified in Division 1 Section “Submittals.”
R Review each submittal, mark to indicate action taken, and return.
I Submittal is for information or record purposes only. No action will be taken

1.5 QUALITY ASSURANCE

1.5.1. Source Limitations

a. Obtain each type of aluminum composite wall panel from single source from single manufacturer.
b. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

1.6 DELIVERY, STORAGE, AND HANDLING

1.6.1. General
a. Deliver components, sheets, aluminum composite wall panels, and other manufactured items so as not to be damaged or deformed. Package metal composite wall panels for protection during transportation and handling.

b. Unload, store, and erect aluminum composite wall panels in a manner to prevent bending, warping, twisting, and surface damage.

c. Store aluminum composite wall panels vertically, covered with suitable weathertight and ventilated covering. Store aluminum composite wall panels to ensure dryness, with positive slope for drainage of water. Do not store aluminum composite wall panels in contact with other materials that might cause staining, denting, or other surface damage. Do not allow storage space to exceed 120 deg F.

d. Retain strippable protective covering on aluminum composite wall panel for period of panel installation.

1.7 PROJECT CONDITIONS

1.7.1. Weather Limitations

a. Proceed with installation only when existing and forecasted weather conditions permit assembly of aluminum composite wall panels to be performed according to manufacturer's written instructions and warranty requirements.

1.7.2. Field Measurements

a. Verify locations of structural members and wall opening dimensions by field measurements before aluminum composite wall panel fabrication and indicate measurements on Shop Drawings.

1.8 WARRANTY

1.8.1. Special Warranty on Panel Finishes

a. Manufacturer's standard form in which manufacturer agrees to repair finish or replace aluminum composite wall panels that show evidence of deterioration of factory-applied finishes within specified warranty period.

(1) Exposed Panel Finish: Deterioration includes, but is not limited to, the following:

(a) Color fading more than 5 Hunter units when tested according to ASTM D 2244.
(b) Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
(c) Cracking, checking, peeling, or failure of paint to adhere to bare metal.

(2) Finish Warranty Period: 30 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS
Basis-of-Design Products: To establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other manufacturers, a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation. Subject to compliance with requirements, provide either the named products or equal products.

2.2 MISCELLANEOUS METAL FRAMING

a. ASTM C 645, cold-formed metallic-coated steel sheet, ASTM A 653/A 653M, G40 hot-dip galvanized or coating with equivalent corrosion resistance unless otherwise indicated.

2.2.1. Fasteners for Miscellaneous Metal Framing

a. Of type, material, size, corrosion resistance, holding power, and other properties required to fasten miscellaneous metal framing members to substrates.

2.3 MISCELLANEOUS MATERIALS

2.3.1. Aluminum Extrusions:

a. STM B 221, alloy and temper recommended by manufacturer for type of use and finish indicated.

2.3.2. Fasteners

a. Self-tapping screws, bolts, nuts, self-locking rivets and bolts, end-welded studs, and other suitable fasteners designed to withstand design loads. Provide exposed fasteners with heads matching color of aluminum composite wall panels by means of plastic caps or factory-applied coating. Provide EPDM, PVC, or neoprene sealing washers.

2.4 ALUMINUM COMPOSITE WALL PANELS

2.4.1. General

a. Provide factory-formed and -assembled, aluminum composite wall panels fabricated from two metal facings bonded, using no glues or adhesives, to solid, extruded thermoplastic core; formed into profile for installation method indicated. Include attachment system components and accessories required for weathertight system.

(1) Basis-of-Design Product: Alcoa Inc.; Reynobond PE.

2.4.2. Aluminum Composite Material Panels (ACM Panels)

a. Formed with 0.020-inch- thick, coil-coated aluminum sheet facings.

(1) Panel Thickness: 0.157 inch.
(2) Core: Standard.
(a) Color: as indicated on drawings.

2.4.3. Attachment System Components

a. Formed from extruded aluminum.

(1) Include manufacturer's standard perimeter extrusions with integral weather stripping, panel stiffeners, panel clips, and anchor channels.

2.4.4. Fabricator Basis of Design


b. Other fabricators are acceptable provided they are MCA certified as a Premium Fabricator.

2.5 WEATHER-RESISTIVE BARRIERS

2.5.1. Dupont Tyvek CommercialWrap

2.5.2. Building Wrap: ASTM E1677, Type I air barrier; with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, when tested according to ASTM E84; UV stabilized; and acceptable to authorities having jurisdiction.

a. Water-Vapor Permeance: Not less than 75 perms per ASTM E 96/E 96M, Desiccant Method (Procedure A).

b. Flame Propagation Test: Materials and construction shall be as tested according to NFPA 285.

c. Building-Wrap Tape: Pressure-sensitive plastic tape recommended by building-wrap manufacturer for sealing joints and penetrations in building wrap.

2.6 ACCESSORIES

2.6.1. Wall Panel Accessories

a. Provide components required for a complete aluminum composite wall panel assembly including trim, copeings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of aluminum composite wall panels unless otherwise indicated.

2.6.2. Flashing and Trim

a. Formed from 0.040-inch minimum thickness, aluminum sheet prepainted with coil coating. Provide flashing and trim as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, bases, drips, sills, jambs, corners, endwalls, framed openings, rakes, fasciae, parapet caps, soffits, reveals, and fillers. Finish flashing and trim with same finish system as adjacent metal composite wall panels.
2.7 FABRICATION

2.7.1. General

a. Fabricate and finish aluminum composite wall panels and accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.

b. Fabricate aluminum composite wall panels in a manner that eliminates condensation on interior side of panel and with joints between panels designed to form weathertight seals.

c. Aluminum Composite Wall Panels: Factory form panels in a continuous process with no glues or adhesives between dissimilar materials. Trim and square edges of sheets with no displacement of face sheets or protrusion of core material.

(1) Form panel lines, breaks, and angles to be sharp and true, with surfaces free from warp and buckle.
(2) Fabricate panels with sharply cut edges, with no displacement of face sheets or protrusion of core material.
(3) Fabricate panels with panel stiffeners, as required to comply with deflection limits, attached to back of panels with structural silicone sealant or bond tape.
(4) Dimensional Tolerances:
   (a) Panel Bow: 0.8 percent maximum of panel length or width.
   (b) Squareness: 0.25 inch maximum.

d. Sheet Metal Accessories: Fabricate flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.

(1) Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
(2) Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.
(3) Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
(4) Sealed Joints: Form nonexpansion but movable joints in metal to accommodate elastomeric sealant to comply with SMACNA standards.
(5) Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
(6) Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended by metal composite wall panel manufacturer.

   (a) Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal composite wall panel manufacturer for application, but not less than thickness of metal being secured.

2.8 GENERAL FINISH REQUIREMENTS

2.8.1. General
a. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
b. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
c. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

3.1.1. General

a. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal composite wall panel supports, and other conditions affecting performance of the Work.

(1) Examine wall framing to verify that girts, angles, channels, studs, and other structural panel support members and anchorage have been installed within alignment tolerances required by metal composite wall panel manufacturer.

b. Examine roughing-in for components and systems penetrating metal composite wall panels to verify actual locations of penetrations relative to seam locations of panels before panel installation.

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

3.2 PREPARATION

3.2.1. Miscellaneous Framing

a. Install subgirts, base angles, sills, furring, and other miscellaneous wall panel support members and anchorage according to ASTM C 754 and metal composite wall panel manufacturer's written instructions.

3.3 ALUMINUM COMPOSITE WALL PANEL INSTALLATION

3.3.1. General

a. Install aluminum composite wall panels according to manufacturer's written instructions in orientation, sizes, and locations indicated on Drawings. Install panels perpendicular to girts and subgirts unless otherwise indicated. Anchor panels and other components of the Work securely in place, with provisions for thermal and structural movement.
(1) Shim or otherwise plumb substrates receiving aluminum composite wall panels.
(2) Flash and seal metal composite wall panels at perimeter of all openings. Do not begin installation until weather barrier and flashings that will be concealed by panels are installed.
(3) Install flashing and trim as metal composite wall panel work proceeds.
(4) Apply elastomeric sealant continuously between metal base channel (sill angle) and concrete, and elsewhere as indicated or, if not indicated, as necessary for waterproofing.
(5) Provide weather tight escutcheons for pipe and conduit penetrating exterior walls.

3.3.2. Fasteners:
   a. Aluminum Wall Panels: Use aluminum or stainless-steel fasteners for surfaces exposed to the exterior and aluminum or galvanized-steel fasteners for surfaces exposed to the interior.

3.3.3. Metal Protection
   a. Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action as recommended by metal composite wall panel manufacturer.

3.3.4. Attachment System Installation, General
   a. Install attachment system required to support aluminum composite wall panels and to provide a complete weathertight wall system, including subgirts, perimeter extrusions, tracks, drainage channels, panel clips, and anchor channels.
      (1) Include attachment to supports, panel-to-panel joinery, panel-to-dissimilar-material joinery, and panel-system joint seals.
      (2) Do not begin installation until weather barrier and flashings that will be concealed by composite panels are installed.

3.3.5. Clip Installation
   a. Attach panel clips to supports at each aluminum composite wall panel joint at locations, spacings, and with fasteners recommended by manufacturer. Attach routed-and-returned flanges of wall panels to panel clips with manufacturer's standard fasteners.

3.3.6. Track-Support Installation
   a. Provide manufacturer's standard horizontal and vertical tracks that provide support and complete secondary drainage system, draining to the exterior at horizontal joints. Install support system at locations, spacings, and with fasteners recommended by manufacturer. Attach panels to wall by interlocking tracks with perimeter extrusions attached to wall panels. Fully engage integral gaskets and leave horizontal and vertical joints with open reveal.
      (1) Attach routed-and-returned flanges of wall panels to perimeter extrusions with manufacturer's standard fasteners.
      (2) Attach flush wall panels to perimeter extrusions by engaging panel edges and by attaching with manufacturer's standard structural silicone adhesive.
      (3) Install wall panels to allow individual panels to "free float" and be installed and removed without disturbing adjacent panels.
      (4) Do not apply sealants to joints unless otherwise indicated on Drawings.
3.4 ACCESSORY INSTALLATION

3.4.1. General

a. Install accessories with positive anchorage to building and weathertight mounting and provide for thermal expansion. Coordinate installation with flashings and other components.

(1) Install components required for a complete aluminum composite wall panel assembly including trim, copings, corners, seam covers, flashings, fillers, closure strips, and similar items.

b. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.

(1) Install exposed flashing and trim that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof and weather-resistant performance.

(2) Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently weather resistant and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

3.5 ERECTION TOLERANCES

3.6 Installation Tolerances: Shim and align aluminum composite wall panel units within installed tolerance of 1/4 inch in 20 feet, nonaccumulative, on level, plumb, and location lines as indicated and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

3.7 CLEANING

3.7.1. General

a. Remove temporary protective coverings and strippable films, if any, as aluminum composite wall panels are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of aluminum composite wall panel installation, clean finished surfaces as recommended by panel manufacturer. Maintain in a clean condition during construction.

b. After aluminum composite wall panel installation, clear weep holes and drainage channels of obstructions, dirt, and sealant.

c. Replace aluminum composite wall panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION
SECTION 07 46 16
METAL WALL PANELS

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes

a. Factory-formed and field-assembled, concealed-fastener, metal wall panels.
b. Weather-Resistive Barriers

1.2 PERFORMANCE REQUIREMENTS

1.2.1. Thermal Movements

a. Provide metal panel assemblies that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, over stressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

(1) Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

1.3 SUBMITTALS

1.3.1. Product Data

a. For each type of metal panel and accessory indicated.

1.3.2. Shop Drawings

a. Show layouts of metal panels, including plans, elevations, sections, details, and attachments to other work.
b. Include details of edge conditions, joints, panel profiles, corners, anchorages, trim, flashings, closures, and accessories.

1.3.3. Samples

a. For each exposed finish.

1.3.4. Submittal List:

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<thead>
<tr>
<th>Reference</th>
<th>Submittal Item</th>
<th>Quantity</th>
<th>Action</th>
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<tr>
<td>1.3.1</td>
<td>Product Data</td>
<td>X</td>
<td>R</td>
</tr>
</tbody>
</table>
1.3.2 Shop Drawings X R
1.3.3 Samples X R

X Submit quantity specified in Division 1 Section “Submittals.”
R Review each submittal, mark to indicate action taken, and return.

1.4 QUALITY ASSURANCE

Installer Qualifications: An employer of workers trained and approved by manufacturer.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

Basis-of-Design Products: To establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other manufacturers, a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation. Subject to compliance with requirements, provide either the named products or equal products.

2.2 METAL WALL PANELS

2.2.1. Concealed-Fastener, Metal Wall Panels
a. General: Provide factory-formed metal panels designed to be field assembled by lapping and interconnecting side edges of adjacent panels and mechanically attaching through panel to supports using concealed fasteners in side laps. Include accessories required for weathertight installation.
c. Material: Aluminum-zinc alloy-coated steel sheet, 0.032-inch nominal thickness.

(1) Exterior Finish: Two-coat Fluoropolymer.
(2) Color: As indicated on drawing.
(3) Texture: Smooth.

d. Panel Coverage: 16 inches (406 mm).
e. Panel Height: 0.875 inches (22 mm).

2.2.2. Wall Panel Accessories
a. Provide components required for a complete metal wall panel assembly including trim, fasciae, corner units, clips, flashings, sealants, gaskets, fillers, and similar items. Match material and finish of metal wall panels, unless otherwise indicated.
b. Closures: Provide closures at eaves, fabricated of same metal as metal wall panels.

2.3 WEATHER-RESISTIVE BARRIERS

2.3.1. Dupont Tyvek CommercialWrap
2.3.2. Building Wrap: ASTM E1677, Type I air barrier; with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, when tested according to ASTM E 84; UV stabilized; and acceptable to authorities having jurisdiction.

a. Water-Vapor Permeance: Not less than 75 perms per ASTM E 96/E 96M, Desiccant Method (Procedure A).

b. Flame Propagation Test: Materials and construction shall be as tested according to NFPA 285.

c. Building-Wrap Tape: Pressure-sensitive plastic tape recommended by building-wrap manufacturer for sealing joints and penetrations in building wrap.

2.4 FABRICATION

2.4.1. Fabrication and Finishing

a. Fabricate and finish metal panels and accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.

b. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.

c. Where indicated, fabricate metal panel joints with factory-installed captive gaskets or separator strips that provide a tight seal and prevent metal-to-metal contact, in a manner that will minimize noise from movements within panel assembly.

d. Sheet Metal Accessories: Fabricate flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to the design, dimensions, metal, and other characteristics of item indicated.

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

PART 3 - EXECUTION

3.1 EXAMINATION

3.1.1. General

a. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal roof panel supports, and other conditions affecting performance of the Work.

b. Examine roughing-in for components and systems penetrating metal roof panels to verify actual locations of penetrations relative to seam locations of metal roof panels before metal roof panel installation.

c. Proceed with installation only after unsatisfactory conditions have been corrected.
3.2 PREPARATION

3.2.1. Miscellaneous Supports: Install subframing, furring, and other miscellaneous panel support members and anchorages according to ASTM C 754 and metal panel manufacturer’s written recommendations.

3.3 METAL PANEL INSTALLATION

3.3.1. Metal Wall Panels

a. Fasten metal wall panels to supports with fasteners at each lapped joint at location and spacing recommended by manufacturer.

b. Provide sealant tape at lapped joints of metal wall panels and between panels and protruding equipment, vents, and accessories.

c. Apply a continuous ribbon of sealant tape to weather-side surface of fastenings on end laps, and on side laps of nesting-type panels; on side laps of panels; and elsewhere as needed to make panels weatherproof to driving rains. Install metal wall panels in orientation, sizes, and locations indicated on Drawings.

d. Install panels perpendicular to girts and subgirts, unless otherwise indicated. Anchor metal wall panels and other components of the Work securely in place, with provisions for thermal and structural movement.

(1) Field cutting of metal wall panels by torch is not permitted.

(2) Rigidly fasten base end of metal wall panels and allow eave end free movement due to thermal expansion and contraction. Predrill panels.

(3) Install screw fasteners in predrilled holes.

(4) Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.

e. Apply elastomeric sealant continuously between metal base channel (sill angle) and concrete, and elsewhere as indicated or, if not indicated, as necessary for waterproofing.

f. Provide weatherproof escutcheons for pipe and conduit penetrating exterior walls.

3.3.2. Fasteners

a. Use stainless-steel fasteners for surfaces exposed to the exterior and galvanized steel fasteners for surfaces exposed to the interior.

3.3.3. Metal Protection

a. Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by metal roof panel manufacturer.

3.3.4. Joint Sealers

a. Install gaskets, joint fillers, and sealants where indicated and where required for weatherproof performance of metal roof panel assemblies.

b. Prepare joints and apply sealants to comply with requirements in Division 7 Section "Joint Sealants."
3.4 ACCESSORY INSTALLATION
   
   a. Install accessories with positive anchorage to building and weathertight mounting and provide for thermal expansion. Coordinate installation with flashings and other components.
   
   b. Install components required for a complete metal panel assembly including trim, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.
   
   c. Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual.” Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.
   
3.5 CLEANING AND PROTECTION

   Remove temporary protective coverings and strippable films, if any, as metal panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction. After metal wall panel installation, clear weep holes and drainage channels of obstructions, dirt, and sealant.

END OF SECTION
SECTION 07 71 00
ROOF SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes

a. Copings.
b. Roof-edge flashings.
c. Roof-edge drainage systems.
d. Reglets and counterflashings.

1.1.2. Related Sections

a. Division 6 Section "Rough Carpentry" for wood nailers, curbs, and blocking.
b. Section 079200 "Joint Sealants" for field-applied sealants between roof specialties and adjacent materials.

1.2 PERFORMANCE REQUIREMENTS

1.2.1. General Performance

a. Roof specialties shall withstand exposure to weather and resist thermally induced movement without failure, rattling, leaking, or fastener disengagement due to defective manufacture, fabrication, installation, or other defects in construction.
b. SPRI Wind Design Standard: Manufacture and install copings and roof-edge flashings tested according to SPRI ES-1 and capable of resisting the following design pressures:

(1) Refer to Structural Drawings for wind loading design criteria.
c. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, hole elongation, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Provide clips that resist rotation and avoid shear stress as a result of thermal movements. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

(1) Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

1.3 SUBMITTALS

1.3.1. Product Data

(1) For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
1.3.2. Shop Drawings

a. For roof specialties. Include plans, elevations, expansion-joint locations, keyed details, and attachments to other work. Distinguish between plant- and field-assembled work. Include the following:

(1) Details for expansion and contraction; locations of expansion joints, including direction of expansion and contraction.
(2) Pattern of seams and layout of fasteners, cleats, clips, and other attachments.
(3) Details of termination points and assemblies, including fixed points.
(4) Details of special conditions.

1.3.3. Samples for Verification

a. For copings and roof-edge flashings made from 12-inch lengths of full-size components including fasteners, cover joints, accessories, and attachments.

1.3.4. Product Test Reports

a. Based on evaluation of comprehensive tests performed by a qualified testing agency, for copings and roof-edge flashings.

1.3.5. Warranty: Sample of special warranty.

1.3.6. Submittal List

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<td>1.3.5</td>
<td>Warranties</td>
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X Submit quantity specified in Division 1 Section “Submittals.”
R Review each submittal, mark to indicate action taken, and return.
I Submittal is for information or record purposes only. No action will be taken.

1.4 QUALITY ASSURANCE

1.4.1. Mockups

a. Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.

(1) Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups.
(2) Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
1.5 DELIVERY, STORAGE, AND HANDLING

1.5.1. Storage

a. Do not store roof specialties in contact with other materials that might cause staining, denting, or other surface damage. Store roof specialties away from uncured concrete and masonry.

1.5.2. Protection

a. Protect strippable protective covering on roof specialties from exposure to sunlight and high humidity, except to extent necessary for the period of roof specialties installation.

1.6 FIELD CONDITIONS

1.6.1. Field Measurements: Verify profiles and tolerances of roof-specialty substrates by field measurements before fabrication, and indicate measurements on Shop Drawings.

1.6.2. Coordination: Coordinate roof specialties with flashing, trim, and construction of parapets, roof deck, roof and wall panels, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.7 WARRANTY

1.7.1. Special Warranty on Painted Finishes

a. Manufacturer's standard form in which manufacturer agrees to repair finish or replace roof specialties that show evidence of deterioration of factory-applied finishes within specified warranty period.

(1) Fluoropolymer Finish: Deterioration includes, but is not limited to, the following:

   (a) Color fading more than 5 Hunter units when tested according to ASTM D 2244.
   (b) Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
   (c) Cracking, checking, peeling, or failure of paint to adhere to bare metal.

b. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 EXPOSED METALS

2.1.1. Aluminum Sheet

a. ASTM B 209, alloy as standard with manufacturer for finish required, with temper to suit forming operations and performance required.

(1) Surface: Smooth, flat finish.
(2) Exposed Coil-Coated Finishes: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

(a) Two-Coat Fluoropolymer: AAMA 620. System consisting of primer and fluoropolymer color topcoat containing not less than 70 percent PVDF resin by weight.

(b) Concealed Surface: Pretreat with manufacturer’s standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil.

2.2 CONCEALED METALS

2.2.1. Aluminum Extrusions

a. ASTM B 221, alloy and temper recommended by manufacturer for type of use and structural performance indicated, mill finished.

2.2.2. Zinc-Coated (Galvanized) Steel Sheet

a. ASTM A 653/A 653M, G90 coating designation.

2.3 UNDERLAYMENT MATERIALS

Provide underlayment in accordance with roofing-specialty manufacture’s recommendations.

2.4 MISCELLANEOUS MATERIALS

2.4.1. General

a. Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items required by manufacturer for a complete installation.

b. Fasteners: Manufacturer's recommended fasteners, suitable for application and designed to meet performance requirements. Furnish the following unless otherwise indicated:

(1) Fasteners: Series 300 stainless steel screws electrolytically compatible with materials fastened.

c. Elastomeric Sealant: ASTM C 920, elastomeric polymer sealant of type, grade, class, and use classifications required by roofing-specialty manufacturer for each application.

d. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D 1187.

2.4.2. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.

2.5 COPINGS

2.5.1. Copings

a. Manufactured coping system consisting of formed-metal coping cap in section lengths not exceeding 12 feet, concealed anchorage; corner units, end cap units, and concealed splice plates with same finish as coping caps.
(1) Basis-of-Design Products: Subject to compliance with requirements, provide products by Pac-Clad Company.

   (a) Pac-Tite Coping (Tapered).

(2) Coping-Cap Material: Formed aluminum, thickness as required to meet performance requirements.

   (a) Size: As indicated on drawings.
   (b) Finish: Standard Prefinished.
   (c) Color: As indicated on drawings.

(3) Aluminum thickness, minimum:

   (a) Coping width up to 12 inches wide: 0.040 inches thick.
   (b) Coping width over 12 inches wide up to 16 inches wide: 0.050 inches thick.
   (c) Coping width over 16 inches wide up to 24 inches wide: 0.063 inches thick.

(4) Corners: Factory mitered and continuously welded or mechanically clinched and sealed watertight.

(5) Special Fabrications: Radiussed sections with sloped coping cap.

(6) 8-inch wide concealed splice plates with dual non-curling isocryl butyl sealant strips to allow for thermal movement of materials and provide a watertight seal at all joints.

(7) Coping-Cap Attachment Method: Snap-on.

(8) Snap-on-Coping Anchor Plates: Concealed, galvanized-steel sheet, 12 inches wide, with integral cleats.

   (a) 20 gage galvanized steel anchor clips spaced 48 inches o.c. anchored with No. 9 by 1-1/2 stainless steel fasteners.

2.6 ROOF-EDGE FLASHINGS

2.6.1. Roof-Edge Fascia

   a. Manufactured, two-piece, roof-edge fascia consisting of snap-on metal fascia cover in section lengths not exceeding 12 feet and a continuous extruded-aluminum anchor bar with integral drip-edge cleat to engage fascia cover. Provide matching corner units.

(1) Basis-of-Design Products: Subject to compliance with requirements, provide products by Pac-Clad Company.

(2) Pac-Snap Edge Built-up/Modified (BUM)

(3) Fascia Cover: Formed aluminum, thickness as required to meet performance requirements.

   (a) Size: As indicated on drawings.
   (b) Aluminum thickness, minimum: 0.040 inches thick.
   (c) Finish: Standard Prefinished.
   (d) Color: As indicated on drawings.

(4) Corners: Factory mitered and continuously welded or mechanically clinched and sealed watertight.
(5) Splice Plates: 8-inch concealed splice plates.
(6) 22 gage galvanized steel continuous anchor clips. anchored with 1-1/4 galvanized ring shank fasteners.
(7) Special Fabrications: Radiusseed sections.

2.7 ROOF-EDGE DRAINAGE SYSTEMS

2.7.1. Downspouts:
   a. Plain round complete with smooth curved elbows, manufactured from the following exposed metal. Furnish with metal hangers, from same material as downspouts, and anchors.
      (1) Formed Aluminum: 0.040 inch (1.02 mm)
      (2) Finish: as indicated on drawings.

2.7.2. Parapet Scuppers:
   a. Manufactured with closure flange trim to exterior, 4-inch- (100-mm-) wide wall flanges to interior, and base extending 4 inches (100 mm) beyond cant or tapered strip into field of roof.
      (1) Formed Aluminum: 0.032 inch (.81 mm)
      (2) Finish: as indicated on drawings.

2.7.3. Conductor Heads:
   a. Manufactured conductor heads, each with flanged back and stiffened top edge, and of dimensions and shape indicated, complete with outlet tube that nests into upper end of downspout exterior flange trim.
      (1) Formed Aluminum: 0.032 inch (.81 mm)
      (2) Finish: as indicated on drawings.

2.8 GENERAL
   a. Comply with NAAMM’s “Metal Finishes Manual for Architectural and Metal Products” for recommendations for applying and designating finishes.
   b. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
   c. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.9 REGLETS AND COUNTERFLASHINGS

2.9.1. Reglets:
   a. Manufactured units formed to provide secure interlocking of separate reglet and counterflashing pieces, from the following exposed metal:
      (1) Formed Aluminum: 0.024 inch (0.61 mm) thick.
      (2) Corners: Factory mitered and mechanically clinched and sealed watertight.
      (3) Surface-Mounted Type: Provide reglets with slotted holes for fastening to substrate, with neoprene or other suitable weatherproofing washers, and with channel for sealant at top edge.
(4) Concrete Type, Embedded: Provide temporary closure tape to keep reglet free of concrete materials, special fasteners for attaching reglet to concrete forms, and guides to ensure alignment of reglet section ends.
(5) Finish: as indicated on drawings.

2.9.2. Counterflashings:
   a. Manufactured units of heights to overlap top edges of base flashings by 4 inches (100 mm) and in lengths not exceeding 12 feet (3.6 m) designed to snap into reglets or through-wall-flashing receiver and compress against base flashings with joints lapped, from the following exposed metal:
      (1) Formed Aluminum: 0.032 inch (0.81 mm) thick.
      (2) Finish: as indicated on drawings.

2.9.3. Accessories:
   a. Flexible-Flashing Retainer: Provide resilient plastic or rubber accessory to secure flexible flashing in reglet where clearance does not permit use of standard metal counterflashing or where reglet is provided separate from metal counterflashing.

PART 3 - EXECUTION

3.1 EXAMINATION

3.1.1. General
   a. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions, and other conditions affecting performance of the Work.
   b. Examine walls, roof edges, and parapets for suitable conditions for roof specialties.
   c. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
   d. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

3.2.1. General
   a. Install roof specialties according to manufacturer's written instructions. Anchor roof specialties securely in place, with provisions for thermal and structural movement. Use fasteners, solder, protective coatings, separators, sealants, and other miscellaneous items as required to complete roof-specialty systems.

      (1) Install roof specialties level, plumb, true to line and elevation; with limited oil-canning and without warping, jogs in alignment, buckling, or tool marks.
      (2) Provide uniform, neat seams with minimum exposure of solder and sealant.
      (3) Install roof specialties to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before manufacture.
      (4) Torch cutting of roof specialties is not permitted.
      (5) Do not use graphite pencils to mark metal surfaces.

3.2.2. Metal Protection
a. Protect metals against galvanic action by separating dissimilar metals from contact with each 
other or with corrosive substrates by painting contact surfaces with bituminous coating or by 
other permanent separation as recommended by manufacturer.

(1) Coat concealed side of uncoated aluminum roof specialties with bituminous coating where in 
contact with wood, ferrous metal, or cementitious construction.
(2) Underlayment: Where installing metal flashing directly on cementitious or wood substrates, 
install a course of underlayment and cover with a slip sheet.
(3) Bed flanges in thick coat of water cut-off mastic where required by manufacturers of roof 
specialties for waterproof performance.

3.2.3. Expansion Provisions

a. Allow for thermal expansion of exposed roof specialties.

(1) Space movement joints at a maximum of 12 feet with no joints within 18 inches of corners or 
intersections unless otherwise shown on Drawings.
(2) When ambient temperature at time of installation is between 40 and 70 deg F, set joint 
members for 50 percent movement each way. Adjust setting proportionately for installation at 
higher ambient temperatures.

3.2.4. Fastener Sizes

a. Use fasteners of sizes that will penetrate substrate not less than recommended by fastener 
manufacturer to achieve maximum pull-out resistance.

3.2.5. Joint Seal

a. Seal joints with elastomeric sealant as required by roofing-specialty manufacturer.
b. Seal joints as required for watertight construction. Place sealant to be completely concealed in 
joint. Do not install sealants at temperatures below 40 deg F.

3.3 COPING INSTALLATION

3.3.1. General

a. Install cleats, anchor plates, and other anchoring and attachment accessories and devices with 
concealed fasteners.
b. Anchor coping to meet performance requirements.

(1) Interlock face and back leg drip edges of snap-on coping cap into cleated anchor plates 
anchored to substrate at manufacturer's required spacing that meets performance 
requirements.

3.4 ROOF-EDGE FLASHING INSTALLATION

3.4.1. General

a. Install cleats, cants, and other anchoring and attachment accessories and devices with 
concealed fasteners.
b. Anchor roof edgings with manufacturer's required devices, fasteners, and fastener spacing to 
meet performance requirements.
3.5 ROOF-EDGE DRAINAGE-SYSTEM INSTALLATION

a. General: Install components to produce a complete roof-edge drainage system according to manufacturer's written instructions. Coordinate installation of roof perimeter flashing with installation of roof-edge drainage system.

b. Downspouts: Join sections with manufacturer's standard telescoping joints. Provide hangers with fasteners designed to hold downspouts securely to walls and 1 inch (25 mm) away from walls; locate fasteners at top and bottom and at approximately 60 inches (1500 mm) o.c.
   (1) Provide elbows at base of downspouts at grade to direct water away from building.
   (2) Connect downspouts to underground drainage system indicated.

c. Parapet Scuppers: Install scuppers through parapet where indicated. Continuously support scupper, set to correct elevation, and seal flanges to interior wall face, over cants or tapered edge strips, and under roofing membrane.
   (1) Anchor scupper closure trim flange to exterior wall and seal or solder to scupper.
   (2) Loosely lock front edge of scupper with conductor head.

d. Conductor Heads: Anchor securely to wall with elevation of conductor top edge 1 inch (25 mm) below scupper discharge.

3.6 REGLET AND COUNTERFLASHING INSTALLATION

a. General: Coordinate installation of reglets and counterflashings with installation of base flashings.

b. Embedded Reglets: See Section 033000 "Cast-in-Place Concrete" for installation of reglets.

c. Surface-Mounted Reglets: Install reglets to receive flashings where flashing without embedded reglets is indicated on Drawings. Install at height so that inserted counterflashings overlap 4 inches (100 mm) over top edge of base flashings.

d. Counterflashings: Insert counterflashings into reglets or other indicated receivers; ensure that counterflashings overlap 4 inches (100 mm) over top edge of base flashings. Lap counterflashing joints a minimum of 4 inches (100 mm) and bed with butyl sealant. Fit counterflashings tightly to base flashings.

3.7 CLEANING AND PROTECTION

3.7.1. General

a. Clean off excess sealants.

b. Remove temporary protective coverings and strippable films as roof specialties are installed. On completion of installation, clean finished surfaces including removing unused fasteners, metal filings, and pieces of flashing. Maintain roof specialties in a clean condition during construction.

c. Replace roof specialties that have been damaged or that cannot be successfully repaired by finish touchup or similar minor repair procedures.
SECTION 07 75 92

ROOFING REPAIR

PART 1 - GENERAL

1.1 WORK INCLUDES

1.1.1. Base Bid:
   a. Contractor provide modifications to existing warranted multi-ply, gravel surface built-up roofing and modified bitumen flashing system as shown and herein specified.

1.1.2. Remove existing construction:
   (1) Miscellaneous flashings & roof accessories as necessary for roof patching installation.

1.1.3. Install new:
   (1) Miscellaneous curb flashings.
   (2) Miscellaneous roof accessories necessary for roof patching installation.

1.2 QUALITY ASSURANCE

1.2.1. Installer Qualifications
   (1) All roofing work shall be performed by only the roofing contractor permitted by the roofing manufacturer to work on this roof (See 1.8,B).
   (2) The installing contractor shall comply with the manufacturer's requirements to maintain warranty on existing built-up roofing system.

1.3 REFERENCES

1.3.1. Cited standards and the manufacturer's catalog, current at the date of bidding documents, unless otherwise specified, are incorporated herein by reference and govern the work.
   (1) If conflict is discovered between referenced Standards or catalogs and the project specifications, request written clarification from the Contracting Officer or designated representative.
   (2) Do not proceed with the work until receiving such clarification.

1.3.2. Standards:
   (2) Factory Mutual Laboratories (FM).

1.4 SUBMITTALS

1.4.1. Product Data
a. For each type of product indicated.

1.4.2. Roofing Repair Certificates:
  a. For work performed.

1.4.3. Submittal List

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<td>Roof Repair Certificates</td>
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X Submit quantity specified in Division 1 Section “Administrative Requirements.”
R Review each submittal, mark to indicate action taken, and return.
I Submittal is for information or record purposes only. No action will be taken.

1.5 DELIVERY, STORAGE, AND HANDLING

1.5.1. Per roofing manufacture’s recommendations.

1.6 EXISTING CONDITIONS

1.6.1. The existing multi-ply, gravel surface membrane roofing and modified bitumen flashing system is approximately 7 years old and is under warranty.

1.6.2. Existing Substrate:
  (1) Steel bar joist construction spaced at 4'-0" centers supporting a 1½” steel roof deck with 2”, mechanically attached, polyisocyanurate insulation and 1” hot mopped perlite insulation sloping at approximately ¼” per foot from column grid to column grid.
  (2) Total thickness of existing system is approximately 3” with an additional hot mopped perlite tapered saddle system to divert water to existing roof drains.
  (3) Penetrations include various piping and conduit, plumbing vents, supply air fans, exhaust fans and pipe portals.
  (4) Existing roof drains will be reused.

1.6.3. Environmental Conditions:
  (1) Remove existing roofing only in dry weather.
  (2) Install roofing and insulation only in dry weather.
  (3) Comply with manufacturer’s climatic restrictions.

1.6.4. Protection:
  (1) Protect existing and new roof, building surfaces, paving and landscaping from traffic and roofing equipment.
  (2) Restore or replace all work or materials damaged by the roofing operation.
  (3) Remove protection materials upon completion of work.
  (4) Avoid traffic on completed work.

1.6.5. Comply with all regulations imposed by Wright-Patterson AFB at the job site.
1.7 WARRANTY

1.7.1. Contractor: Maintain existing warranty.

1.7.2. The existing roofing system is under warranty from Johns Manville Roofing Corporation.
   (1) All work on warranted J-M roof shall be performed by the original roofing subcontractor:
   (2) Enterprise Roofing & Sheet Metal Company 1021-1025 Irving Avenue Dayton, OH 45419-4138 (937) 298-8664
   (3) Do not perform any demolition or new construction work on any portion of warranted roof system without coordination and written documentation of approval to proceed from Johns Manville Roofing Corporation and Enterprise Roofing & Sheet Metal Company.

PART 2 - PRODUCTS

2.1 MATERIALS

2.1.1. Use materials for roof patching including insulations, mechanical anchors, bitumen, roofing felts, flashings, gravel surfacing materials and other related components manufactured or recommended by John Manville Roofing Corporation and Enterprise Roofing & Sheet Metal Company.

2.1.2. Use only materials and components manufactured or recommended by this manufacturer and subcontractor throughout the project to match original materials currently in place.

PART 3 - EXECUTION

3.1 ENVIRONMENTAL CONDITIONS

3.1.1. Installation during weather conditions other than those permitted in the manufacturer’s specifications must be acknowledged in writing by the manufacturer and specified roofing subcontractor.

3.1.2. Removal and Installation shall be performed during dry weather conditions.

3.2 REMOVE EXISTING CONSTRUCTION

3.2.1. Permanent Removals:
   (1) Remove existing Mechanical equipment, related piping, wiring, boxes, disconnects and pipe portals.
   (2) Remove abandoned equipment curbs.
   (3) Remove abandoned piping and conduit below roof deck as indicated.

3.3 INSPECTION
3.3.1. Examine all existing surfaces and components to remain for inadequate anchorage, foreign material, moisture, unevenness or other conditions which could prevent the best quality and longevity of roofing, flashing and accessory components.

3.3.2. Notify Architect/Engineer of all deficiencies.

3.3.3. Do not proceed with the work until all deficiencies have been corrected to the satisfaction of the roof system manufacturer and the Architect/Engineer.

3.4 PREPARATION

3.4.1. Ensure that all surfaces are clean and dry before starting and during performance of work.

3.4.2. Verify that all work of subcontractors which penetrates the roof deck or requires men and equipment to traverse the roof deck has been completed before proceeding with roof system patching installation.

3.5 INSTALLATION

3.5.1. Permanently patch roof deck with new metal roof deck to match existing at locations where abandoned curbs are removed.

3.5.2. Install the roofing and flashing system and all accessory items in accord with the manufacturer’s printed instructions.

3.6 ADJUST AND CLEAN

3.6.1. Carefully inspect all completed work and correct all defects.

3.6.2. Accompany the manufacturer’s Technical Inspector during inspection and assist with equipment and workmen if necessary to provide access to the roof.

3.6.3. Correct all defects noted during inspection.

3.6.4. Remove from job site and legally dispose of rubbish and debris.

3.6.5. Prevent storage of material or equipment on the completed roof.

3.7 WARRANTY

3.7.1. Submit amended warranty with final close-out documents per requirements set forth in Section 017000.

END OF SECTION
PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Joint sealants for the following applications, including those specified by reference to this Section:
   a. Exterior Joints in Vertical Surfaces and Nontraffic Horizontal Surfaces:
      1) Joints Between Precast Concrete Units: Elastomeric joint sealant ES-S1, match precast concrete coating color.
      2) Perimeter Joints Between Precast Concrete Units and Metal Frames Of Doors and Windows: Elastomeric joint sealant ES-S1, match precast coating concrete color.
   b. Interior Joints in Vertical Surfaces and Nontraffic Horizontal Surfaces:
      1) Joints Between Precast Concrete Units: Elastomeric joint sealant ES-S1, match precast concrete coating color.
      2) Control Joints in Ceramic Tile: Elastomeric joint sealant ES-S2, match grout color.
      3) Joints in Field-Painted Vertical and Overhead Surfaces in Gypsum Board: Latex joint sealant. Match color of paint topcoat.
   c. Interior Joints in Horizontal Traffic Surfaces:
      1) Control Joints in Ceramic Tile Flooring: Elastomeric joint sealant ES-S3, match grout color.

B. Related Sections:

1. Division 03 Section Polished Concrete Floor Finish for filling joints in polished interior floor slabs.
2. Division 08 Section Glazing for glazing sealants.
3. Division 09 Section Gypsum Board for sealing perimeter joints of gypsum board partitions to reduce sound transmission.
1.2 PRECONSTRUCTION TESTING

A. Preconstruction Compatibility and Adhesion Testing:

1. Submit to joint-sealant manufacturers, for testing indicated below, samples of materials that will contact or affect joint sealants.
   a. Adhesion Testing: Use ASTM C 794 to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.
   b. Compatibility Testing: Use ASTM C 1087 to determine sealant compatibility when in contact with glazing and gasket materials.
   c. Submit not fewer than eight pieces of each type of material, including joint substrates, shims, joint-sealant backings, secondary seals, and miscellaneous materials.
   d. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
   e. For materials failing tests, obtain joint-sealant manufacturer's written instructions for corrective measures including use of specially formulated primers.

B. Testing will not be required if joint-sealant manufacturers submit joint preparation data that are based on previous testing of current sealant products for adhesion to, and compatibility with, joint substrates and other materials matching those submitted.

C. Preconstruction Field-Adhesion Testing:

1. Before installing elastomeric sealants, field test their adhesion to Project joint substrates as follows:
   a. Locate test joints where indicated on Project or, if not indicated, as directed by Contracting Officer.
   b. Conduct field tests for each application indicated below:
      1) Each kind of elastomeric sealant and joint substrate indicated.
   c. Notify Contracting Officer seven days in advance of dates and times when test joints will be erected.
   d. Arrange for tests to take place with joint-sealant manufacturer's technical representative present.
      2) For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.
   e. Report whether sealant failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. For sealants that fail adhesively, retest until satisfactory adhesion is obtained.
   f. Evaluation of Preconstruction Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing, in absence of other indications of
noncompliance with requirements, will be considered satisfactory. Do not use sealants that fail to adhere to joint substrates during testing.

1.3 SUBMITTALS

A. Product Data:

1. For each joint-sealant product indicated.

B. Samples for Verification:

1. For each kind and color of joint sealant required, provide Samples with joint sealants in 1/2-inch- wide joints formed between two 6-inch- long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.

C. Preconstruction Compatibility and Adhesion Test Reports:

1. From sealant manufacturer, indicating the following:
   a. Materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.
   b. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.

D. Product Test Reports:

1. Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating that sealants comply with requirements.

E. Preconstruction Field-Adhesion Test Reports:

1. Indicate which sealants and joint preparation methods resulted in optimum adhesion to joint substrates based on testing specified in "Preconstruction Testing" Article.

F. Sealant, Waterproofing, and Restoration Institute (SWRI) Validation Certificate:

1. For each sealant specified to be validated by SWRI's Sealant Validation Program. www.SWRIONLINE.org

G. Submittal List:

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1.4 QUALITY ASSURANCE

A. Source Limitations:

1. Obtain each kind of joint sealant through one source from a single manufacturer.

B. Product Testing:

1. Test joint sealants using a qualified testing agency.
   a. Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.
   b. Test elastomeric joint sealants according to SWRI's Sealant Validation Program for compliance with requirements specified by reference to ASTM C 920, for adhesion and cohesion under cyclic movement, adhesion-in-peel, and indentation hardness.

1.5 PROJECT CONDITIONS

A. General:

1. Do not proceed with installation of joint sealants under the following conditions:
   a. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer.
   b. When joint substrates are wet.
   c. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
   d. Where Contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Products: To establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other manufacturers, a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation. Subject to compliance with requirements, provide either the named products or equal products.
2.2 MATERIALS, GENERAL

A. Compatibility:

1. 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. VOC Content of Interior Sealants:

1. Provide sealants and sealant primers for use inside the weatherproofing system that comply with the following limits for VOC content when calculated according to 40 CFR 59, Part 59, Subpart D (EPA Method 24):
   a. Architectural Sealants: 250 g/L.
   b. Sealant Primers for Nonporous Substrates: 250 g/L.
   c. Sealant Primers for Porous Substrates: 775 g/L

2.3 ELASTOMERIC JOINT SEALANTS

A. Elastomeric Sealants:

1. 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.

B. Stain-Test-Response Characteristics:

1. Where elastomeric sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.

C. Suitability for Contact with Food:

1. Where elastomeric sealants are indicated for joints that will come in repeated contact with food, provide products that comply with 21 CFR 177.2600.

D. ES-S1 Single-Component Nonsag Neutral-Curing Surface Modified Silicone Sealant (Low dirt pick-up):

1. Basis-of-Design Product: Master Builders; MasterSeal NP150 Premium Sealant.
2. Type and Grade: S (single component) and NS (nonsag).
3. Class: 100/50.
4. Use Related to Exposure: NT (nontraffic).

E. ES-S2 Single-Component Mildew-Resistant Acid-Curing Silicone Sealant:

1. Basis-of-Design Product: Dow Corning Corporation; 786 Mildew Resistant.
2. Type and Grade: S (single component) and NS (nonsag).
4. Use Related to Exposure: NT (nontraffic).

F. **ES-S3** Single-Component Neutral-Curing Silicone Sealant:

2. Type and Grade: S (single component) and NS (nonsag).
3. Class: 100/50.
4. Use Related to Exposure: T (traffic).

2.4 **LATEX JOINT SEALANTS**

A. Acrylic Latex or Siliconized Acrylic Latex Sealant:

1. Comply with ASTM C 834, Type OP, Grade NF.

B. Basis-of-Design Products:

1. Bostik Findley; Chem-Calk 600.
4. Tremco; Tremflex 834.

2.5 **JOINT-SEALANT BACKING**

A. General:

1. Provide sealant backings of material 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:

1. ASTM C 1330, Type C (closed-cell material with a surface skin), O (open-cell material), B (bicellular material with a surface skin), or any of the preceding types, as approved in writing by joint-sealant manufacturer for joint application indicated, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance:

C. Bond-Breaker Tape:

1. Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.
2.6 **FOAM COMPRESSION SEALS**

A. Manufacturer's standard preformed continuous foam compression seals to fill voids between refrigerated display cases and adjacent wall surfaces.

B. Basis-of-design product: Armacell LLC, AP/Armaflex, 48-inch wide by 18-foot long by 2-inch thick rolls.

1. Meets requirements for resistance to mold growth (UL181), fungi (ASTM G 21 / C 1338), and bacteria (ASTM G 22).

2. Properties: Permanently elastic, mildew resistant, nonmigratory, nonstaining, and compatible with joint substrates and other joint sealants.

3. Flame spread and smoke developed index: 25/50, ASTM E 84.

4. Density: 3.0 to 6.0 lb/cu. ft.

2.7 **MISCELLANEOUS MATERIALS**

A. Primer:

1. 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:

1. Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.

C. Masking Tape:

1. Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

**PART 3 - EXECUTION**

3.1 **EXAMINATION**

A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 **PREPARATION**

A. Surface Cleaning of Joints:
1. Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:
   
a. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
   
b. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:
   
   1) Concrete.
   2) Masonry.
   3) Unglazed surfaces of ceramic tile.

c. Remove laitance and form-release agents from concrete.

   d. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:
    
   1) Metal.
   2) Glass.
   3) Porcelain enamel.
   4) Glazed surfaces of ceramic tile.

2. Joint Priming: Prime joint substrates, where recommended in writing by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

3. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

A. General:

   1. Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

B. Sealant Installation Standard:

   1. Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
C. Sealant Backings:
   1. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
      a. Do not leave gaps between ends of sealant backings.
      b. Do not stretch, twist, puncture, or tear sealant backings.
      c. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.

D. Bond-Breakers:
   1. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

E. Sealant Installation:
   1. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
      a. Place sealants so they directly contact and fully wet joint substrates.
      b. Completely fill recesses in each joint configuration.
      c. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

F. Tooling of Nonsag Sealants:
   1. Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
      a. Remove excess sealant from surfaces adjacent to joints.
      b. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
      c. Provide concave joint configuration per Figure 8A in ASTM C 1193, unless otherwise indicated.
      d. Provide flush joint configuration where indicated per Figure 8B in ASTM C 1193.
      e. Provide recessed joint configuration of recess depth and at locations indicated per Figure 8C in ASTM C 1193.
         1) Use masking tape to protect surfaces adjacent to recessed tooled joints.

3.4 CLEANING

A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.
3.5 PROTECTION

A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

END OF SECTION
SECTION 08 11 13
HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Standard hollow-metal steel doors.
   2. Standard hollow-metal steel frames.

B. Related Sections:
   1. Division 08 Door Hardware
   2. Division 08 Glazing

1.2 PERFORMANCE REQUIREMENTS

A. The fasteners and anchorage methods used to attach the tested door assembly will be representative of the actual door installation.

1.3 DEFINITIONS

A. Minimum Thickness: Minimum thickness of base metal without coatings.

B. Standard Hollow Metal Work: Hollow metal work fabricated according to ANSI/SDI A250.8, SDI-100 "Recommended Specifications for Standard Steel Doors and Frames" as Published by the Steel Door Institute.

1.4 SUBMITTALS

A. Product Data:
   1. Include construction details, material descriptions, core descriptions, label compliance, fire-resistance rating, and finishes for each type of steel door and frame specified.

B. Shop Drawings:
   1. In addition to requirements below, provide a schedule of standard steel doors and frames using same reference numbers for details and openings as those on Drawings:
   2. Elevations of each door design.
   3. Details of doors, including vertical and horizontal edge details.
   4. Frame details for each frame type, including dimensioned profiles.
   5. Details and locations of reinforcement and preparations for hardware.
   6. Details of each different wall opening condition.
7. Details of anchorages, accessories, joints, and connections.
8. Details of glazing frames and stops showing glazing.
9. Details of conduit and preparations for electrified door hardware and controls.

C. Coordination Drawings:
1. Drawings of each opening, including door and frame, drawn to scale and coordinating door hardware. Show elevations of each door design type, showing dimensions, locations of door hardware, and preparations for power, signal, and electrified control systems.

D. Submittal List:

<table>
<thead>
<tr>
<th>Reference</th>
<th>Submittal Item</th>
<th>Quantity</th>
<th>Action</th>
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<tbody>
<tr>
<td>1.3A</td>
<td>Product Data</td>
<td>X</td>
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<tr>
<td>1.3B</td>
<td>Shop Drawings</td>
<td>X</td>
<td>R</td>
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<tr>
<td>1.3C</td>
<td>Coordination Drawings</td>
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X Submit quantity specified in Division 01 Section Administrative Requirements.
R Review each submittal, mark to indicate action taken, and return.
I Submittal is for information or record purposes only. No action will be taken.

1.5 QUALITY ASSURANCE

A. Installer Qualifications:
1. An employer of workers trained and approved by manufacturer.

B. Source Limitations:
1. Obtain standard steel doors and frames through one source from a single manufacturer.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Delivery:
1. Deliver doors and frames palletized, wrapped, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.
2. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.

B. Storage:
1. Store doors and frames under cover at Project site. Place units in a vertical position with heads up, spaced by blocking, on minimum 4-inch- high wood blocking. Avoid using nonvented plastic or canvas shelters that could create a humidity chamber.
   a. If wrappers on doors become wet, remove cartons immediately. Provide minimum 1/4-inch space between each stacked door to permit air circulation.
1.7 PROJECT CONDITIONS

A. Field Measurements: Verify openings by field measurements before fabrication and indicate measurements on Shop Drawings.

1.8 COORDINATION

A. Coordinate installation of anchorages for standard steel frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in masonry. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cold-Rolled Steel Sheet:
   1. ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.

B. Metallic-Coated Steel Sheet:
   1. ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum A40 zinc-iron-alloy (galvannealed) coating designation.

C. Frame Anchors:
   1. Interior Frame Anchors: ASTM A 591/A 591M, Commercial Steel (CS), 40Z coating designation; mill phosphatized.
      a. Exterior Frame Anchors: Steel sheet complying with ASTM A 1008/A 1008M or ASTM A 1011/A 1011M. After fabricating, hot-dip galvanize units to be built into exterior walls according to ASTM A 153/A 153M, Class B.

D. Inserts, Bolts, and Fasteners:
   1. Provide items to be built into exterior walls, hot-dip galvanized according to ASTM A 153/A 153M.

E. Powder-Actuated Fasteners in Concrete:
   1. Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching standard steel door frames of type indicated.

F. Grout:
   1. Comply with ASTM C 476, with a slump of 4 inches for standard steel door frames built into concrete or masonry, as measured according to ASTM C 143/C 143M.
G. Mineral-Fiber Insulation:

1. ASTM C 665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool with 6- to 12-lb/cu. ft. density; with maximum flame-spread and smoke-developed indexes of 25 and 50 respectively; passing ASTM E 136 for combustion characteristics.

H. Glazing:

1. Comply with requirements in Division 08 Section Glazing.

I. Bituminous Coating:

1. Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.2 STANDARD STEEL DOORS

A. General:

1. Provide doors of design indicated, not less than thickness indicated; fabricated with smooth surfaces, without visible joints or seams on exposed faces unless otherwise indicated. Comply with ANSI/SDI A250.8.

2. Design: Flush panel.

3. Core Construction: Manufacturer's standard core indicated that produces doors complying with ANSI/SDI A250.8.

   a. Thermal-Rated (Insulated) Doors: Where indicated, provide doors fabricated with rigid polyurethane core with thermal-resistance value (R-value) of not less than 12.3 deg F x h x sq. ft./Btu) when tested according to ASTM C 1363.


5. Top and Bottom Edges: Closed with flush or inverted 0.042-inch-thick end closures or channels of same material as face sheets.


B. Exterior Doors:

1. Face sheets fabricated from metallic-coated steel sheet. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical-endurance level:

   a. Level 3 and Physical Performance Level A (Extra Heavy Duty), Model 2 (Seamless) MSG No. 16 gage, (0.053-inch-thick) steel faces.
C. Interior Doors:
   1. Face sheets fabricated from cold-rolled steel sheet. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical-endurance level:
      a. Unless Otherwise Indicated: Level 3 and Physical Performance Level A (Extra Heavy Duty), Model 1 (Full Flush), MSG No. 16, (0.053-inch-thick), uncoated steel faces.
      b. Security Doors Level 4 and Physical Performance Level A (Maximum Duty), Model 1 (Full Flush), MSG No. 14, (0.067-inch-thick) uncoated steel faces.
   3. Metallic-coated steel sheet where interior steel doors are located in cold storage rooms.

D. Hardware Reinforcement:
   1. Fabricate according to ANSI/SDI A250.6 with reinforcement plates from same material as door face sheets

E. Concealed Stiffeners and Hardware Reinforcement:
   1. Fabricate concealed stiffeners and hardware reinforcement from either cold- or hot-rolled steel sheet.

2.3 STANDARD STEEL FRAMES

A. General:
   1. Comply with ANSI/SDI A250.8 and with details indicated for type and profile.
   2. Fabricate frames with mitered or coped corners. Fabricate frames as full profile welded frames.
   3. Fabricate from metallic-coated steel sheet.

B. Exterior Frames:
   1. Frames of MSG No. 14, (0.067-inch-thick) uncoated steel sheet.
   2. Fabricated from metallic-coated steel sheet.

C. Interior Frames:
   1. Frames of MSG No.16, (0.053-inch-thick) uncoated steel sheet, unless otherwise indicated.
   3. Frames for Borrowed Lights: Same as adjacent door frame.
   5. Metallic-coated steel sheet where interior steel frames are located in cold storage rooms.

D. Hardware Reinforcement:
   1. Fabricate according to ANSI/SDI A250.6 with reinforcement plates from same material as frames and to comply with the following:
a. Impact Type Traffic Door Frames: As indicated.

E. Jamb Anchors:

1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, not less than 0.042 inch thick, with corrugated or perforated straps not less than 2 inches wide by 10 inches long. Do not use wire anchors.

2. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch thick.

3. Postinstalled Expansion Type for In-Place Concrete or Masonry: Minimum 3/8-inch-diameter bolts with expansion shields or inserts. Provide pipe spacer from frame to wall, with throat reinforcement plate, welded to frame at each anchor location.

F. Floor Anchors:

1. Formed from same material as frames, not less than 0.042 inch thick, and as follows:

   a. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.
   b. Separate Topping Concrete Slabs: Adjustable-type anchors with extension clips, allowing not less than 2-inch height adjustment. Terminate bottom of frames at finish floor surface.

G. Hardware Reinforcement:

1. Fabricate according to ANSI/SDI A250.6 with reinforcement plates from same material as frames.

H. Ceiling Struts:

1. Minimum 1/4-inch-thick by 1-inch wide steel.

I. Grout Guards:

1. Formed from same material as frames, not less than 0.016-inch thick.

J. Mullions and Transom Bars: Join to adjacent members by welding or rigid mechanical anchors.

2.4 STOPS AND MOLDINGS

A. Moldings for Glazed Lites in Doors:

1. Minimum 0.032 inch thick, fabricated from same material as door face sheet in which they are installed.

B. Fixed Frame Moldings:

1. Formed integral with standard steel frames, minimum 5/8 inch high, unless otherwise indicated.

C. Loose Stops for Glazed Lites in Frames:
1. Minimum 0.032 inch thick, fabricated from same material as frames in which they are installed.

2.5 LOUVERS

A. Interior Doors:

1. Provide louvers where indicated, that comply with SDI 111C, with blades or baffles formed of 0.020-inch thick, cold-rolled steel sheet set into 0.032-inch-thick steel frame.
   a. Sightproof Louver: Stationary louvers constructed with inverted V-shaped or Y-shaped blades.

2.6 FABRICATION

A. General:

1. Fabricate standard steel doors and frames to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.

B. Tolerances:

1. Fabricate hollow metal work to tolerances indicated in SDI 117.

C. Standard Steel Doors:

1. Exterior Doors: Provide weep-hole openings in bottom of exterior doors to permit moisture to escape. Seal joints in top edges of doors against water penetration.
2. Glazed Lites: Factory cut openings in doors.
3. Astragals: Provide overlapping astragal on one leaf of pairs of doors as specified in Division 08 Section Door Hardware where required by NFPA 80 for fire-performance rating or where indicated. Extend minimum ¾ inch beyond edge of door on which astragal is mounted.

D. Standard Steel Frames:

1. Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames. This does not permit knockdown frames or slip-on drywall frames to be substituted for full profile welded frames.
2. Full Profile Welded Frames: Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible.
3. Sidelight and Transom Bar Frames: Provide closed tubular members with no visible face seams or joints; fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.
4. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners, unless otherwise indicated.
5. **Grout Guards:** Weld guards to frame at back of hardware mortises in frames to be grouted.

6. **Floor Anchors:** Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.

7. **Jamb Anchors:** Provide number and spacing of anchors as follows:
   
   a. **Masonry Type:** Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:
      
      1) Two anchors per jamb up to 60 inches in height.
      2) Three anchors per jamb from 60 to 90 inches in height.
      3) Four anchors per jamb from 90 to 120 inches in height.
      4) Four anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof more than 120 inches in height.
   
   b. **Stud-Wall Type:** Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:
      
      1) Three anchors per jamb up to 60 inches in height.
      2) Four anchors per jamb from 60 to 90 inches in height.
      3) Five anchors per jamb from 90 to 96 inches in height.
      4) Five anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof more than 96 inches in height.
      5) Two anchors per head for frames more than 42 inches wide and mounted in metal-stud partitions.
   
   c. **Postinstalled Expansion Type:** Locate anchors not more than 6 inches from top and bottom of frame. Space anchors not more than 26 inches o.c.

8. **Door Silencers:** Except on weather-stripped doors, drill stops to receive door silencers as follows. Keep holes clear during construction.
   
   a. **Single-Door Frames:** Drill stop in strike jamb to receive three door silencers.
   b. **Double-Door Frames:** Drill stop in head jamb to receive two door silencers.

**E. Hardware Preparation:**

1. Factory prepare standard steel doors and frames to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping, according to the Door Hardware Schedule and templates furnished as specified in Division 08 Section Door Hardware.

2. Reinforce doors and frames to receive nontemplated mortised and surface-mounted door hardware.

3. Comply with applicable requirements in ANSI/SDI A250.6 and ANSI/DHI A115 Series specifications for door and frame preparation for hardware. Locate hardware as indicated on Shop Drawings or, if not indicated, according to ANSI/SDI A250.8.

**F. Stops and Moldings:**

1. Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with butted or mitered hairline joints.

2. **Single Glazed Lites:** Provide fixed stops and moldings welded on secure side of door or frame.
3. Multiple Glazed Lites: Provide fixed and removable stops and moldings such that each glazed lite is capable of being removed independently.
4. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames.
5. Provide loose stops and moldings on inside of doors and frames.
6. Coordinate rabbet width between fixed and removable stops with type of glazing and type of installation indicated.

2.7 STEEL FINISHES

A. Factory Priming for Field-Painted Finish:

1. Apply shop primer specified below immediately after surface preparation and pretreatment.
   a. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with ANSI/SDI A250.10 acceptance criteria; recommended by primer manufacturer for substrate; compatible with substrate and field-applied finish paint system indicated; and providing a sound foundation for field-applied topcoats despite prolonged exposure.

PART 3 - EXECUTION

3.1 EXAMINATION

1. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of standard steel doors and frames.
2. Examine roughing-in for embedded and built-in anchors to verify actual locations of standard steel frame connections before frame installation.
3. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Remove Spreaders:

1. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.

B. Adjust and Brace:

1. Prior to installation and with installation spreaders in place, adjust and securely brace standard steel door frames for squareness, alignment, twist, and plumb:

C. Drill and Tap:

1. Drill and tap doors and frames to receive nontemplated mortised and surface-mounted door hardware.
3.3 INSTALLATION

A. General:

1. Provide doors and frames of sizes, thicknesses, and designs indicated. Install standard steel doors and frames plumb, rigid, properly aligned, and securely fastened in place; comply with Drawings and manufacturer's written instructions.

B. Standard Steel Frames:

1. Install standard steel frames for doors, sidelights, transoms, borrowed lights, and other openings, of size and profile indicated. Comply with ANSI/SDI A250.11.

2. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.

   a. Where frames are fabricated in sections due to shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.

   b. At fire-protection-rated openings, install frames according to NFPA 80.

   c. Install frames with removable glazing stops located on secure side of opening.

   d. Install door silencers in frames before grouting.

   e. Remove temporary braces necessary for installation only after frames have been properly set and secured.

   f. Check plumb, squareness, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.

   g. Field Apply bituminous coating to backs of frames that are filled with containing antifreezing agents.

3. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor and secure with postinstalled expansion anchors.

   a. Floor anchors may be set with powder-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.


5. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout.

6. In-Place Masonry Construction: Secure frames in place with postinstalled expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.

7. In-Place Gypsum Board Partitions: Secure frames in place with postinstalled expansion anchors through floor anchors at each jamb. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.

8. Ceiling Struts: Extend struts vertically from top of frame at each jamb to supporting construction above, unless frame is anchored to masonry or to other structural support at each jamb. Bend top of struts to provide flush contact for securing to supporting construction above. Provide adjustable wedged or bolted anchorage to frame jamb members.

9. Installation Tolerances: Adjust standard steel door frames for squareness, alignment, twist, and plumb to the following tolerances:

   a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
d. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.

C. Standard Steel Doors:

1. Fit hollow-metal doors accurately in frames, within clearances specified below. Shim as necessary.
2. Non-Fire-Rated Standard Steel Doors:
   a. Jambs and Head: 1/8 inch plus or minus 1/16 inch.
   b. Between Edges of Pairs of Doors: 1/8 inch plus or minus 1/16 inch.
   c. Between Bottom of Door and Top of Threshold: Maximum 3/8 inch.

3. Fire-Rated Doors: Install doors with clearances according to NFPA 80.

D. Glazing:

1. Comply with installation requirements in Division 08 Section Glazing and with standard steel door and frame manufacturer's written instructions.

3.4 ADJUSTING AND CLEANING

A. Final Adjustments:

1. Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including standard steel doors or frames that are warped, bowed, or otherwise unacceptable.

B. Clean:

1. Remove grout and other bonding material off standard steel doors and frames immediately after installation.

C. Prime-Coat Touchup:

1. Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying primer.

D. Metallic-Coated Surfaces:

1. Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.

END OF SECTION
SECTION 08 14 16
FLUSH WOOD DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Solid-core doors with wood-veneer faces.
2. Factory finishing flush wood doors.
3. Factory machining for hardware.

B. Related Sections include the following:

1. Division 8 Section "Hollow Metal Steel Doors and Frames" for metal door frames.
2. Division 8 Section "Door Hardware".

1.3 SUBMITTALS

A. Product Data: For each type of door. Include details of core and edge construction and trim for openings. Include factory-finishing specifications.

B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; location and extent of hardware blocking; and other pertinent data.

1. Indicate dimensions and locations of mortises and holes for hardware.
2. Indicate dimensions and locations of cutouts.
3. Indicate requirements for veneer matching.
4. Indicate doors to be factory finished and finish requirements.

C. Samples for Verification:

1. Factory finishes applied to actual door face materials, approximately 8 by 10 inches (200 by 250 mm), for each material and finish. For each wood species and transparent finish, provide set of three samples showing typical range of color and grain to be expected in the finished work.
2. Corner sections of doors, approximately 8 by 10 inches (200 by 250 mm), with door faces and edgings representing typical range of color and grain for each species of veneer and solid lumber required. Finish sample with same materials proposed for factory-finished doors.
3. Frames for light openings, 6 inches (150 mm) long, for each material, type, and finish required.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain flush wood doors through one source from a single manufacturer.

B. Quality Standard: Comply with AWI's "Architectural Woodwork Quality Standards Illustrated." Provide AWI Quality Certification Labels or an AWI letter of licensing for Project indicating that doors comply with requirements of grades specified.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Protect doors during transit, storage and handling to prevent damage, soiling, warping and deterioration. Protect doors from direct sunlight. Comply with requirements of referenced standard and manufacturer's written instructions.

B. Package doors individually in cardboard cartons and wrap bundles of doors in plastic sheeting. Separate packing materials in accordance with Waste Management Plan and place in designated areas for recycling.

C. Mark each door on top and bottom rail with opening number used on Shop Drawings.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install doors until building is enclosed, wet work is complete, and HVAC system is operating and will maintain temperature and relative humidity at occupancy levels during the remainder of the construction period.

1.7 WARRANTY

A. General Warranty: Door manufacturer's 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: Manufacturer's standard form, signed by manufacturer, Installer, and Contractor, in which manufacturer agrees to repair or replace doors that are defective in materials or workmanship, have warped (bow, cup, or twist) more than 1/4 inch (6.4 mm) in a 42-by-84-inch (1067-by-2134-mm) section, or show telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch (0.25 mm in a 75-mm) span.

1. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors.
2. Warranty shall be in effect from date of Substantial Completion for the life of the installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Flush Wood Doors:
   a. Algoma Hardwoods Inc.
   b. Eggers Industries; Architectural Door Division.
   c. GRAHAM Manufacturing Corp.
   d. Haley Brothers, Inc.
   e. Lynden Door, Inc.
   f. Vancouver Door Company, Inc.
   g. VT Industries Inc.
   h. Weyerhaeuser Company.
   i. Western Oregon Door, Inc.

2.2 DOOR CONSTRUCTION, GENERAL

A. Doors for Transparent Finish:

1. Grade: Premium, with Grade A faces.
2. Species and Cut: Red oak, plain sliced.
4. Assembly of Veneer Leaves on Door Faces: Balance match.
5. Pair and Set Match: Provide for doors hung in same opening or separated only by mullions.
7. Adhesive: Type I per WDMA T.M.-6.

2.3 SOLID-CORE DOORS

A. Particleboard Cores: Comply with the following requirements:

2. Blocking: Provide wood blocking in particleboard-core doors as follows:
   a. 5-inch (125-mm) top-rail blocking, in doors indicated to have closers.
   b. 5-inch (125-mm) bottom-rail blocking, in doors indicated to have kick, mop, or armor plates.
   c. 5-inch (125-mm) midrail blocking, in doors indicated to have exit devices.

B. Interior Veneer-Faced Doors:
   1. Core: Particleboard.
   2. Construction: Five or seven plies with stiles and rails bonded to core, then entire unit abrasive planed before veneering.

2.4 LIGHT FRAMES

A. Wood Beads for Light Openings in Wood Doors:
   1. Wood Species: Same species as door faces.
   2. Profile: Manufacturer's standard shape.
   3. At 20-minute, fire-rated, wood-core doors, provide wood beads and metal glazing clips approved for such use.

2.5 FABRICATION

A. Factory fit doors to suit frame-opening sizes indicated, with the following uniform clearances and bevels, unless otherwise indicated:

   1. Comply with clearance requirements of referenced quality standard for fitting.

B. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame Shop Drawings, DHI A115-W series standards, and hardware templates.

   1. Coordinate measurements of hardware mortises in metal frames to verify dimensions and alignment before factory machining.

C. Openings: Cut and trim openings through doors to comply with applicable requirements of referenced standards for kind(s) of door(s) required.

   1. Light Openings: Trim openings with moldings of material and profile indicated.

2.6 FACTORY FINISHING

A. General: Comply with AWI's "Architectural Woodwork Quality Standards Illustrated" for factory finishing.

B. Finish doors at factory.
C. Transparent Finish:
   1. Grade: Premium.
   2. Finish: AWI System TR-6 catalyzed polyurethane.
   3. Effect: Open-grain finish.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine doors and installed door frames before hanging doors.
   1. Verify that frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs.
   2. Reject doors with defects.

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

3.2 INSTALLATION

A. Hardware: For installation, see Division 8 Section "Door Hardware."

B. Manufacturer's Written Instructions: Install doors to comply with manufacturer's written instructions, referenced quality standard, and as indicated.

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.

E. Job-Fitted Doors: Align and fit doors in frames with uniform clearances and bevels as indicated below; do not trim stiles and rails in excess of limits set by manufacturer or permitted for fire-rated doors. Machine doors for hardware. Seal edges of doors, edges of cutouts, and mortises after fitting and machining.
   1. Clearances: Provide 1/8 inch (3.2 mm) at heads, jambs, and between pairs of doors. Provide 1/8 inch (3.2 mm) from bottom of door to top of decorative floor finish or covering unless otherwise indicated. Where threshold is shown or scheduled, provide 1/4 inch (6.4 mm) from bottom of door to top of threshold unless otherwise indicated.
      a. Comply with NFPA 80 for fire-rated doors.
   2. Bevel non-fire-rated doors 1/8 inch in 2 inches (3-1/2 degrees) at lock and hinge edges.
   3. Bevel fire-rated doors 1/8 inch in 2 inches (3-1/2 degrees) at lock edge; trim stiles and rails only to extent permitted by labeling agency.

3.3 ADJUSTING
A. Operation: Rehang or replace doors that do not swing or operate freely.

B. Finished Doors: Replace doors that are damaged or do not comply with requirements. Doors may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing.

C. Protect doors as recommended by door manufacturer to ensure that wood doors are without damage or deterioration at the time of Substantial Completion.

END OF SECTION
SECTION 08 38 00
TRAFFIC DOORS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Double action, self-closing, lightweight, solid core, laminate faced, impact resistant doors of the following types:

   a. Single door, non-sealed.

1.2 SUBMITTALS

A. Product Data:

1. Manufacturer's product description, installation and maintenance instructions for each type and size of traffic door.

B. Submittal List:

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<th>Submittal Item</th>
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<td>1.2A</td>
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X Submit quantity specified in Division 01 Section Administrative Requirements.
R Review each submittal, mark to indicate action taken, and return.
I Submittal is for information or record purposes only. No action will be taken.

1.3 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Protect doors during transit, storage and handling to prevent damage, soiling and deterioration. Store products in manufacturers unopened packages until ready for installation. Do not lay flat.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Products: To establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other manufacturers, a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation. Subject to compliance with requirements, provide either the named products or equal products.
2.2 DOOR TYPES AND ACCESSORIES

A. Traffic Doors:

2. Door Body: Exterior surface of decorative high pressure laminate, bonded to a ¾” exterior grade solid wood core both sides; 1” inch total door thickness.
4. Windows: Clear acrylic; 9” x 14”; black rubber molding.
5. Base Plate: Impact resistant 18 ga. S.S. material; 24 inches high; front and back, stainless steel edge trim and top hinge covers.
7. Hinges; Double action, zinc coated.

PART 3 - EXECUTION

3.1 INSPECTION

A. Verify openings are prepared with headers level, jambs plumb, floor level, without projections, and are correctly dimensioned to receive traffic doors. Begin installation of doors only when conditions are satisfactory.

3.2 INSTALLATION

A. General:

1. Install doors, complete with accessories and hardware, in strict accordance with shop drawings and manufacturer's installation instructions.

3.3 ADJUST AND CLEAN

A. General:

1. Follow traffic door manufacturer’s instructions as required to:

   a. Clean and lubricate operating parts.
   b. Adjust to open and close smoothly and freely without binding.

B. Repair and Clean:

1. Repair damage to doors to match manufacturer's original finish; if unable to repair damage, replace doors.
2. Clean surfaces soiled by work as recommended by manufacturer.
3. Leave work area clean and free of debris.

END OF SECTION
SECTION 08 71 00
DOOR HARDWARE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Mechanical door hardware for the following:
      a. Swinging doors.
   2. Cylinders for door hardware specified in other Sections.
   3. Electrified door hardware.

B. Related Sections:
   1. Division 8 Section "Flush Wood Doors" for factory prefitting and factory premachining of doors for door hardware.

1.2 SUBMITTALS

A. Product Data:
   1. Manufacturer's technical product data for each item of door hardware, installation instructions, maintenance of operating parts and finish, and other information necessary to show compliance with requirements.

B. Product Certificates: For locksets, signed by product manufacturer.
   1. Certify that locksets approved for use complies with "Buy American Act."

C. Hardware Schedule:
   1. Door Hardware Sets: Prepared by or under the supervision of Architectural Hardware Consultant. Coordinated with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
   2. Hardware Schedule Content: Based on hardware indicated, organize schedule into "hardware sets" indicating complete designations of every item required for each door or opening. Use same door and hardware set designations as in the Contract Documents. Include the following information:
      a. Type, style, function, size, and finish of each hardware item.
      b. Name and manufacturer of each item.
      c. Fastenings and other pertinent information.
      d. Location of each hardware set cross referenced to indications on Drawings both on floor plans and in door and frame schedule.
e. Explanation of all abbreviations, symbols and codes contained in schedule.
f. Mounting locations for hardware.
g. Door and frame sizes and materials.
h. Door handing and key side.

3. Submittal Sequence: Submit final schedule at earliest possible date particularly where acceptance of hardware schedule must precede fabrication of other work that is critical in the Project construction schedule. Include with schedule the product data, samples, shop drawings of other work affected by door hardware, and other information essential to the coordinated review of schedule.

D. Keying Schedule:

1. Submit separate detailed schedule indicating clearly how the Contracting Officer's final instructions on keying of locks has been fulfilled.

E. Submittal List:

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X Submit quantity specified in Division 01 Section Administrative Requirements.
R Review each submittal, mark to indicate action taken, and return.
I Submittal is for information or record purposes only. No action will be taken.

1.3 QUALITY ASSURANCE

A. Single Source Responsibility:

1. Obtain each type of hardware (latch and lock sets, hinges, closers, etc.) from a single manufacturer.

B. Lockset Manufacturer Qualifications:

1. A recognized architectural door hardware manufacturer that has a record of successful in-service performance for domestically manufacturing locksets similar in quantity, type, and quality to that indicated for this Project and that meets the requirements of the "Buy American Act."

C. Installer Qualifications:

1. An employer of workers trained and approved by lock manufacturer.
2. Installer's responsibilities include supplying and installing door hardware.
3. Installer shall have warehousing facilities in Project's vicinity.
4. Scheduling Responsibility: Preparation of door hardware and keying schedules.
5. Engineering Responsibility: Preparation of data for electrified door hardware, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.
6. Meet with Contracting Officer to finalize keying requirements and to obtain final instructions in writing.

1.4 MAINTENANCE

A. Furnish a complete set of specialized tools and maintenance instructions as needed for Government’s continued adjustment, maintenance and removal and replacement of door hardware.

1.5 COORDINATION

A. Templates:

1. Distribute door hardware templates for doors, frames, and other work specified to be factory prepared for installing door hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

1.6 REGULATORY REQUIREMENTS

A. Accessibility Requirements:

1. Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's "Architectural Barriers Act (ABA) Accessibility Guidelines for Buildings and Facilities" and ICC/ANSI A117.1 as follows:

   a. Provide operating devices that do not require tight grasping, pinching, or twisting of the wrist and that operate with a force of not more than 5 lbf.

   b. Comply with the following maximum opening-force requirements:

      1) Interior, Non-Fire-Rated Hinged Doors: 5 lbf applied perpendicular to door.

   c. Bevel raised thresholds with a slope of not more than 1:2. Provide thresholds not more than 1/2 inch high.

1.7 DELIVERY, STORAGE, AND HANDLING

A. General:

1. Inventory door hardware on receipt and provide secure lock-up for door hardware delivered to Project site.

2. Tag each item or package separately with identification related to the final door hardware sets, and include basic installation instructions, templates, and necessary fasteners with each item or package.

3. Deliver keys and replacement cores to manufacturer of key control system for subsequent delivery to Contracting Officer.
PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following. Submittals for approved substitutions must be received no later than 10 days before bid date. Only requests for substitutions submitted by a distributor firm will be considered. No substitutions will be allowed after bid opening.

1. Hinges:
   a. Bommer Industries, Inc.
   b. Hager Hinge Co.
   c. Ives, Div. Ingersoll-Rand
   d. McKinney Products Co.

2. Locks
   a. Best Access Systems
   b. Falcon Lock, Div. Ingersoll-Rand Door Hardware Group
   c. Arrow Lock, Div. Assa Abloy Group

3. Cylinders
   a. Best Access Systems
   b. Falcon Lock, Div. Ingersoll-Rand Door Hardware Group
   c. Arrow Lock, Div. Assa Abloy Group

4. Bolts
   a. Triangle Brass Manufacturing Company (Trimco)
   b. Ives, Div. Ingersoll-Rand Door Hardware Group
   c. Rockwood Mfg. Company

2.2 MATERIALS AND FABRICATION

A. Manufacturer's Name Plate:

1. Do not use manufacturers' products that have manufacturer's name or trade name displayed in a visible location (omit removable nameplates) except in conjunction with required fire-rated labels and as otherwise acceptable to Contracting Officer.

2. Manufacturer's identification will be permitted on rim of lock cylinders only.

B. Base Metals:

1. Produce hardware units of basic metal and forming method indicated, using manufacturer's standard metal alloy, composition, temper and hardness, but in no case of lesser (commercially recognized) quality than specified for applicable hardware units by applicable ANSI/BHMA A156 series standards for each type of hardware item and with ANSI/BHMA A156.18 for finish designations indicated. Do not furnish "optional" materials or forming methods for those indicated, except as otherwise specified.
C. Fasteners:
   1. Provide hardware manufactured to conform to published templates, generally prepared for machine screw installation. Do not provide hardware that has been prepared for self-tapping sheet metal screws, except as specifically indicated.
   2. Furnish screws for installation with each hardware item. Provide Phillips flat-head screws except as otherwise indicated. Finish exposed (exposed under any condition) screws to match hardware finish, or, if exposed in surfaces of other work, to match finish of this other work as closely as possible including "prepared for paint" surfaces to receive painted finish.
   3. Provide concealed fasteners for hardware units that are exposed when door is closed except to the extent no standard units of type specified are available with concealed fasteners. Do not use thru-bolts for installation where bolt head or nut on opposite face is exposed in other work unless their use is the only means of reinforcing the work adequately to fasten the hardware securely. Where thru-bolts are used as a means of reinforcing the work, provide sleeves for each thru-bolt or use sex screw fasteners.

2.3 HINGES

A. Templates:
   1. Except for hinges to be installed entirely (both leaves) into wood doors and frames, provide only template-produced units.

B. Screws:
   1. Furnish Phillips flat-head screws complying with the following requirements:
      a. For metal doors and frames, install machine screws into drilled and tapped holes.
      b. For wood doors, install wood screws.
      c. Finish screw heads to match surface of hinges or pivots.

C. Hinge Pins:
   1. Except as otherwise indicated, provide hinge pins as follows:
      a. Doors with Locks: Nonremovable pins.
      c. Out-Swing Corridor Doors with Locks: Nonremovable pins.
      d. Interior Doors: Nonrising pins.
      e. Tips: Flat button and matching plug, finished to match leaves.

D. Number of Hinges:
   1. Provide number of hinges indicated but not less than 2 hinges per door leaf for doors 60 inches or less in height and one additional hinge for each 30 inches, or fraction thereof, of additional height.

E. Butts:
   1. 5 knuckle, full mortise hinges with ball bearings conforming to ANSI/BHMA A156.1 and as follows:
a. Exterior Door Hinges: Stainless steel base metal, A5111, 4-1/2 by 4-1/2 by 0.180 inches, with 4 ball bearings.
b. Interior Door Hinges: Cold rolled steel base metal, A8112, 4-1/2 by 4-1/2 by 0.134 inches, with 2 ball bearings.
c. Provide doors greater than 3 feet in width with hinges 5 inches high.
d. Where required to clear trim or permit doors to swing 180 degrees, furnish hinges of sufficient throw.
e. Nylon and oil impregnated bearing hinges shall not be substituted for ball bearing hinges.
f. Ball bearing hinges which are not adequately greased shall be rejected.

2.4 LOCK CYLINDERS AND KEYING

A. General:
1. Provide cylinders for each hardware device requiring cylinder operation. Cylinders and the locks in which they are used shall be functionally compatible.
2. Coordinate preparation of doors receiving cylinders with door manufacturer to assure their compatibility.

B. Cylinders:
1. Equip locks with cylinders that comply with performance requirements for Grade 1 cylinders as listed in ANSI/BHMA A 156.5.
   a. Number of Pins: Seven.
   b. Mortise Type: Threaded cylinders with rings and straight- or clover-type cam.
   c. Rim Type: Cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.
   d. Bored-Lock Type: Cylinders with tailpieces to suit locks.
2. Equip locks with cylinders for interchangeable-core pin tumbler inserts, compatible with Installation’s locking system. Provide temporary inserts for the construction period, and remove these when directed. Provide key control for removal and insertion of cores.
3. Furnish final cores (complete with materials to combine) and keys for installation by Government. After final acceptance and keying, Government will return construction cores to Contractor.
4. Metals: Construct lock cylinder parts from brass or bronze, stainless steel or nickel silver.
5. Furnish replacement cores in the quantity of 10 percent of total locks with interchangeable core pin tumbler inserts.
6. Manufacturers
   a. Best Access Systems
   b. Falcon Lock, Div. Ingersoll-Rand Door Hardware Group
   c. Arrow Lock, Div. Assa Abloy Group

C. Keys and Keying:
1. Installer shall meet with Contracting Officer at Project site to finalize keying requirements and obtain final instructions in writing.
2. Keying System: Factory registered, complying with guidelines in ANSI/BHMA A156.28, Appendix A. Except as otherwise indicated, coordinate the keying system with the Contracting Officer and provide the type required (master, grandmaster or great-grandmaster), either new or integrated with Government’s existing system.
3. Comply with Contracting Officer’s instructions for master keying and, except as otherwise indicated, provide individual change key for each lock that is not designated to be keyed alike with a group of related locks.

   a. Key Type: Verify with Installation if a special key section is required to match existing.

4. Permanently inscribe each key with number of lock that identifies cylinder manufacturer's key symbol, and notation "U.S. GOVERNMENT - DO NOT DUPLICATE."

5. Key Material: Provide keys of nickel silver only.

6. Key Quantity: Furnish 3 change keys for each lock, 5 master keys for each master system, and 5 grandmaster keys for each grandmaster system.

7. Furnish blank keys in the quantity of 10 percent of total locks.

D. Delivery:

1. Deliver keys and replacement cores to Contracting Officer.

2.5 LOCKS, LATCHES, AND BOLTS

A. General:

1. Keyed locks shall conform to general requirements and cylinder requirements specified under "LOCK CYLINDERS AND KEYING."

B. Tactile Warnings on Doors to Hazardous Areas:

1. Provide a textured surface on the door handle, knob, pull, and other operating hardware of doors that lead to areas that might prove dangerous to a blind person, i.e., doors to loading platforms, boiler rooms, mechanical equipment rooms, electrical equipment rooms, and janitor's closets.

C. Strikes:

1. Provide manufacturer's standard wrought box strike for each latch and lock bolt, with curved lip extended to protect frame, finished to match hardware set, unless otherwise indicated.
2. Mortise-type locks and latches for doors 1-3/4 inches thick and over: Provide adjustable bevel fronts or otherwise conform to the shape of the door edge.
3. Provide mortise locks with armored fronts.
4. Provide flat lip strikes for locks with 3-piece, antifriction latchbolts as recommended by manufacturer.
5. Provide recess type top strikes for bolts locking into head frames, unless otherwise indicated.
6. Provide dust-proof strikes for foot bolts, except where special threshold construction provides nonrecessed strike for bolt.

D. Certified Locks & Latches:

1. Mortise type locks shall be listed under Category F in BHMA's "Certified Product Directory."

E. Bored Type:
1. ANSI/BHMA A156.2, Grade 1; Series 4000.
   a. Lock Functions: Function numbers and descriptions indicated in door hardware sets comply with ANSI/BHMA A156.2.

2. Lock Trim:
   a. Levers: Machined from solid brass or bronze.
   b. Escutcheons (Roses): Brass or bronze reinforced with steel liner.

F. Mortise Type: (Exterior Door To Administration)
1. BHMA A156.13; Operational Grade 1; stamped steel case with steel or brass parts; Series 1000.
   a. Lock Functions: Function numbers and descriptions indicated in door hardware sets comply with ANSI/BHMA A156.13.

2. Lever Handle:
   a. Cast lever handle and cast shank. Breakaway feature on lock functions (such as weakened spindle or shear key) to prevent irreparable damage to lock when force in excess of that specified in reference standard is applied to the lever handle. Lever handles shall return to within 1/2 inch of door face.
   b. Standard Lever Design: 15H

G. Latch Guard:
1. Provide stainless steel latchguards appropriate for the type of lock and strike used; concealed, through-bolt fasteners.

2.6 EXIT ALARMS
A. General:
1. Local sound alarm produced by a high decibel horn; armed and disarmed by control key; cylinders as specified under "LOCK CYLINDERS AND KEYING" automatic rearming after authorized use; sign stating "EMERGENCY EXIT/ALARM WILL SOUND"
   a. Battery powered.
   b. Color: Grey
   c. Surface mounted magnetic switch with all wiring concealed within rigid conduit.
   d. Cylinder controlled alarm armed and disarmed by inside mortise cylinder key switch. Conform to general requirements and cylinder requirements specified for LOCK CYLINDERS AND KEYING.
2.7 EXIT DEVICES

A. General:
   1. Conform to ANSI/BHMA A156.3, Grade 1.
   2. Classified by UL as to Accident Hazard for panic protection and shall be listed in UL's Mechanical Equipment Directory.
   3. Cylinder controlled locks: Conform to general requirements and cylinder requirements specified for LOCKS, LATCHES, AND BOLTS.
   4. Mount exit device centerline of strike approximately 40 inches above finished floor.

B. Exit Device:
   1. Type: 6, Concealed vertical rod touch bar device.
   2. Function: 01, Exit only, no trim.
   4. Finish: US28

2.8 PUSH/PULL UNITS

A. General:
   1. Conform to ANSI/BHMA A156.6.
   2. Mount pushes and pulls on centerline of stiles unless otherwise indicated. Where length of push or pull is "by door width", length shall be centerline to centerline of stiles unless otherwise indicated or required to clear door jamb.
      a. Mount push/pull sets back to back.
      b. Locate center of top return of vertical pulls 42 inches above finished floor.

B. Material and Finish:
   1. BHMA 630, satin stainless steel (US 32D).

C. Push and Pull Types:
   1. Type 1: Push/Pull set; J304/J407; 1/8 inch by 4-inch by 16-inch push plate with beveled edges and 3/4 inch round bar by 8-inch center-to-center pull, exposed fasteners.
   2. Type 2: Push/Pull set; push bar J501, 1 inch round bar by door width; pull J402, 90 degree offset, 1 inch round bar by 9 inches center-to-center, concealed fasteners.
   3. Type 3: Pull; J402, 90 degree offset; 1 inch round bar by 9 inches center-to-center.

2.9 CLOSERS

A. General:
   1. Conform to ANSI/BHMA A156.4, Grade 1.
   2. Closers shall be the product of a single manufacturer.
   3. Provide closers with adjustable back check, which becomes effective between 60 and 85 degrees of door opening.
   4. Provide closers without hold-open feature.
   5. Locate closers on pull side of door, except where door swings to exterior or into corridor and as indicated.

B. Size of Units:
1. Except as otherwise specifically indicated, comply with the manufacturer's recommendations for size of door control unit depending upon size of door, exposure to weather, and anticipated frequency of use.
2. Wind conditions and mechanical ventilation systems shall be taken into consideration, and closer size shall be increased accordingly.
3. If, after closers are installed, a larger size is required, provide the larger size.
4. Where parallel arms are indicated for closers, provide closer unit one size larger than recommended for use with standard arms.

C. Overhead Closers:

1. Warranty closers against mechanical defects for a period of 10 years.
2. Modern-Type-with-Cover Surface Closers: Rack-and-pinion hydraulic type; with high strength cast iron cylinders, one piece forged steel pistons, hardened, double heat-treated steel pinions, full-complement bearings, and adjustable sweep and latch speeds controlled by key-operated valves; with forged-steel main arm; enclosed in full plastic covers. Provide specified finish on all parts of closer, including arms, pivots, brackets and fasteners, exposed to view regardless of position of door.
3. Provide closers with fluid complying with ANSI/BHMA A156.4, including cold storage rooms.
4. Overhead closer types:
   a. C02011 surface mounted on pull side, regular arm with closing power adjustment at least 50 percent more than minimum tested value.
   b. C02021 surface mounted on push side, parallel arm with closing power adjustment at least 50 percent more than minimum tested value and spring stop function in soffit shoe set at approximately 90 degrees to 110 degrees.

2.10 DOOR TRIM UNITS

A. General:

1. Provide manufacturer's standard exposed fasteners for door trim units consisting of either machine screws or self-tapping screws.
2. Fabricate protection plates not more than 1-1/2 inches less than door width on pull side and not more than 1/2 inch less than door width on pull side by height indicated.
3. Stainless steel, 0.050 inch thick (U.S. 18 gage).
4. Bevel plate top and 2 sides.
5. Provide kickplates on both sides of door leaf unless otherwise indicated.

B. Types:

1. Kickplate: 12 inches high unless otherwise indicated.

2.11 ASTRAGALS

A. Types:

1. Type 1: Steel, 2 inches wide by 1/8 inch thick minimum, prime coat. Provide overlapping astragal on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated. Extend minimum 3/4 inch beyond edge of door on which astragal is mounted. Paint finish to match doors. Provide with tamperproof fasteners.
a. Reese Enterprises, Inc., 183S.
b. National Guard Products, Inc., 139SP.

2.12 Coordinators:

A. BHMA A156.3; consisting of active-leaf, hold-open lever and inactive-leaf release trigger; fabricated from steel with nylon-coated strike plates; with built-in, adjustable safety release.

2.13 DOOR STOPS

A. General:

1. Conform to ANSI/BHMA A156.8 for overhead stops and ANSI/BHMA A156.16 for floor and wall stops.
2. Provide stops at all doors except where closers with integral stops are indicated or no stops are indicated.
3. Provide wall stops except where floor stops are more appropriate or overhead stops are indicated.
4. Place door stops in such a position that they permit maximum door swing but do not present hazard or obstruction.
5. Provide floor stops with risers at carpeted floors, at undercut doors, and at thresholds, as required for at least 1/2 inch contact with door bottom.
6. Size overhead stops in accordance with manufacturer's printed instructions for each door opening.
7. Set overhead stops for 110 degree opening, unless limited by building construction or equipment.

B. Stop Types:

1. Wall bumper, concave, L02251.
2. Floor stop, dome, L02141 without threshold, L02161 with threshold, or with risers.
3. Overhead surface mounted slide type: Type 2; hold open and release by push and pull of door unless control is set in inactive position; with stop and shock absorber; adjustable holding pressure.

2.14 JAMB, HEAD AND SILL SEALS

A. General:

1. Provide continuous jamb, head and sill seals on exterior doors and on interior doors where indicated or scheduled. Provide noncorrosive fasteners for exterior applications and elsewhere as indicated.
2. Provide only those units where resilient or flexible seal strip is easily replaceable and readily available from stocks maintained by manufacturer.

B. Weatherstripping:

1. ANSI/BHMA 156.22, R3B196; bumper-type resilient insert and metal retainer strips, surface applied to stop, screw fastened, slotted holes for adjustment.
a. Metal and finish: Extruded aluminum with natural anodized finish, 0.062-inch minimum thickness of main walls and flanges.

1) Flexible, hollow bulb or loop insert.

C. Door Bottom Protection:

1. ANSI/BHMA 156.22, R3D536; door bottom consisting of contact-type resilient insert and metal housing, applied to door face, screw fastened, slotted holes for adjustment, as follows:

a. Metal and finish: Extruded aluminum rain drip type sweep retainer with natural anodized finish, 0.062-inch minimum thickness of main walls and flanges.
b. Resilient seal strip: Flexible vinyl wiper or sweep seal strip.

2.15_THRESHOLDS


1. Type 1: J32130, 5 inches wide.
2. Type 2: J36130, 5 inches wide with stop and gasket, 1/2 inch high to top of stop, beveled rise slope no greater than 1:2.

2.16_DOOR HEAD PROTECTION

A. Extruded aluminum drip, 0.59 inch minimum projection, 0.082 inch minimum thickness, applied to frame face, screw fastened.

2.17_DOOR SILENCERS (MUTES)

A. Conform to ANSI/BHMA A156.16. L03011 for metal frames. Provide 3 silencers at strike jamb of single doors and 2 silencers at tops of frames of double doors. Install silencers on all door frames except frames receiving weatherstripping or gaskets.

2.18_HARDWARE FINISHES

A. U.S. and BHMA Finishes:

1. US 26D, satin chromium except hardware exposed to the weather shall be US 32D, satin stainless steel.
2. Provide finishes that match those established by BHMA.
3. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware.
4. The designations used in schedules and elsewhere to indicate hardware finishes are those listed in ANSI/BHMA A156.18, "Materials and Finishes," including coordination with the traditional U.S. finishes shown by certain manufacturers for their products.
2.19 FASTENERS

A. General:

1. Furnish door hardware with necessary screws, bolts and other fasteners of suitable size and type to anchor the hardware in position for long life under hard use.
2. Furnish fastenings where necessary with expansion shields, toggle bolts, sex bolts, and other approved anchors according to material which the hardware is to be applied and instructions of the hardware manufacturer.
3. Fasteners exposed to weather shall be stainless steel, and shall match the finish of the trim.
4. Design: All fastenings shall harmonize with hardware as to material and finish.

2.20 OTHER MATERIALS

A. All other materials, such as brackets, fasteners, back-up plates and other accessories not specifically described but required for a complete operable finish hardware installation, shall be as provided by the Contractor and subject to approval.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Mounting Heights:

1. Mount door hardware units at heights indicated in following applicable publications, unless otherwise specifically indicated or required to comply with governing regulations:
   b. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."

B. General:

1. Install each hardware item in compliance with the manufacturer's instructions and recommendations. Where cutting and fitting is required to install hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation or application of surface protection with finishing work specified in the Division 09 Sections. Do not install surface-mounted items until finishes have been completed on the substrates involved.
2. Set units level, plumb, and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.
3. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors in accordance with industry standards.
4. Install closers, overhead stops, and similar hardware subject to hard use with sex nut and bolt type fastening on wood doors unless doors have been fabricated with wood blocking, plywood or similar substrate to receive screw type fasteners for absolute holding power.
5. Cope metal thresholds neatly to opening frame profiles. Attach thresholds to substrate with No. 10 or larger flat head, countersunk, wood screws. Use lead shield for anchoring
to concrete. Provide fasteners of bronze or stainless steel which will not corrode in contact with the threshold metal; match threshold finish.

6. Set thresholds in a bed of non-shrink, non-metallic, grout or mortar to completely support threshold from deflecting and bending; remove excess grout and mortar.

7. To prevent water infiltration into building at exterior doors, install elastomeric urethane sealant around exterior and interior perimeter of threshold including joint where ends of threshold abut door frame. Provide sealant that is compatible with substrates and is recommended by manufacturer for traffic use. Remove excess sealant.

8. Install jamb and head seals to provide a complete seal against air and moisture, when door is in closed position. Install seals so as not to interfere with latching function of door. Comply with manufacturer's instructions and recommendations to the extent installation requirements are not otherwise indicated.

3.2 ADJUSTING, CLEANING, AND DEMONSTRATING

A. Adjusting:

1. Adjust and check each operating item of hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate freely and smoothly or as intended for the application made.

2. Where door hardware is installed more than one month prior to acceptance or occupancy of a space or area, return to the installation during the week prior to acceptance or occupancy and make final check and adjustment of all hardware items in such space or area. Clean operating items as necessary to restore proper function and finish of hardware and doors. Adjust door control devices to compensate for final operation of heating and ventilating equipment.

B. Cleaning:

1. Clean adjacent surfaces soiled by hardware installation.

C. Demonstrating:

1. Instruct Government's personnel in the proper adjustment and maintenance of door hardware and hardware finishes. Refer to Division 01 Section Demonstration and Training.

3.3 HARDWARE SCHEDULE

A. General:

1. Provide finish hardware in sets according to the following schedule. Unless otherwise modified in the hardware sets, provide hardware as previously specified in this Section. Hardware indicated is for each door leaf in an opening except where a single item serves a pair of doors, and unless additional items are indicated.
HDW SET 1:
Storage Doors
  Buts
  Lockset F86
  Wall Stop
  Kickplate
  Door Silencers

HDW SET 2:
Double-acting Service Doors
  All hardware by door manufacturer

HDW SET 3:
Office Doors
  Buts
  Lockset F82
  Wall Stop
  Kickplate
  Door Silencers

HDW SET 4:
Toilet Room Doors
  Buts
  Push / Pull
  Closer C02011
  Wall Stop
  Kickplate
  Door Silencers

HDW SET 5:
Non-secured Interior Doors
  Buts
  Passage F75
  Wall Stop
  Kickplate
  Door Silencers

HDW SET 6:
Emergency Exit Doors
  Buts
  Exit Device
  Exit Alarm
  Astragal
  Coordinator
  Overhead Stop
  Threshold
  Door Bottom Protection
  Weatherstripping
  Head Drip
HDW SET 7:
Cashier Office Door
Butts
Lockset F82
Closer C02011
Wall Stop
Kickplate
Door Silencers

HDW SET 8:
Secured Office Area Entry Vestibule Door
Butts
Entrance F04
Cylinder
Closer C02021
Wall Stop
Door Silencers

HDW SET 9:
Secured Exterior Office Area Entry Doors
Butts
Entrance F04
Closer C02021
Latch Guard
Floor Stop
Threshold
Door Bottom Protection
Weatherstripping
Head Drip

END OF SECTION
SECTION 08 81 00
GLAZING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Glazing for the following products and applications, including those specified in other Sections where glazing requirements are specified by reference to this Section:

   a. Borrowed lites in interior hollow metal doors.
   b. Glazed Entrance.

B. Related Sections:

   1. Division 08 Hollow Metal Doors and Frames

1.2 DEFINITIONS

A. Manufacturer:

   1. A firm that produces primary glass or fabricated glass as defined in referenced glazing publications.

B. Deterioration of Laminated Glass:

   1. Defects developed from normal use that is 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:

   1. 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:
1. Capable of withstanding tensile and shear stresses imposed by window and door systems without failing adhesively or cohesively.

1.4 SUBMITTALS

A. Product Data:

1. For each glass product and glazing material indicated.

B. Glazing Schedule:

1. Use same designations indicated on Drawings for glazed openings in preparing a schedule listing glass types and thicknesses for each size opening and location.

C. Product Certificates:

1. Signed by manufacturers of glass and glazing products certifying that products furnished comply with requirements.

D. Submittal List:

<table>
<thead>
<tr>
<th>Reference</th>
<th>Submittal Item</th>
<th>Quantity</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.5A</td>
<td>Product Data</td>
<td>X</td>
<td>R</td>
</tr>
<tr>
<td>1.5B</td>
<td>Glazing Schedule</td>
<td>X</td>
<td>R</td>
</tr>
<tr>
<td>1.5C</td>
<td>Product Certificates</td>
<td>X</td>
<td>R</td>
</tr>
</tbody>
</table>

X Submit quantity specified in Division 01 Section Administrative Requirements.
R Review each submittal, mark to indicate action taken, and return.
I Submittal is for information or record purposes only. No action will be taken.

1.5 QUALITY ASSURANCE

A. Source Limitations for Laminated Glass:

1. Obtain laminated-glass units from one manufacturer using the same type of glass lites and interlayers for each type of unit indicated.

B. Source Limitations for Glazing Accessories:

1. Obtain glazing accessories from one source for each product and installation method indicated.

C. Safety Glass:

2. Subject to compliance with requirements, permanently mark safety glass with certification label of Safety Glazing Certification Council or another certification agency acceptable to authorities having jurisdiction.
D. Glazing Publications:

1. 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.


E. Structural-Sealant Glazing: Comply with ASTM C 1401 for design and installation of structural-sealant-glazed doors.

1.6 DELIVERY, STORAGE, AND HANDLING

A. General:

1. Protect glazing materials according to manufacturer's written instructions and as needed to prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

1.7 WARRANTY

A. Manufacturer's Special Warranty for Laminated Glass: Manufacturer agrees to replace laminated-glass units that deteriorate within specified warranty period. Deterioration of laminated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.

1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Products: To establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other manufacturers, a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation. Subject to compliance with requirements, provide either the named products or equal products.
2.2 ANNEALED FLOAT GLASS
A. Annealed Float Glass:
   1. ASTM C 1036, Type I (transparent flat glass), Quality Q3 (glazing select); class indicated.

2.3 HEAT-TREATED FLOAT GLASS
A. Heat-Treated Float Glass:
   1. ASTM C 1048; Type I (transparent flat glass); Quality Q3 (glazing select); class, kind, and condition indicated.

2.4 LAMINATED GLASS
A. Laminated Glass:
   1. Comply with ASTM C 1172 and other requirements specified.

   B. Interlayer:
      1. Interlayer material as indicated below 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.

   C. Laminating Process:
      1. Fabricate laminated glass to meet ASTM C 1172, and complying with testing requirements in 16 CFR 1201 for Category II materials, and with other requirements specified. Use materials that have a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after fabrication and installation:
         a. Laminate lites with polyvinyl butyral interlayer in autoclave with heat plus pressure.

2.5 INSULATING GLASS
A. Insulating-Glass Units:
   1. Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified according to ASTM E 2190, and complying with other requirements specified.

   B. Overall Unit Thickness and Thickness of Each Lite:
      1. Dimensions indicated are nominal and the overall thicknesses of units are measured perpendicularly from outer surfaces of glass lites at unit's edge.

   C. Sealing System:
      1. Dual seal, with primary and secondary sealants as follows:
a. Polyisobutylene and silicone.

D. Spacer Specifications:
1. Manufacturer's standard spacer material and construction complying with the following requirements:
   a. Aluminum with mill or clear-anodized finish.
   b. Desiccant: Molecular sieve or silica gel, or blend of both.
   c. Corner Construction: Manufacturer's standard corner construction.

2.6 ELASTOMERIC GLAZING SEALANTS

A. General:
1. Provide products of type indicated, complying with the following requirements:
   a. 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.
   b. 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.

B. Elastomeric Glazing Sealant Standard:
1. Comply with ASTM C 920 and other requirements indicated for each liquid-applied, chemically curing sealant in the Glazing Sealant Schedule at the end of Part 3, including those referencing ASTM C 920 classifications for type, grade, class, and uses.
   a. Additional Movement Capability: Where additional movement capability is specified in the Glazing Sealant Schedule, provide products with the capability, when tested for adhesion and cohesion under maximum cyclic movement per ASTM C 719, to withstand the specified percentage change in the joint width existing at time of installation and remain in compliance with other requirements in ASTM C 920 for uses indicated.

2.7 GLAZING TAPES

A. Back-Bedding Mastic Glazing Tape:
1. 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.

B. Expanded Cellular Glazing Tape:
1. Closed-cell, PVC foam tape; factory coated with adhesive on both surfaces; packaged on rolls with release liner protecting adhesive; and complying with AAMA 800 for the following types:

a. AAMA 810.1, Type 1, for glazing applications in which tape acts as the primary sealant.
b. AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

2.8 GLAZING GASKETS

A. Dense Compression Gaskets:

1. 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:

a. EPDM, ASTM C 864.
b. Silicone, ASTM C 1115.
c. Thermoplastic polyolefin rubber, ASTM C 1115.
d. Any material indicated above.

B. Soft Compression Gaskets:

1. 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:

a. EPDM.
b. Silicone.
c. Thermoplastic polyolefin rubber.
d. Any material indicated above.

2.9 MISCELLANEOUS GLAZING MATERIALS

A. General:

1. 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:

1. Types recommended by sealant or gasket manufacturer.

C. Setting Blocks:

1. Elastomeric material with a Shore A durometer hardness of 85, plus or minus 5.
D. Spacers:
   1. Elastomeric blocks or continuous extrusions with a Shore A durometer hardness required by glass manufacturer to maintain glass lites in place for installation indicated.

E. Edge Blocks:
   1. Elastomeric material of hardness needed to limit glass lateral movement (side walking).

2.10 FABRICATION OF GLASS AND OTHER GLAZING PRODUCTS

A. General:
   1. Fabricate glass and other glazing products in sizes required to glaze openings indicated for Project, with edge and face clearances, edge and surface conditions, and unless otherwise indicated glass bite complying with written instructions of product manufacturer and referenced glazing standard, to comply with system performance requirements.
      a. Glass shall have a minimum frame bite of 3/8 inch for structurally glazed systems.
      b. Glass shall have a minimum frame bite of 1 inch for systems that are not structurally glazed.
   2. Grind smooth and polish exposed glass edges.

PART 3 - EXECUTION

3.1 EXAMINATION

A. General:
   1. Examine framing glazing, with Installer present, for compliance with the following:
      a. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
      b. Presence and functioning of weep system.
      c. Minimum required face or edge clearances.
   2. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

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

3.3 GLAZING

A. General:
1. 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.

2. 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.

3. 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.

4. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction sealant-substrate testing.

5. 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.

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

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

8. 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.

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

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

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

3.4 TAPE GLAZING

A. General:

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

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

3. Where framing joints are vertical, cover these joints by applying tapes to heads and sills first and then to jambs. Where framing joints are horizontal, cover these joints by applying tapes to jambs and then to heads and sills.

4. 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.
5. Do not remove release paper from tape until just before each glazing unit is installed.
6. 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.

3.5 GASKET GLAZING (DRY)

A. General:

1. Fabricate compression gaskets in lengths recommended by gasket manufacturer to fit openings exactly, with stretch allowance during installation.
2. 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.
3. 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.
4. Install gaskets so they protrude past face of glazing stops.

3.6 PROTECTION AND CLEANING

A. General:

1. Protect 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.
2. 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 them immediately as recommended by glass manufacturer.
3. Remove and replace glass that is broken, chipped, cracked, abraded, or damaged in any way, including natural causes, accidents, and vandalism, during construction period.
4. Wash glass on both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended by glass manufacturer.

3.7 GLASS SCHEDULE

A. Type 1 - Uncoated Clear Insulating Heat-Treated and Laminated Float Glass Unit:

1. Outdoor Lite:
   a. Kind FT (fully tempered).
   b. Condition A (uncoated surfaces).
   c. Type I (transparent flat glass).
   d. Class 1 (clear).
e. Thickness: 1/4 inch.

2. Indoor Lite: Kind LA, consisting of two lites of annealed float glass.
   a. Inner and Outer Laminated Lites:
      1) Type I (transparent flat glass).
      2) Class 1 (clear).
      3) Thickness of each individual ply of glass used in the laminate: Comply with system performance requirements for glass, but not less than 1/8 inch per ply.
   b. Plastic Interlayer: 0.030 inch thick.
      1) Interlayer Color: Clear.

3. Interspace Content: Argon.
4. Interspace: 1/2 inch.

B. Type 2 - Uncoated Clear Laminated Float Glass:

1. Kind LA, consisting of two lites of annealed float glass.
   a. Inner and Outer Laminated Lites:
      1) Type I (transparent flat glass).
      2) Class 1 (clear).
      3) Thickness of each individual ply of glass used in the laminate: Comply with system performance requirements for glass, but not less than 1/8 inch per ply.
   b. Plastic Interlayer: 0.030 inch thick.
      1) Interlayer Color: Clear.

END OF SECTION
SECTION 09 29 00
GYPSUM BOARD ASSEMBLIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Nonload-bearing steel framing members for interior gypsum board assemblies.
   2. Gypsum board assemblies attached to steel framing.

B. Related Sections:
   1. Division 01 Section Sustainable Design Reporting for sealants and recycled content of products.
   2. Division 05 Section Cold-Formed Metal Framing for exterior and interior load-bearing and exterior non-load-bearing wall studs; floor joists; roof rafters and ceiling joists; and roof trusses.

1.2 SUBMITTALS

1. Product Data: For each type of product.

B. Submittal List:
   Reference  Submittal Item  Quantity  Action
   1.2A  Product Data  X  R

X Submit quantity specified in Division 01 Section Administrative Requirements.
R Review each submittal, mark to indicate action taken, and return.
I Submittal is for information or record purposes only. No action will be taken.

1.3 DEFINITIONS

A. Gypsum Board Construction Terminology: Refer to ASTM C 11 and GA-505 for definitions of terms for gypsum board assemblies not defined in this Section or in other referenced standards.
1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in original packages, containers, or bundles bearing brand name and identification of manufacturer or supplier. Store materials inside under cover and keep them dry and protected against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic, and other causes. Neatly stack gypsum panels flat to prevent sagging.

1.5 PROJECT CONDITIONS

A. Environmental Conditions, General:
   1. Establish and maintain environmental conditions for applying and finishing gypsum board to comply with ASTM C 840 requirements or gypsum board manufacturer's recommendations, whichever are more stringent.

B. Room Temperatures:
   1. For nonadhesive attachment of gypsum board to framing, maintain not less than 40º F. Do not exceed 95 deg F when using temporary heat sources.

C. Ventilation:
   1. Ventilate building spaces as required to dry joint treatment materials. Avoid drafts during hot, dry weather to prevent finishing materials from drying too rapidly.

D. Product Condition: Do not install panels that are wet, those that are moisture damaged, and those that are mold damaged.
   1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape
   2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination or discoloration.

PART 2 - PRODUCTS

2.1 FRAMING SYSTEMS

A. Framing Members, General:
   1. Comply with ASTM C 754 for conditions indicated.
      a. Steel Sheet Components: Comply with ASTM C 645 requirements for metal unless otherwise indicated.
      b. Protective Coating: Manufacturer's standard rust-inhibiting coating.

2.2 STEEL FRAMING COMPONENTS FOR SUSPENDED CEILINGS

A. General:
1. Provide components complying with ASTM C 754 for materials and sizes unless otherwise indicated.

B. Wire for Hangers and Ties:
   1. ASTM A 641, Class 1 zinc coating, soft temper.
      a. Wire Hangers: 0.16 inch in diameter.
      b. Tie Wire: 0.062-inch-diameter wire, or double strand of 0.048-inch-diameter wire.

C. Channels:
   1. Cold-rolled steel, 0.053 inch minimum thickness of base (uncoated) metal and 1/2 inch wide flanges, and as follows:
      b. Furring Channels: 3/4 inch deep.

D. Steel Rigid Furring Channels:
   1. ASTM C 645, hat-shaped, depth of 7/8 inch, and minimum thickness of base (uncoated) metal of 0.018 inch.

E. Grid Suspension System for Interior Gypsum Ceilings:
   1. ASTM C 645, manufacturer’s standard direct-hung grid suspension system composed of main beams and cross furring members that interlock.

2.3 STEEL FRAMING FOR WALLS AND PARTITIONS

A. General:
   1. Provide steel framing members complying with the following requirements:
      a. Component Sizes and Spacings: As indicated but not less than that required to comply with ASTM C 754.

B. Steel Studs and Runners:
   1. ASTM C 645.
      a. Minimum Base Metal Thickness: 0.033 inch (20 gage).
      b. Depth: As indicated.

C. Slip-Type Head Joints (Deflection Track):
   1. Where indicated, provide steel sheet top runner manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure above; in thickness not less than indicated for studs and in width to accommodate depth of studs.

D. Fasteners for Metal Framing:
1. Provide fasteners of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel framing to substrates.

2.4 INTERIOR GYPSUM BOARD

A. General:

1. Complying with ASTM C 1396.
2. Provide gypsum board of types indicated in maximum lengths available to minimize end-to-end butt joints.
   a. Thickness: Provide gypsum board in thicknesses indicated or, if not otherwise indicated, in 5/8 inch thicknesses to comply with ASTM C 840 for application system and support spacing indicated.
   b. Long Edges: Tapered unless otherwise indicated.

B. Types:

1. Type X Gypsum Board.
2. Ceiling Type Gypsum Board: Manufactured to have more sag resistance than regular-type gypsum board.
   a. Thickness: 1/2 or 5/8 inch
3. Moisture and Mold-Resistant Gypsum Board
   a. Type X.
   b. Basis-of-Design Product: Georgia-Pacific Gypsum; "ToughRock" or "DensArmor Plus Fireguard "
   c. Thickness: 5/8 inch
4. Glass-Mat Interior Gypsum Board: ASTM C 1658, C1178. With fiberglass mat laminated to both sides. Specifically designed for interior use
   a. Type X
   b. Thickness : 5/8 inch.
   d. Microbial Resistance (ASTM D6329): Will not support microbial growth
   e. Basis-of-Design Product: Georgia-Pacific Gypsum; DensShield.Fireguard Tile Backer.

2.5 TRIM ACCESSORIES

A. Accessories for Interior Installation:

1. Corner beads, edge trim, and control joints complying with ASTM C 1047 and requirements indicated below:

   a. Material: Formed metal, or metal combined with paper, with metal complying with the following requirement:

      1) Sheet steel coated with zinc by hot-dip or electrolytic processes, or with aluminum or rolled zinc.

   b. Shapes indicated below by reference to Fig. 1 designations in ASTM C 1047.
c. Cornerbead on outside corners, unless otherwise indicated.
d. Bullnose bead with flanges formed to receive joint compound. Use rounded cornerbead for vertical corner joints.
e. LC-bead with both face and back flanges; face flange formed to receive joint compound. Use LC-beads for edge trim unless otherwise indicated.
f. L-bead with face flange only; face flange formed to receive joint compound. Use L-bead where indicated.
g. U-bead with face and back flanges; face flange formed to be left without application of joint compound. Use U-bead where indicated.
h. One-piece expansion (control) joint formed with V-shaped slot, with removable strip covering slot opening.

2.6 JOINT TREATMENT MATERIALS

A. General:
   1. Provide joint treatment materials complying with ASTM C 475.

B. Joint Tape for Gypsum Board:
   1. Paper reinforcing tape, unless otherwise indicated.

C. Setting-Type Joint Compounds for Gypsum Board:
   1. Factory-packaged, job-mixed, chemical-hardeninmg powder products formulated for uses indicated.
      a. Where setting-type joint compounds are indicated as a taping compound only or for taping and filling only, use formulation that is compatible with other joint compounds applied over it.
      b. For prefiling gypsum board joints, use formulation recommended by gypsum board manufacturer for this purpose.
      c. For filling joints and treating fasteners of water-resistant gypsum backing board behind base for ceramic tile, use formulation recommended by the gypsum board manufacturer for this purpose.
      d. For topping compound, use sandable formulation.

2.7 MISCELLANEOUS MATERIALS

A. General:
   1. Provide auxiliary materials for gypsum board construction that comply with referenced standards and recommendations of gypsum board manufacturer.

B. Steel Drill Screws:
   1. Complying with ASTM C 1002 for fastening gypsum board to steel members less than 0.033 inch (22 gage) thick.
   2. Complying with ASTM C 954 for fastening gypsum board to steel members from 0.033 to 0.112 inch thick.
C. Isolation Strip at Exterior Walls: Provide one of the following:

1. Asphalt-Saturated Organic Felt: ASTM D 226, Type I (No. 15 asphalt felt), nonperforated.
2. Foam Gasket: Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 1/8 inch thick, in width to suit steel stud size.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates to which gypsum board assemblies attach or abut, installed hollow metal frames, cast-in-anchors, and structural framing, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of assemblies specified in this Section. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Ceiling Anchorages: Coordinate installation of ceiling suspension systems with installation of overhead structural assemblies to ensure that inserts and other provisions for anchorages to building structure have been installed to receive ceiling hangers that will develop their full strength and at spacing required to support ceilings.

3.3 INSTALLING STEEL FRAMING, GENERAL

A. Steel Framing Installation Standard:

1. Install steel framing to comply with ASTM C 754 and with ASTM C 840 requirements that apply to framing installation.
2. Install supplementary framing, blocking, and bracing in gypsum board assemblies to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, wall mounted door stops, and similar construction. Comply with details indicated and with recommendations of gypsum board manufacturer or, if none available, with United States Gypsum Co.'s "Gypsum Construction Handbook."
3. Isolate steel framing from building structure at locations indicated to prevent transfer of loading imposed by structural movement. Comply with details shown on Drawings.

a. Where building structure abuts ceiling perimeter or penetrates ceiling.

b. Where partition framing and wall furring abut structure, except at floor.

1) Install deflection track top runner to attain lateral support and avoid axial loading.

4. Do not bridge building control and expansion joints with steel framing or furring members. Independently frame both sides of joints with framing or furring members as indicated.
3.4 INSTALLING STEEL FRAMING FOR SUSPENDED AND FURRED CEILINGS

A. Suspend ceiling hangers from building structural members and as follows:

1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting 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. Secure wire hangers by looping and wire-tying, either directly to structures or to inserts, eyescrews, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause them to deteriorate or otherwise fail.

4. Do not attach hangers to steel deck tabs.

5. Do not attach hangers to steel roof deck. Attach hangers to structural members.
   a. Do not connect or suspend steel framing from ducts, pipes, or conduit.

6. Sway-brace suspended steel framing with hangers used for support.

7. Install suspended steel framing components in sizes and at spacings indicated, but not less than that required by the referenced steel framing installation standard.
   a. Wire Hangers: 48 inches o.c.
   b. Carrying Channels (Main Runners): 48 inches o.c.
   c. Furring Channels (Furring Members): 16 inches o.c.

8. Installation Tolerances: Install steel framing components for suspended ceilings so that cross-furring or grid suspension members are level to within 1/8 inch in 12 feet as measured both lengthwise on each member and transversely between parallel members.

9. Wire-tie or clip furring members to main runners and to other structural supports as indicated.

10. 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.

3.5 INSTALLING STEEL FRAMING FOR WALLS AND PARTITIONS

A. General:

1. Install runners (tracks) at floors, ceilings, and structural walls and columns where gypsum board stud assemblies abut other construction.
   a. Where studs are installed directly against exterior walls, install asphalt felt strips between studs and wall.

2. Extend partition framing full height to structural supports or substrates above suspended ceilings, except where otherwise indicated. Continue framing over frames for doors and
3. Install steel studs and furring in sizes and at spacings indicated.
   a. Single-Layer Construction: Space studs 16 inches o.c., unless otherwise indicated.

4. Install steel studs so flanges point in the same direction and leading edge or end of each gypsum board panel can be attached to open (unsupported) edges of stud flanges first.

5. Slip-Type Head Joints (Deflection Track): Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.

6. Frame door openings to comply with GA-219, and with applicable published recommendations of gypsum board manufacturer, unless otherwise indicated. Attach vertical studs at jambs with screws either directly to frames or to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.
   a. Install 2 studs at each jamb, unless otherwise indicated.

7. Frame openings other than door openings to comply with details indicated or, if none indicated, as required for door openings. Install framing below sills of openings to match framing required above door heads.

3.6 APPLYING AND FINISHING GYPSUM BOARD, GENERAL

A. Gypsum Board Application and Finishing Standards:

1. Install and finish gypsum panels to comply with ASTM C 840 and GA-216.

2. Install sound-attenuation blankets, where indicated, prior to installing gypsum panels unless blankets are readily installed after panels have been installed on one side.

3. Install ceiling board panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in the central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.

4. Install gypsum panels with face side out. Do not install imperfect, damaged, or damp panels. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.

5. Locate both edge or end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Avoid joints other than control joints at corners of framed openings where possible.

6. Attach gypsum panels to steel studs so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.

7. Attach gypsum panels to framing provided at openings and cutouts.

8. Spot grout hollow metal door frames for solid-core wood doors, hollow metal doors, and doors over 32 inches wide. Apply spot grout at each jamb anchor clip and immediately insert gypsum panels into frames.

9. Form control and expansion joints at locations indicated and as detailed, with space between edges of adjoining gypsum panels, as well as supporting framing behind gypsum panels.
10. Cover both faces of steel stud partition framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases that are braced internally.
   a. Except where concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. in area.
   b. Fit gypsum panels around ducts, pipes, and conduits.
   c. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch-wide joints to install sealant.

11. Isolate perimeter of nonload-bearing gypsum board partitions at structural abutments, except floors. Provide 1/4- to 1/2-inch-wide spaces at these locations and trim edges with U-bead edge trim where edges of gypsum panels are exposed.

12. Space fasteners in gypsum panels according to referenced gypsum board application and finishing standard and manufacturer’s recommendations.

13. Space fasteners in panels that are tile substrates a maximum of 8 inches o.c.

3.7 GYPSUM BOARD APPLICATION METHODS

A. Single-Layer Application:

1. Install gypsum wallboard panels as follows:
   a. On ceilings, apply gypsum panels prior to wall/partition board application to the greatest extent possible and at right angles to framing, unless otherwise indicated.
   b. On partitions/walls, apply gypsum panels vertically (parallel to framing), unless otherwise indicated, and provide panel lengths that will minimize end joints.

B. Wall Tile Substrates:

1. For substrates indicated to receive thin-set ceramic tile and similar rigid applied wall finishes, comply with the following:
   a. Install gypsum wallboard panels with tapered edges taped and finished to produce a flat surface except at locations indicated to receive water-resistant panels.

C. Single-Layer Fastening Methods:

1. Apply gypsum panels to supports as follows:
   a. Fasten with screws.

3.8 INSTALLING TRIM ACCESSORIES

A. General:

1. For trim accessories with back flanges, fasten to framing with the same fasteners used to fasten gypsum board. Otherwise, fasten trim accessories according to accessory manufacturer’s directions for type, length, and spacing of fasteners.
2. Install corner bead at external corners.

3. Install edge trim where edge of gypsum panels would otherwise be exposed. Provide edge trim type with face flange formed to receive joint compound, except where other types are indicated.
   a. Install LC-bead where gypsum panels are tightly abutted to other construction and back flange can be attached to framing or supporting substrate.
   b. Install L-bead where edge trim can only be installed after gypsum panels are installed.
   c. Install U-bead where indicated.

4. Install control joints according to ASTM C 840 and manufacturer's recommendations.

3.9 FINISHING GYPSUM BOARD ASSEMBLIES

A. General:

1. Treat gypsum board joints, interior angles, flanges of corner bead, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration.
2. Prefill open joints, rounded or beveled edges, and damaged areas using setting-type joint compound.
3. Apply joint tape over gypsum board joints, except those with trim accessories having flanges not requiring tape.
4. Levels of Gypsum Board Finish: Provide the following levels of gypsum board finish per GA-214.
   a. Level 1 for ceiling plenum areas and concealed areas, unless a higher level of finish is required for fire-resistance-rated assemblies and sound-rated assemblies.
      1) At joints and angles, embed tape in joint compound. Finish panel surfaces free of excess joint compound, but tool marks and ridges are acceptable.
   b. Level 2 where panels form substrates for tile and where indicated.
      1) At joints and angles, embed tape in joint compound and apply one separate coat of joint compound over tape, fastener heads, and flanges of trim accessories. Joint compound applied on the face of the tape when the tape is embedded is considered a separate coat. Finish panel surfaces free of excess joint compound, but tool marks and ridges are acceptable.
   c. Level 4 for all gypsum board exposed surfaces, unless otherwise indicated.
      1) At joints and angles, embed tape in joint compound and apply three separate coats of joint compound over joints, angles, fastener heads, and flanges of trim accessories. Finish panel surfaces and joint compound smooth and free of tool marks and ridges.

5. Use the following joint compound combination as applicable to the finish levels specified:
   a. Embedding and First Coat: Setting-type joint compound.
b. Fill (Second) Coat: Setting-type joint compound.
c. Finish (Third) Coat: Sandable, setting-type joint compound.

6. For Level 4 gypsum board finish, embed tape in joint compound and apply first, fill (second), and finish (third) coats of joint compound over joints, angles, fastener heads, and accessories. Touch up and sand between coats and after last coat as needed to produce a surface free of visual defects and ready for decoration.

7. Where Level 2 gypsum board finish is indicated, embed tape in joint compound and apply first coat of joint compound.

8. Where Level 1 gypsum board finish is indicated, embed tape in joint compound.


10. Follow manufacturer finish recommendations for glass mat and mold resistant gypsum board which may be a high-hide primer for low gloss paints or a level 5 finish for glossier paints and when surface is illuminated from severe lighting angles.

3.10 CLEANING AND PROTECTION

A. Promptly remove any residual joint compound from adjacent surfaces. Provide final protection and maintain conditions, in a manner acceptable to Installer, that ensure gypsum board assemblies are without damage or deterioration at the time of final acceptance.

END OF SECTION
SECTION 09 30 00

TILING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Glazed wall tile.
   2. Unpolished Porcelain Floor tile.

B. Related Sections:
   1. Division 07 Section Joint Sealants for sealing of expansion, contraction, control, and isolation joints in tile surfaces.

1.2 DEFINITIONS

A. General: Definitions in the ANSI A108 series of tile installation standards and in ANSI A137.1 apply to Work of this Section unless otherwise specified.


C. Module Size: Actual tile size plus joint width indicated.

D. Face Size: Actual tile size, excluding spacer lugs.

1.3 PERFORMANCE REQUIREMENTS

A. Static Coefficient of Friction: For tile installed on walkway surfaces, provide products with the following values as determined by testing identical products per ASTM C 1028
   1. Level Surfaces: Minimum 0.6

1.4 SUBMITTALS

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

B. Samples for Verification:
   1. Sample of actual tile in size to be installed.
2. Actual grout samples in specified colors or in manufacturer standard grout selector for selection and approval.

3. Actual sealant sample in specified color or in manufacturer standard sealant selector for selection and approval.

4. Metal edge strips in 6 inch lengths.

C. Submittal List:

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</tbody>
</table>

X Submit quantity specified in Division 01 Section Administrative Requirements.
R Review each submittal, mark to indicate action taken, and return.
I Submittal is for information or record purposes only. No action will be taken.

1.5 QUALITY ASSURANCE

A. Source Limitations for Tile: Obtain all tile of same type and color or finish from one source or producer.

   1. Obtain tile from same production run and of consistent quality in appearance and physical properties for each contiguous area.

B. Source Limitations for Setting and Grouting Materials: Obtain ingredients of a uniform quality for each mortar, adhesive, and grout component from a single manufacturer and each aggregate from one source or producer.

C. Source Limitations for Other Products: Obtain each of the following products specified in this Section from a single manufacturer for each product:

   1. Joint sealants.
   2. Cementitious backer units.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirement in ANSI A137.1 for labeling sealed tile packages.

B. Store tile and cementitious materials on elevated platforms, under cover, and in a dry location.

C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

D. Store liquid latexes and emulsion adhesives in unopened containers and protected from freezing.
E. Handle tile that has temporary protective coating on exposed surfaces to prevent coated surfaces from contacting backs or edges of other units. If coating does contact bonding surfaces of tile, remove coating from bonding surfaces before setting tile.

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Do not install tile until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated in referenced standards and manufacturer's written instructions.

1.8 EXTRA MATERIALS

A. Furnish extra materials that match and are from same production runs as products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Tile and Trim Units: Furnish quantity of full-size units equal to 2 percent of amount installed, for each type, composition, color, pattern, and size indicated. Extra stock shall be from the same production run as installed materials.

2. Grout: Furnish quantity of grout equal to 3 percent of amount installed for each type, composition, and color indicated.

PART 2 - PRODUCTS

2.1 PRODUCTS, GENERAL

A. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1, "Specifications for Ceramic Tile," for types, compositions, and other characteristics indicated.

1. Provide tile complying with Standard grade requirements, unless otherwise indicated.
2. Provide Vitreous type tile complying with ASTM C373-88 for water absorption in Food Processing areas, whether new or to match or replace existing tiles.

B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI A108.02, ANSI standards referenced in other Part 2 articles, ANSI standards referenced by TCNA installation methods specified in tile installation schedules, and other requirements specified.

C. Factory Blending: For tile exhibiting color variations within ranges selected during Sample submittals, blend tile in factory and package so tile units taken from one package show same range in colors as those taken from other packages and match approved Samples.

D. Mounting: For factory-mounted tile, provide back- or edge-mounted tile assemblies as standard with manufacturer, unless otherwise indicated.

E. Factory-Applied Temporary Protective Coating: Where indicated under tile type, protect exposed surfaces of tile against adherence of mortar and grout by precoating with continuous film of petroleum paraffin wax, applied hot. Do not coat unexposed tile surfaces.
F. Colors, Textures, and Patterns: Where manufacturer's standard products are indicated for tile, grout, and other products requiring selection of colors, surface textures, patterns, and other appearance characteristics, provide specific products or materials complying with the following requirements:

1. As indicated by manufacturer's designations.

2.2 MANUFACTURERS

A. Basis-of-Design Products: To establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other manufacturers, a specific manufacturer's product is named and accompanied by the words "basis of design", including make or model number or other designation. Subject to compliance with requirements, provide either the named products or equal products.

2.3 TILE PRODUCTS

A. Porcelain Floor Tile:
1. See Finish Legend / Schedule on Architectural Drawings for tile description and location.

B. Ceramic Wall and Base Tile:
1. See Finish Legend / Schedule on Architectural Drawings for tile description and location.

2.4 METAL ACCESSORIES

A. Aluminum Corner Trim

B. Aluminum Flooring Transition
1. Schluter Systems: RENO RAMP anodized aluminum profile with textured, sloped exposed surface, tapered leading edge, integrated trapezoid-perforated anchoring leg, and integrated grout joint spacer.
2. Material and Finish: AE - Satin Anodized Aluminum
3. Height: as required
4. Ramp Length: as indicated on drawings

2.5 SETTING MATERIALS

A. Latex-Portland Cement Mortar . ANSI A118.4:
1. Provide prepackaged dry-mortar mix combined with acrylic resin or styrene-butadiene-rubber liquid-latex additive at Project site.
2. For wall applications, provide nonsagging mortar that complies with Paragraph F-4.6.1 in addition to the other requirements in ANSI A118.4.
3. Provide bed depths as recommended by tile manufacturer.
2.6 GROUT MATERIALS

A. Polymer-Modified Tile Grout. ANSI A118.7.

1. Polymer Type: Acrylic resin or styrene-butadiene rubber in liquid-latex form for addition to prepackaged dry-grout mix.
   a. Unsanded grout mixture for joints 1/8 inch and narrower. Color as indicated.
   b. Sanded grout mixture for joints 1/8 inch and wider. Color as indicated.

B. Water-Cleanable Epoxy Grout: ANSI A118.3.

1. Provide product capable of withstanding continuous and intermittent exposure to temperatures of up to 140 deg F and 212 deg F, respectively, and certified by manufacturer for intended use.
2. Use at all food handling and food processing areas where quarry or paver tile is used.

2.7 ELASTOMERIC SEALANTS

A. General: Provide sealants, primers, backer rods, and other sealant accessories that comply with the following requirements and with the applicable requirements in Division 07 Section Joint Sealants.

1. Use sealants that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
2. Use primers, backer rods, and sealant accessories recommended by sealant manufacturer.

B. Colors: Provide colors of exposed sealants to match colors of grout in tile adjoining sealed joints, unless otherwise indicated.

2.8 Crack Isolation Membrane and Tile-Setting Adhesive: One-part, fluid-applied product intended for use as both a crack isolation membrane and tile-setting adhesive in a two-step process.

2.9 MISCELLANEOUS MATERIALS

A. Trowelable Underlayments and Patching Compounds: Latex-modified, portland cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.

B. Temporary Protective Coating: Either product indicated below that is formulated to protect exposed surfaces of tile against adherence of mortar and grout; compatible with tile, mortar, and grout products; and easily removable after grouting is completed without damaging grout or tile.

1. Petroleum paraffin wax, fully refined and odorless, containing at least 0.5 percent oil with a melting point of 120 to 140 deg F per ASTM D 87.
2. Grout release in form of manufacturer's standard proprietary liquid coating that is specially formulated and recommended for use as temporary protective coating for tile.
C. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.

D. Grout Sealer: Manufacturer's standard product for sealing grout joints and that does not change color or appearance of grout.

2.10 MIXING MORTARS AND GROUT

A. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions.

B. Add materials, water, and additives in accurate proportions

C. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of installed tile.

1. Verify that substrates for setting tile are firm, dry, clean, free of coatings that are incompatible with tile-setting materials including curing compounds and other substances that contain soap, wax, oil, or silicone; and comply with flatness tolerances required by ANSI A108.01 for installations.

2. Verify that concrete substrates for tile floors installed with adhesives or thin-set mortar comply with surface finish requirements in ANSI A108.01 for installations indicated.

   a. Verify that surfaces that received a steel trowel finish have been mechanically scarified.
   b. Verify that protrusions, bumps, and ridges have been removed by sanding or grinding.

3. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed before installing tile.

4. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Contracting Officer.

B. Proceed with installation only after correcting unsatisfactory conditions.
3.2 PREPARATION

A. Fill cracks, holes, and depressions in concrete substrates for tile floors installed with adhesives or thin-set mortar with trowelable leveling and patching compound specifically recommended by tile-setting material manufacturer.

B. Where indicated on drawings, provide Waterproof Membrane. Provide per manufacturer recommendations.

C. Blending: For tile exhibiting color variations within ranges selected during Sample submittals, verify that tile has been factory blended and packaged so tile units taken from one package show same range of colors as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

D. Field-Applied Temporary Protective Coating: Where indicated under tile type or needed to prevent grout from staining or adhering to exposed tile surfaces, precoat them with continuous film of temporary protective coating, taking care not to coat unexposed tile surfaces.

3.3 TILE INSTALLATION

A. Comply with TCNA's "Handbook for Ceramic Tile Installation" for TCNA installation methods specified in tile installation schedules. Comply with parts of the ANSI A108 Series "Specifications for Installation of Ceramic Tile" that are referenced in TCA installation methods, specified in tile installation schedules, and apply to types of setting and grouting materials used.

1. For the following installations, follow procedures in the ANSI A108 Series of tile installation standards for providing 95 percent mortar coverage:
   a. Tile floors composed of tiles 8 by 8 inches or larger.
   b. Tile floors composed of rib-backed tiles.

B. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions, unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.

C. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.

D. Jointing Pattern: Lay tile in grid pattern, unless otherwise indicated. Lay out tile work and center tile fields in both directions in each space or on each wall area. Adjust to minimize tile cutting and the use of pieces that are less than half of a tile. Provide uniform joint widths, unless otherwise indicated.

1. For tile mounted in sheets, make joints between tile sheets same width as joints within tile sheets so joints between sheets are not apparent in finished work.
2. Where adjoining tiles on floor, base, walls, or trim are specified or indicated to be same size, align joints.
3. Where tiles are specified or indicated to be whole integer multiples of adjoining tiles on floor, base, walls, or trim, align joints unless otherwise indicated.
E. Joint Widths: Unless otherwise indicated, install tile with the following joint widths:
   1. Minimum width as recommended by tile manufacturer and TCNA

F. Expansion Joints: Provide expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated. Form joints during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.
   1. Unless noted otherwise, locate joints in tile surfaces directly above movement joints in concrete slab.
   2. Prepare joints and apply sealants to comply with requirements in Division 07 Section “Joint Sealants.”
   3. Indicate expansion joints and other sealant filled joints at perimeter of floor tiles where abutting wall base and columns, including control, contraction, and isolation joints, on Drawings.

G. Grout Sealer: Apply grout sealer to cementitious grout joints in tile floors according to grout-sealer manufacturer’s written instructions. As soon as grout sealer has penetrated grout joints, remove excess sealer and sealer from tile faces by wiping with soft cloth.

H. Grouting Standards: Grout tile to comply with requirements of the following tile installation standards:
   1. For ceramic tile grouts (latex-portland cement grouts), comply with ANSI A108.10.

3.4 CLEANING AND PROTECTING

A. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.
   1. Remove latex-portland cement grout residue from tile as soon as possible.
   2. Clean grout smears and haze from tile according to tile and grout manufacturer’s written instructions but no sooner than 10 days after installation. Use only cleaners recommended by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.
   3. Remove temporary protective coating by method recommended by coating manufacturer and that is acceptable to tile and grout manufacturer. Trap and remove coating to prevent drain clogging.

B. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear. If recommended by tile manufacturer, apply coat of neutral protective cleaner to completed tile walls and floors.

C. Prohibit foot and wheel traffic from tiled floors for at least seven days after grouting is completed.

D. Before final inspection, remove protective coverings and rinse neutral protective cleaner from tile surfaces.
3.5  INTERIOR TILE INSTALLATION SCHEDULE

A. Interior Floor Tile Installations, Concrete Subfloor:

1. Tile Installation F113: Thin-set mortar; TCNA F113 and ANSI A108.5.
   a. Tile Type: Unpolished Porcelain Tile.
   b. Thin-Set Mortar: Latex portland cement mortar.

B. Interior Wall Tile Installations, Wood or Metal Studs or Furring:

   a. Tile Type: Ceramic wall tile.
   b. Thin-Set Mortar: Latex- portland cement mortar.
   c. Grout: Polymer-modified grout. Color as indicated.

END OF SECTION 09 30 00
SECTION 09 51 00

ACOUSTICAL PANEL CEILINGS

PART 1 - GENERAL

1.1 SUMMARY
A. Section Includes:
   1. Ceilings composed of acoustical panels and exposed suspension systems.

1.2 PERFORMANCE REQUIREMENTS
A. Seismic Performance:
   1. Acoustical ceiling system shall withstand the effects of earthquake motions determined according to ASCE/SEI 7-05, Chapter 13 as referenced by the International Building Code (IBC), Chapter 16. Specific seismic requirements for suspended ceiling are indicated in ASCE section 13.5.6.

1.3 SUBMITTALS
A. Product Data:
   1. For each type of acoustical panel specified.

B. Samples for Verification: For each component indicated and for each exposed finish required, prepared on Samples of size indicated below.
   1. Acoustical Panel: Set of 6-inch square minimum size Samples of each type, color, pattern, and texture.

C. Maintenance Data
   1. For finishes to include in maintenance manuals.

D. Submittal List:

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X  Submit quantity specified in Division 01 Section Administrative Requirements.
Review each submittal, mark to indicate action taken, and return.
Submittal is for information or record purposes only. No action will be taken.

1.4 QUALITY ASSURANCE

A. Installer Qualifications:
   1. Engage an experienced Installer who has completed acoustical panel ceilings similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.

B. Single-Source Responsibility for Ceiling Units and Suspension System:
   1. Obtain acoustical ceiling panel and suspension system from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying the Work.

C. Fire-Test-Response Characteristics:
   1. Provide acoustical panel ceilings that comply with the following requirements:
      a. Surface-Burning Characteristics: Provide acoustical panels with the following surface-burning characteristics complying with ASTM E 1264 for Class A materials as determined by testing identical products per ASTM E 84:
         1) Smoke-Developed Index: 50 or less for Class A ceiling.

D. Seismic Standard:
   1. Provide acoustical panel ceilings designed and installed to withstand the effects of earthquake motions indicated in Division 01 Section Summary of Work, according to ASCE 7-05, "Minimum Design Loads for Buildings and Other Structures," Section 13, "Seismic Design Requirements for Nonstructural Components."

E. Testing Agency Qualification:
   1. Qualified according to NVLAP for testing indicated.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver acoustical panels and suspension system components to Project site in original, unopened packages and store them in a fully enclosed space where they will be protected against damage from moisture, direct sunlight, surface contamination, and other causes. Before installing acoustical panels, permit them to reach room temperature and a stabilized moisture content. Handle acoustical panels carefully to avoid chipping edges or damaging units in any way.
1.6 PROJECT CONDITIONS

A. Space Enclosure and Environmental Limitations: Do not install acoustical panel ceilings until spaces are enclosed and weatherproof, wet-work in spaces is completed and dry, ambient temperature and humidity conditions are being maintained at the levels indicated for Project when occupied for its intended use, and work above ceilings is complete and accepted by Government.

1.7 COORDINATION

A. Coordinate layout and installation of acoustical panels and suspension system components with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system components (if any), and partition assemblies (if any).

1.8 EXTRA STOCK

A. General:
   1. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

B. Acoustical Ceiling Panels:
   1. Full-size panels equal to 1.0 percent of quantity installed and no less than 2 full panels.

C. Suspension System Components:
   1. Quantity of each exposed component equal to 1.0 percent of quantity installed.

D. Seismic Clips:
   1. Equal to 1.0 percent of amount installed.

1.9 WARRANTY

A. General Warranty:
   1. The special warranties specified in this Article shall not deprive the Government of other rights the Government 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 Acoustical Panel Ceiling System Warranty:
   1. Submit a written warranty executed by acoustical panel ceiling system manufacturer to repair or replace acoustical panel ceiling system that falls within the warranty period. Failures include, but are not limited to:
PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Products: To establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other manufacturers, a specific manufacturer's product is named and accompanied by the words “basis of design,” including make or model number or other designation. Subject to compliance with requirements, provide either the named products or equal products.

2.2 ACOUSTICAL PANELS, GENERAL

A. Acoustical Panel Standard:

1. Provide manufacturer's standard panels of configuration indicated that comply with ASTM E 1264 classifications as designated by types, patterns, acoustical ratings, and light reflectances, unless otherwise indicated.
3. Test Method for Ceiling Attenuation Class (CAC): Where acoustical panel ceilings are specified to have a CAC, provide units identical to those tested per ASTM E 1414 by a qualified testing agency.

B. Acoustical Panel Colors and Patterns:

1. Match appearance characteristics indicated for each product type.

2.3 ACOUSTICAL PANELS

A. See Room Finish Schedule for location of each Acoustical Panel Ceiling (APC) type.

B. APC-1: USG Fissured, No. 562

1. Provide panels complying with ASTM E 1264 and with characteristics described below:

   a. Modular Size: 24 in. x 48 in. x 5/8 in.
b. Core: Wet-formed ceramic and mineral fiber composite.
c. Surface: Scrubbable, factory-applied plastic paint finish.
d. Colors: White.
e. Edge/Joint Detail: Square.
f. Sag resistant.
g. Thickness: Manufacturer’s standard but not less than 5/8”.

C. APC-2 : USG Fissured, No. 560
1. Provide panels complying with ASTM E 1264 and with characteristics described below:
   a. Modular Size: 24 in. x 24 in. x 5/8 in.
   b. Core: Wet-formed ceramic and mineral fiber composite.
   c. Surface: Scrubbable, factory-applied plastic paint finish.
   d. Colors: White.
   e. Edge/Joint Detail: Square.
   f. Sag resistant.
   g. Thickness: Manufacturer’s standard but not less than 5/8”.

D. APC-3 : USG Premier hi-lite panels, No. 7050G
1. Provide panels complying with ASTM E 1264 and with characteristics described below:
   a. Modular Size: 24 in. x 24 in. x 5/8 in.
   b. Core: Wet-formed ceramic and mineral fiber composite.
   c. Surface: Scrubbable, factory-applied plastic paint finish.
   d. Colors: White.
   e. Edge/Joint Detail: Square.
   f. Sag resistant.
   g. Thickness: Manufacturer’s standard but not less than 5/8”.

2.4 METAL SUSPENSION SYSTEMS, GENERAL
A. Metal Suspension-System Standard
1. Provide manufacturer’s standard direct-hung metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable requirements in ASTM C 635.
2. Fire Class A.

B. Attachment Devices:
1. Size for five times design load indicated in ASTM C 635, Table 1, Direct Hung unless otherwise indicated. Comply with seismic design requirements.

C. Wire Hangers, Braces, and Ties:
1. Provide wires complying with the following requirements
a. Zinc-Coated, Carbon-Steel Wire: ASTM A 641, Class 1 zinc coating, soft temper.
b. 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.

2.5 METAL SUSPENSION SYSTEM

A. Wide Aluminum Capped Double-Web Steel Suspension System:

1. Main and cross-runners roll-formed from commercial-quality G-30 hot dipped galvanized steel coating. Exposed surfaces chemically cleansed, capping prefinished galvanized steel in baked polyester. 15/16-inch wide aluminum metal caps on flanges; other characteristics as follows:
   b. Cross Tees: Light gauge steel with rotary stitching to improve column strength and staked-on end detail allowing easy cross tee removal and remounting.
   c. End Condition of Cross-Runners: Override (stepped) or butt-edge type, as standard with manufacturer.

2. Cap Material and Finish: Aluminum sheet with baked polyester painted to match color of panels supported.
3. Capable of withstanding cleaning / disinfecting chemicals at tested in accordance with ASTM D5402.
4. Meets USDA/FSIS requirements for food processing conditions.

2.6 METAL EDGE MOLDINGS AND TRIM

A. Roll-Formed, Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that comply with seismic design requirements; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension-system runners.

1. Provide manufacturer's standard edge moldings that fit acoustical panel edge details and suspension systems indicated and that match width and configuration of exposed runners unless otherwise indicated.
2. For lay-in panels with reveal edge details, provide stepped edge molding that forms reveal of same depth and width as that formed between edge of panel and flange at exposed suspension member.
3. For circular penetrations of ceiling, provide edge moldings fabricated to diameter required to fit penetration exactly.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and structural framing to which acoustical panel ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that
affect ceiling installation and anchorage. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Measure each ceiling area and establish the layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders, and conform to the layout shown on reflected ceiling plans.

3.3 INSTALLATION

A. General:

1. Install acoustical panel ceilings to comply with publications referenced below and per manufacturer's written instructions.

   a. Standard for Ceiling Suspension System Installations: Comply with ASTM C 636 and seismic design requirements indicated according to CISCA's "Ceiling Systems Handbook".

2. Suspend ceiling hangers from building's structural members and as follows:

   a. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of the supporting structure or of the ceiling suspension system.

   b. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.

   c. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with the location of hangers at spacings required to support standard suspension system members, install supplemental suspension members and hangers in the form of trapezes or equivalent devices. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.

   d. Secure wire hangers to ceiling suspension members and to supports above with a minimum of three tight turns. Connect hangers either directly to structures or to inserts, eye screws, or other devices that are secure, that are appropriate for substrate, and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.

   e. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.

   f. Do not attach hangers to steel deck tabs.

   g. Do not attach hangers to steel roof deck. Attach hangers to structural members.

   h. Space hangers not more than 48 inches o.c. along each member supported directly from hangers, unless otherwise shown; and provide hangers not more than 8 inches from ends of each member.

3. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels.
a. Attach moldings to substrate with screws at intervals not over 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.

4. Install suspension system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.

5. Install acoustical panels with undamaged edges and fitted accurately into suspension system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide neat, precise fit.

a. For reveal-edged panels on suspension system runners, install panels with bottom of reveal in firm contact with top surface of runner flanges.

b. Paint the cut panel edges remaining exposed after installation; match color of exposed panel surfaces using coating recommended for this purpose by acoustical panel manufacturer.

3.4 CLEANING

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

END OF SECTION 09 51 00
SECTION 09 65 19
RESILIENT FLOOR TILE

PART 1 - GENERAL

1.1 SUMMARY

1.1.1. Section Includes
   a. Vinyl composition floor tile.
   b. Solid vinyl floor tile.
   c. Resilient wall base.
   d. Aluminum and vinyl flooring transitions.

1.1.2. Related Sections

1.2 SUBMITTALS

1.2.1. Product Data
   a. For each type of product indicated.

1.2.2. Samples for Verification
   a. Full-size units of each color and pattern of resilient floor tile required.
      (1) Resilient Wall Base and Accessories: Manufacturer’s standard-size Samples, but not less than
          12 inches long, of each resilient product color and pattern required.

1.2.3. Maintenance Data
   a. For resilient products to include in maintenance manuals.

1.2.4. Moisture/Bond Tests
   a. Submit moisture/bond tests prior to installation of resilient tile.

1.2.5. Submittals:
   a. Product Data for adhesives, including printed statement of VOC content.

1.2.6. Submittal List

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<td>Moisture/Bond Tests</td>
<td>X</td>
<td>I</td>
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</table>
1.3 QUALITY ASSURANCE

1.3.1. Installer Qualifications: A qualified installer who employs workers for this Project who are competent in techniques required by manufacturer for floor tile installation indicated.

1.3.2. Fire-Test-Response Characteristics

  a. As determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.

    (1) Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

1.4 DELIVERY, STORAGE, AND HANDLING

Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 degree F or more than 90 degree F. Store tiles on flat surfaces.

1.5 PROJECT CONDITIONS

1.5.1. General

  a. Maintain temperatures within range recommended by manufacturer, but not less than 70 degree F or more than 95 degree 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 degree F or more than 95 degree F.

  c. Close spaces to traffic during floor covering installation.

  d. Close spaces to traffic for 48 hours after floor covering installation.

  e. Install resilient products after other finishing operations, including painting, have been completed.

1.6 EXTRA MATERIALS

1.6.1. General

  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. Furnish extra materials from the same production run as installed materials.

    (1) Provide one box of flooring and 10 lineal feet of base materials of each material specified.
PART 2 - PRODUCTS

Basis-of-Design Products: To establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other manufacturers, a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation. Subject to compliance with requirements, provide either the named products or equal products.

2.1 COLORS AND PATTERNS

Colors and Patterns: As indicated by manufacturer's designations and drawing notes.

2.2 VINYL COMPOSITION FLOOR TILE

2.2.1. Floor Tile

a. ASTM F 1066.
b. Class: As indicated by product designations.
c. Wearing Surface: As indicated.
d. Thickness: 0.125 inch.
e. Size: as indicated in documents.

2.2.2. Basis-of-Design Product

a. As indicated in documents.

2.3 SOLID VINYL FLOOR TILE

2.3.1. Floor Tile

a. ASTM F 1700.
b. Class: As indicated by product designations.
c. Wearing Surface: As indicated.
d. Thickness: As indicated by product designations.
e. Size: as indicated in documents.

2.3.2. Basis-of-Design Product

a. As indicated in documents.

2.4 RESILIENT WALL BASE

2.4.1. Wall Base

a. ASTM F 1861.
b. Type (Material Requirement): TP (rubber, thermoplastic).
c. Group (Manufacturing Method): I (solid, homogeneous) or II (layered).
d. Style:
(1) Cove with top-set toe at resilient tile flooring and where indicated.  
(2) Straight (no toe) at carpet and where indicated.

e. Minimum Thickness: 0.125 inch.  
f. Height: 4 inches, typical; 6" where indicated.  
g. Lengths: Coils in manufacturer’s standard length.  
h. Corners: Premolded.  
i. Surface: Smooth.

2.4.2. Basis-of-Design Product

a. Johnsonite; Traditional Rubber Base.

2.5 ALUMINUM AND VINYL FLOORING TRANSITIONS

2.5.1. Vinyl Flooring Molding Accessory

a. Description: Reducer strip for resilient flooring to concrete.  
b. Material: Vinyl; color coordinate with resilient flooring.  
c. Profile and Dimensions: Tapered edge, thickness matching resilient flooring, and width not less than one inch.

2.5.2. Carpet Molding Accessory

a. Description: Edge guard for glue-down carpet to concrete.  
b. Material: Extruded or molded heavy-duty vinyl; color coordinate with carpet or as indicated.  
c. Profile and Dimensions: Tapered or bull nose edge with undercut appropriate for carpet thickness. 2 inches wide, minimum, anchorage flange.

2.5.3. Accessibility for the Disabled

a. Provide edge, transition, and other flooring accessory materials that comply with accessibility requirements of authorities having jurisdiction.

2.5.4. Aluminum Flooring Transition

a. Schluter Systems: RENO RAMP anodized aluminum profile with textured, sloped exposed surface, tapered leading edge, integrated trapezoid-perforated anchoring leg, and integrated grout joint spacer.  
b. Material and Finish: AE - Satin Anodized Aluminum  
c. Height: as indicated – to match height of finish flooring.  
d. Ramp Length: manufacturer standard to coordinate with ramp height, and no shorter than required to meet accessibility standards.

2.6 INSTALLATION MATERIALS

2.6.1. General

a. Basis-of-Design Products: Provide either the named products or products provided or approved by resilient tile flooring manufacturer for applications indicated.
2.6.2. Concrete Sealer
   a. Material recommended by resilient tile flooring manufacturer where required to ensure adhesion of resilient tile to concrete substrates, as determined from preconstruction resilient-tile-concrete-substrate tests and field tests.

2.6.3. Concrete Primer

2.6.4. Trowelable Leveling and Patching Compounds
   a. For repairing substrates and ramping:
   b. For flash patching and skim coating:
   c. Do not use gypsum-based formulations.

2.6.5. Adhesives (Cements):

PART 3 - EXECUTION

3.1 EXAMINATION

3.1.1. General
   a. Examine substrates, with Installer present, for compliance with requirements for installation tolerances, moisture content, and other conditions affecting performance.
      (1) Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.
      (2) Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

3.2.1. General
   a. Prepare substrates according to manufacturer's written recommendations to ensure adhesion of resilient products.
3.2.2. Concrete Substrates

a. Prepare according to ASTM F 710 and as follows:

1. Review prospective floor covering manufacturer’s recommendations for slab preparation. Identify requirements of levelness, texture, water vapor transmission limits and similar criteria and compare against the found condition of the subject slab.

2. Remove dust, solvent, paint, wax, oil, grease, residual adhesive, adhesive removers, curing, sealing, hardening, or parting compounds, alkaline salts, excessive carbonation or laitance, mold mildew, and other foreign materials that might prevent adhesive bond.

3. 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.

4. 48 hours, minimum, before testing substrate for moisture, bead-blast surfaces with an apparatus that abrasives the concrete surface, contains the dispensed beads within the apparatus, and re-circulates the beads by vacuum pickup. Acid etching, mechanical sanding, or mechanical scarification will not be accepted.

   a. Bead-blast concrete surfaces where existing resilient flooring has been removed.
   b. Bead-blast concrete surfaces where new resilient flooring is required.

5. Moisture Testing:

   a. Perform anhydrous calcium chloride test, ASTM F 1869, or other test methods acceptable to the resilient flooring manufacturer. Proceed with installation of resilient flooring only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.

   b. Prepare 3 test sites for the first 1,000 sq. ft. and include 1 more test for each additional 1,000 sq. ft. area.

   c. Proceed with installation only after substrates pass testing.

6. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer only after shot-blasting of surfaces has been completed. Proceed with installation only after substrates pass testing.

3.2.3. Concrete Sealing

a. Seal concrete substrates, where recommended in writing by resilient tile flooring manufacturer, based on preconstruction resilient-tile-concrete-substrate tests or prior experience. Apply sealer to comply with resilient tile manufacturer’s written instructions.

1. Contract completion time will not be extended due to time interval between sealer application and flooring installation.

3.2.4. Leveling And Patching

a. Use trowelable leveling and patching compound to fill cracks, holes, and depressions in substrates.

1. Fill and smooth surface cracks, grooves, depressions, control joints and other non-moving joints, and other irregularities with latex patching or underlayment compound recommended by the resilient flooring manufacturer.

3.2.5. Material Preconditioning
a. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.
b. Do not install resilient products until they are same temperature as space where they are to be installed.

3.2.6. Substrate Preparation

a. 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.

3.3 TILE INSTALLATION

3.3.1. General

a. Lay out tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.

(1) Lay tiles square with room axis.

b. Match tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles.

(1) **LAY TILES WITH GRAIN RUNNING IN ONE DIRECTION, IN PATTERN OF COLORS AND SIZES INDICATED, AND WITH JOINTS IN STRAIGHT LINE** – unless noted otherwise.

c. Scribe, cut, and fit tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, edgings, door frames, thresholds, and nosings.

(1) Where a visible gap occurs between joints of vertical surfaces and edge of resilient flooring, install clear elastomeric joint sealant ES-3 as specified in Division 7 Section “Joint Sealants” to form a waterproof seal.

d. Extend tiles into toe spaces, door reveals, closets, and similar openings, run flooring full under checkstands, shelving, and display cases.

e. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor tiles as marked on substrates. Use chalk or other nonpermanent, nonstaining marking device.

f. Install tiles on covers for telephone and electrical ducts and similar items in finished floor areas. Maintain overall continuity of color and pattern with pieces of tile installed on covers. Tightly adhere tile edges to substrates that abut covers and to cover perimeters.

g. Adhere tiles to flooring substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

h. Hand roll tiles immediately after installation according to tile manufacturer's written instructions, except if rolling is not required for products specified.

3.4 RESILIENT WALL BASE INSTALLATION
3.4.1. General

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.

3.5 RESILIENT ACCESSORY INSTALLATION

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. Install expansion joint insert strip in isolation joints around columns in slabs on grade to allow movement of tile below cap and keep tile from cracking; miter corners.

3.6 METAL ACCESSORY INSTALLATION

Install transition edge strips at edges of flooring as indicated. Anchor edge strips with No. 10 or larger flat head, countersunk, machine screws (MS) at spacings not to exceed 12 inches. Use lead shield for anchoring to concrete.

3.7 CLEANING AND PROTECTION

3.7.1. General

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.

   (1) Floor Polish: Remove soil, visible adhesive, and surface blemishes from floor tile surfaces before applying liquid floor polish.

   (a) Apply two coats of liquid floor finish.

   (b) Use commercially available product acceptable to manufacturer.

   (2) Cover products installed on horizontal surfaces with undyed, untreated building paper until final acceptance. Coordinate with manufacturers' written recommendations for products used.
(3) Do not move heavy and sharp objects directly over surfaces. Place hardboard or plywood panels over flooring and under objects while they are being moved. Slide or roll objects over panels without moving panels.

(a) When required by flooring manufacturer, allow a minimum of 72 hours after resilient tile installation before moving and installing equipment on flooring.

END OF SECTION
SECTION 09 68 13
CARPET

PART 1 - GENERAL

1.1 SUMMARY
1.1.1. Section Includes
a. Direct glue-down carpet installation only (EF/CI).
b. Modular carpet tile installation only (EF/CI).
1.1.2. Related Sections
a. Section 09 65 19 “Resilient Floor Tile” for resilient wall base, molding accessories and floor transitions installed with carpet.

1.2 SUBMITTALS
1.2.1. Product Data
a. For each type of carpet installation accessory specified.
1.2.2. Submittal List

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<td>1.2.1</td>
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X Submit quantity specified in Division 1 Section “Submittals.”
R Review each submittal, mark to indicate action taken, and return.

1.3 DELIVERY, STORAGE, AND HANDLING
1.3.1. General
a. Comply with the Carpet and Rug Institute's CRI 104, Section 5: "Storage and Handling."
1.3.2. Delivery
a. Accept delivery of materials to Project site in original factory wrappings and containers, labeled with identification of manufacturer, brand name, and lot number.
1.3.3. Storage
a. Store materials on-site in original undamaged packages, inside well-ventilated area protected from weather, moisture, soilage, extreme temperatures, and humidity. Lay flat, with continuous blocking off ground.

1.4 PROJECT CONDITIONS

1.4.1. General

a. Comply with CRI 104, Section 6: "Site Conditions."

1.4.2. Space Enclosure and Environmental Limitations

a. Do not install carpet until space is enclosed and weatherproof, wet-work in space is completed and nominally dry, work above ceilings is complete, and ambient temperature and humidity conditions are and will be continuously maintained at values near those indicated for final occupancy.

1.4.3. Subfloor Moisture Conditions

a. Moisture emission rate of not more than 3 lb/1000 sq. ft./24 hours when tested by calcium chloride moisture test in compliance with CRI 104, 6.2.1, with subfloor temperatures not less than 55 º F.

1.4.4. Subfloor Alkalinity Conditions

a. A pH range of 5 to 9 when subfloor is wetted with potable water and pHydron paper is applied.

PART 2 - PRODUCTS

2.1 CARPET

2.1.1. EXCHANGE Furnished and CONTRACTOR Installed (EFCI).

2.2 INSTALLATION ACCESSORIES

2.2.1. Concrete-Slab Primer

a. Nonstaining type as recommended by the carpet manufacturer.

2.2.2. Trowelable Underlayments and Patching Compounds

a. As recommended by the carpet manufacturer.
   b. Do not use gypsum-based formulations.

2.2.3. Adhesives

a. Water-resistant, mildew-resistant, nonstaining type to suit products and subfloor conditions indicated and to comply with flammability requirements for installed carpet as recommended by the carpet manufacturer.
2.2.4. Seaming Cement

a. Hot-melt adhesive tape or similar product recommended by carpet manufacturer for taping seams and butting cut edges at backing to form secure seams and to prevent pile loss at seams.

PART 3 - EXECUTION

3.1 EXAMINATION

Examine subfloors and conditions, with Installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting performance of carpet. Do not proceed with installation until unsatisfactory conditions have been corrected. Verify that subfloors and conditions are satisfactory for carpet installation and comply with requirements specified in this Section and those of the carpet manufacturer.

3.2 PREPARATION

3.2.1. General

a. Comply with carpet manufacturer's installation recommendations to prepare substrates indicated to receive carpet installation.

3.2.2. Floor Flatness and Levelness

a. Prepare subfloor to F(F) (floor flatness) and F(L) (floor levelness) tolerances indicated in Division 3, Section "Cast-In-Place Concrete" for trowel finish of monolithic slabs. Sand or grind protrusions, bumps, and ridges. Patch and repair cracks and rough areas. Fill depressions.

b. Use leveling and patching compounds to fill cracks, holes, and depressions in subfloor

c. Allow underlayment patching compounds to cure prior to installation of finish materials.

3.2.3. Preparation

a. Remove subfloor coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone.

b. Broom or vacuum clean subfloors to be covered with carpet. Following cleaning, examine subfloors for moisture, alkaline salts, carbonation, or dust.

c. Concrete-Subfloor Preparation: Apply concrete-slab primer, according to manufacturer's directions, where recommended carpet manufacturer.

3.3 INSTALLATION

3.3.1. Direct Glue-Down Installation

a. Comply with CRI 104, Section 8: "Direct Glue-Down."

3.3.2. General
a. Comply with carpet manufacturer's recommendations for seam locations and direction of carpet; maintain uniformity of carpet direction and lay of pile. At doorways, center seams under door in closed position. Do not bridge building expansion joints with continuous carpet.
b. Where demountable partitions or other items are indicated for installation on top of finished carpet floor, install carpet before installation of these items.
c. Cut and fit carpet to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet manufacturer.
d. Extend carpet into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.
e. Install pattern parallel to walls and borders.

3.4 CLEANING

3.4.1. Perform The Following Operations Immediately After Completing Installation.

a. Remove visible adhesive, seam sealer, and other surface blemishes using cleaner recommended by carpet manufacturer.
b. Remove protruding yarns from carpet surface.
c. Vacuum carpet using commercial machine with face-beater element.

3.5 PROTECTION

3.5.1. General

a. Comply with CRI 104, Section 15: “Protection of Indoor Installation.”
b. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure carpet is without damage or deterioration at the time of final acceptance.
SECTION 09 90 00
PAINTING AND COATING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

   1. Surface preparation and the application of paint systems on the following substrates:

      a. Exterior Painting:

         1) Plaster substrates.
         2) Steel substrates.
         3) Galvanized-metal substrates.
         4) Concrete substrates (precast and cast-in-place)

      b. Interior Painting:

         1) Concrete and Concrete masonry units (CMU).
         2) Steel, including exposed structure where indicated.
         3) Galvanized metal, including exposed structure where indicated.
         4) Wood indicated to receive opaque finish.
         5) Gypsum board.

      c. Liquid floor treatments.

B. Related Sections:

   1. Division 05 Sections for shop priming of metal substrates with primers specified in this Section.
   2. Division 08 Section Flush Wood Doors for stains and transparent finishes applied to interior wood doors.
   3. Division 08 Sections for factory priming hollow metal windows and doors with primers specified in this Section.

1.2 SUBMITTALS

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

B. Samples: For each finish and for each color and texture required.

C. Product List: For each product indicated, include the following:
1. Printout of current "MPI Approved Products List" for each product category specified in Part 2, with the proposed product highlighted.

D. Submittal List:

<table>
<thead>
<tr>
<th>Reference</th>
<th>Submittal Item</th>
<th>Quantity</th>
<th>Action</th>
</tr>
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<tr>
<td>1.2B</td>
<td>Samples</td>
<td>X</td>
<td>R</td>
</tr>
<tr>
<td>1.2C</td>
<td>Product List</td>
<td>X</td>
<td>I</td>
</tr>
</tbody>
</table>

X Submit quantity specified in Division 1 Section Administrative Requirements.
R Review each submittal, mark to indicate action taken, and return.
I Submittal is for information or record purposes only. No action will be taken.

1.3 QUALITY ASSURANCE

A. MPI Standards:

1. Products: Complying with MPI standards indicated and listed in "MPI Approved Products List."

B. Mockups: Apply mockup of exterior elastomeric paint to exterior precast concrete panel to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Architect will select one surface to represent surfaces and conditions for application of each paint system.
   a. Vertical and Horizontal Surfaces: Provide to Architect, samples of at least 100 sf
   b. Other Items: Architect may designate items or areas required.
   c. Final Architect approval of paint selections will be based on mockup.
   d. Subject to compliance with requirements, approved mockup may become part of the completed Work if undisturbed at time of Substantial Completion.

1.4 MAINTENANCE MATERIAL SUBMITTALS

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

1. Paint: One gallon of each material and color applied.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.
1.6 FIELD CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.
B. Do not apply paints in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 PAINT, GENERAL

A. MPI Standards: Provide products that comply with MPI standards indicated and that are listed in its "MPI Approved Products List."
B. Material Compatibility:
   1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
   2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.
C. VOC Content: Products shall comply with VOC limits of authorities having jurisdiction and, for interior paints and coatings applied at Project site, the following VOC limits, exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
   1. Flat Paints and Coatings: 50 g/L.
   2. Nonflat Paints and Coatings: 150 g/L.
   3. Clear Wood Finishes, Varnishes: VOC not more than 350 g/L.
   4. Stains: VOC not more than 250 g/L.
   5. Dry-Fog Coatings: 400 g/L.
   6. Primers, Sealers, and Undercoaters: 200 g/L.
   7. Anticorrosive and Antirust Paints Applied to Ferrous Metals: 250 g/L.
   9. Pretreatment Wash Primers: 420 g/L.
   10. Floor Coatings: 100 g/L.
D. Chemical Components of Field-Applied Interior Paints and Coatings: Provide products that comply with the following chemical restrictions; these requirements do not apply to primers or finishes that are applied in a fabrication or finishing shop:
   1. Aromatic Compounds: Paints and coatings shall not contain more than 1.0 percent by weight of total aromatic compounds (hydrocarbon compounds containing one or more benzene rings).
   2. Restricted Components: Paints and coatings shall not contain any of the following:
      a. Acrolein.
      b. Acrylonitrile.
      c. Antimony.
      d. Benzene.
      e. Butyl benzyl phthalate.
      f. Cadmium.
g. Di (2-ethylhexyl) phthalate.
h. Di-n-butyl phthalate.
i. Di-n-octyl phthalate.
j. 1,2-dichlorobenzene.
k. Diethyl phthalate.
l. Dimethyl phthalate.
m. Ethylbenzene.
n. Formaldehyde.
o. Hexavalent chromium.
p. Isophorone.
q. Lead.
r. Mercury.
s. Methyl ethyl ketone.
t. Methyl isobutyl ketone.
u. Methylene chloride.
v. Naphthalene.
w. Toluene (methylbenzene).
x. 1,1,1-trichloroethane.
y. Vinyl chloride.

E. Colors as indicated in "Room Finish and Color Schedule."

2.2 BLOCK FILLERS

B. Concrete Unit Masonry Block Filler Under Vapor Barrier Finish:
   1. Duron, Block Kote Latex Block Filler, 08-126: Applied at a dry film thickness of not less than 10.2 mils.

2.3 EXTERIOR PAINT PRODUCTS

A. Exterior Metal Primers:
   1. Quick-Drying Alkyd Metal Primer: MPI #76.

B. Exterior Elastomeric Primers:
   1. Manufacturer's recommended.

C. Exterior Alkyd Paints:
   1. Exterior Alkyd Gloss Enamel: MPI #9 (Gloss Level 6).

D. Exterior Quick-Drying Enamels:
   1. Quick-Drying High Gloss Enamel: MPI #96 (Gloss Level 7).

E. Exterior Latex Paints:
1. Exterior Latex Flat: MPI #10 (Gloss Level 1).

F. Exterior Elastomeric Coating:

1. Dow Corning AllGuard Silicone Elastomeric.

2.4 INTERIOR PAINT PRODUCTS

A. Interior Metal Primers:

1. Quick-Drying Alkyd Metal Primer: MPI #76.
2. Rust-Inhibitive Primer Water Based: MPI #107.
3. Waterborne Galvanized-Metal Primer: MPI #134.

B. Interior Latex Primers/Sealers:

1. Alkali-Resistant Primer Water Based: MPI #3.
2. Interior Latex Primer/Sealer: MPI #50.

C. Interior Latex Vapor Barrier Primer/Sealer:

1. Benjamin Moore; Super Spec Latex Vapor Barrier Primer Sealer 260.
   a. Film Thickness: Wet 3.6 mils, dry 1.0 mil.

D. Interior Wood Primers:

1. Interior Latex-Based Wood Primer: MPI #39.

E. Interior Latex Paints:

1. Institutional Low-Odor/VOC Latex Flat: MPI #143 (Gloss Level 1).
2. Institutional Low-Odor/VOC Latex Eggshell: MPI #145 (Gloss Level 3).
3. Institutional Low-Odor/VOC Latex Semi-Gloss: MPI #147 (Gloss Level 5).

2.5 FLOOR AND SLAB TREATMENTS

A. Acrylic Liquid Floor Sealing Treatment (ONLY TO BE APPLIED TO AREAS THAT ARE NOT RECEIVING POLISHED CONCRETE TREATMENTS):

1. Waterborne solution, VOC compliant, 15 percent to 20 percent total solids, that dries to form a clear, glossy, protective film that seals concrete surfaces.
2. Basis-of-Design Products:
   a. Dress & Seal WB; L&M Construction Chemicals, Inc.
   b. Aqua Cure VOX; Euclid Chemical Co.
   c. Mastercure CC 200WB; BASF Corp.
PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of work.

B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:

1. Wood: 15 percent.
2. Gypsum Board: 12 percent.
3. Concrete: 12 percent
5. Portland Cement Plaster: 12 percent.

C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.

D. Primer is not required on shop-primed items that are compatible with system subsequent applied coats.

E. Provide barrier coats over incompatible primers or remove and reprime.

F. Portland Cement Plaster Substrates: Verify that plaster is fully cured.

G. Exterior Gypsum Board Substrates: Verify that finishing compound is sanded smooth.

H. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.

I. Beginning coating application constitutes Contractor's acceptance of substrates and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates indicated.

B. Clean substrates of substances that could impair bond of paints, including dirt, oil, grease, and incompatible paints and encapsulants.

1. Remove incompatible primers and reprime substrate with compatible primers as required to produce paint systems indicated.

C. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

D. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection.

E. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.

F. Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceeds that permitted in manufacturer's written instructions.

G. Steel Substrates: Remove rust, loose mill scale, and shop primer if any. Clean using methods recommended in writing by paint manufacturer, but not less than the following:

1. SSPC-SP 2, "Hand Tool Cleaning."
H. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.

I. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

J. Interior Wood Substrates:
   1. Scrape and clean knots. Before applying primer, apply coat of knot sealer recommended in writing by topcoat manufacturer for exterior use in paint system indicated.
   2. Sand surfaces that will be exposed to view, and dust off.
   3. Prime edges, ends, faces, undersides, and backsides of wood.
   4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

3.3 APPLICATION

A. Apply paints according to manufacturer's written instructions and recommendations in "MPI Manual".
   1. Use applicators and techniques suited for paint and substrate indicated.
   2. Paint surfaces behind movable items same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed items with prime coat only.
   3. Paint both sides and edges of exterior doors and entire exposed surface of exterior door frames.
   4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
   5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.
   6. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
   7. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.

B. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

C. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.
   1. Minimum Coating Thickness: Apply paint materials no thinner than manufacturer's recommended spreading rate to achieve dry film thickness indicated. Provide total dry film thickness of the entire system as recommended by manufacturer, except as follows:
      b. Interior surfaces: Minimum of 3 mils.

D. Painting Mechanical and Electrical Work:
   1. Paint items exposed in customer areas including, but not limited to, the following:
      a. Mechanical Work:
1) Uninsulated metal piping.
2) Uninsulated plastic piping.
3) Pipe hangers and supports.
4) Tanks that do not have factory-applied final finishes.
5) Visible portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets.
6) Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
7) Mechanical equipment that is indicated to have a factory-primed finish for field painting.

b. Electrical Work:

1) Switchgear.
2) Panelboards.
3) Conduit.
4) Cable trays.
5) Electrical equipment that is indicated to have a factory-primed finish for field painting.

3.4 LIQUID FLOOR TREATMENTS

A. Acrylic Liquid Floor Sealing Treatment:
   Apply two coats of sealer in accordance with manufacturer's recommendations.

3.5 CLEANING AND PROTECTION

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

3.6 EXTERIOR PAINTING SCHEDULE

A. Steel Substrates:

1. Quick-Drying Enamel System: MPI EXT 5.1A.
   c. Topcoat: Quick-drying alkyd, high gloss.

B. Galvanized-Metal Substrates:

1. Alkyd System: MPI EXT 5.3B

C. Plaster Substrates:

1. Latex Over Alkali-Resistant Primer System: MPI EXT 9.1J.
   a. Prime Coat: Alkali-resistant primer, water based.
   c. Topcoat: Exterior latex, flat.

D. Concrete substrates (precast and cast-in-place):

1. Elastomeric Coating System:
   a. Prime Coat: Elastomeric coating manufacturer's recommended, factory-formulated, alkali-resistant primer compatible with substrate and other materials indicated.

3.7 INTERIOR PAINTING SCHEDULE

A. CMU Substrates Except Where Vapor Barrier Finish Is Indicated:

1. Institutional Low-Odor/VOC Latex System: MPI INT 4.2E.

B. Hollow Metal Doors and Frames:

1. Institutional Low-Odor/VOC Latex System: MPI INT 5.1S.
   a. Prime Coat: Rust-inhibitive primer, water based.
   c. Topcoat: Institutional low-odor/VOC interior latex, semi-gloss, unless otherwise indicated.

C. Steel Substrates - (not doors and frames).

1. Institutional Low-Odor/VOC Latex System: MPI INT 5.1S.
   a. Prime Coat: Rust-inhibitive primer, water based.

D. Galvanized-Metal Substrates Unless Otherwise Indicated:

1. Institutional Low-Odor/VOC Latex System: MPI INT 5.3N.

E. Dressed Lumber Substrates Indicated to Receive Opaque Finish:

1. Including architectural woodwork.
2. Institutional Low-Odor/VOC Latex System: MPI INT 6.3V.

F. Wood Panel Substrates Indicated to Receive Opaque Finish:

1. Including painted plywood, medium-density fiberboard, and hardboard.
2. Institutional Low-Odor/VOC Latex System: MPI INT 6.4T.

G. Gypsum Board Substrates:

1. Institutional Low-Odor/VOC Latex System: MPI INT 9.2M.
   a. Prime Coat: Interior latex primer/sealer, institutional low odor/VOC.
   c. Topcoat: Institutional low-odor/VOC interior latex:
   d. 
      1) Ceilings:
         a) Flat finish typical
         b) Semi-gloss finish in toilet rooms.
      2) Walls and Soffits:
         a) Eggshell typical.
         b) Satin finish where noted.
         c) Semi-gloss finish in toilet rooms.

END OF SECTION
SECTION 10 14 00

SIGNS

PART 1 - GENERAL

1.2 SUMMARY

A. This Section includes the following:
   1. Restroom identification signage.
   2. Interior room identification signage.

1.3 SUBMITTALS

A. General: Submit the following in accordance with Conditions of the Contract and Division 1 Specification Sections.

B. Product data from each manufacturer for each type of product specified, including construction details relative to materials, dimensions of individual components, profiles, finishes and accessories for each type of sign and dimensional letter and number required.

C. Shop Drawings: Provide shop drawings for fabrication and erection of signs. Include elevations and large-scale sections of typical members and other components. Show anchors, grounds, reinforcement, accessories, layout, and installation details. Provide text for each sign required, including large scale details of wording and layout of lettering.

D. Panel sign samples: Provide one full size sample of each type of sign specified for initial selection of color, pattern and surface texture required. On each panel include a representative example of the graphic image process required, showing graphic style, colors and finishes of letters, numbers and other graphic devices as required and for verification of compliance with requirements indicated.

E. Dimensional letters and number samples: Provide full-size representative sample of each dimensional letter type required, showing letter style, color, and material finish and method of attachment, as required and for verification of compliance with requirements indicated.
1.4 QUALITY ASSURANCE

A. Single-Source Responsibility: For each separate type of sign required, obtain signs from one source from a single manufacturer.

B. Take field measurements prior to preparation of shop drawings and fabrication to ensure proper fitting. Show recorded measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delay.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Signs: Specifications are based on Interface Architectural Signage. Subject to compliance with requirements and properties of the products specified, products by the following manufacturers will be considered:

1. ANDCO Industries Corp.
2. Best Manufacturing Company.
3. Charleston Industries, Inc.
4. DGS Corp.
5. Diskey Sign Corp.
8. Modulex.
10. Poblocki & Sons, Inc.
11. Spanjer Brothers, Inc.
12. The Supersine Company.
13. Vomar Products, Inc.

2.2 UNFRAMED PANEL SIGNS

A. General: Comply with requirements indicated for materials, thicknesses, finishes, colors, designs, shapes, sizes, and details of construction.

1. Produce smooth, even level sign panel surfaces, constructed to remain flat under installed conditions within a tolerance of plus or minus 1/16 inch measured diagonally.
2. Text shall be centered at top of signs, with symbol centered.
3. Braille shall be produced by extracting the background of the plaque using a photetic etching process, leaving the copy and braille raised. The plaque shall then be laminated to an opaque acrylic base, cut to size and finished with a professional surface painted acrylic polyurethane enamel in a specified color. The photo etched plaque shall have raised Grade 2 Braille, meeting both ADA and ANSI guidelines.

2.3 FABRICATION

A. Signs: Plaque face; 1/32" raised copy, integral copy/Braille, 1/8" thick opaque acrylic base. Comply with ADA.

1. Raised Copy: Produced by photo mechanical etching process.
2. Plaque background color to be Interface #5 Slate.
3. Plaque face shall be laminated to 1/8" thick opaque acrylic base.
4. Text, logos, and border design, precision cut, 1/32" minimum thickness, black or white, polyurethane enamel finish, upper case. Helvetica medium style, shall be chemically welded to the face of the plaque.
5. Edge Condition: Beveled.

2.4 SIGN TYPES

A. ADA, text, Braille text and symbol as indicated, 8-3/4" x 8-3/4", plaque.
   1. Men/Women with universal symbols and universal accessibility symbol.
      a. Unisex Men / Women sign with Accessibility symbol adjacent to door.
   2. Room Name Identification.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Locate signs and dimensional letter units and accessories where indicated, using mounting methods of the type described and in compliance with the manufacturer's instructions. Install signs and dimensional letters level, plumb, and at the height indicated and free from distortion or other defects in appearance, with sign surfaces free from distortion or other defects in appearance.

B. Wall Mounted Panel Signs: Attach panel signs to wall surfaces using double-sided foam tape to mount signs to smooth, nonporous surfaces. Do not use this method for vinyl-covered or rough surfaces. Use silastic adhesive for irregular or porous surfaces or where sign occurs on a vinyl covered surface.

Provide signs on wall adjacent to latch side of door, with Braille between 48" and 60" above finish floor unless otherwise noted.

1. Mount sign so that a person may approach within 3" of sign without encountering protruding objects or standing within the swing of a door.

3.2 CLEANING AND PROTECTION

A. After installation, clean soiled sign surfaces according to the manufacturer's instructions. Protect units from damage until acceptance by AAFES.

END OF SECTION 10 14 00
SECTION 10 21 13
PLASTIC TOILET COMPARTMENTS

PART 1 - GENERAL

1.1 SUMMARY
   A. Section Includes:
      1. Solid plastic toilet compartments and urinal screens.
   B. Related Sections:
      1. Division 01: Administrative, procedural, and temporary work requirements.

1.2 REFERENCES
   A. ASTM International (ASTM):

1.3 SYSTEM DESCRIPTION
   A. Compartment Configurations:
      1. Toilet partitions and : Floor mounted, overhead braced.
      2. Urinal screens: Wall mounted.

1.4 SUBMITTALS
   A. Submittals for Review:
      1. Shop Drawings: Include dimensioned layout, elevations, trim, closures, and accessories.
      2. Product Data: Manufacturer's descriptive data for panels, hardware, and accessories.

1.5 QUALITY ASSURANCE
   A. Manufacturer Qualifications: Minimum 5 years experience in manufacture of solid plastic toilet compartments with products in satisfactory use under similar service conditions.
   B. Installer Qualifications: Minimum 5 years experience in work of this Section.

1.6 WARRANTIES
   A. Provide manufacturer’s 25 year warranty against breakage, corrosion, and delamination under normal conditions.
PART 2  PRODUCTS

2.1 MANUFACTURERS
A. Contract Documents are based on Hiny Hiders by Scranton Products. (www.scrantonproducts.com)
B. Substitutions: Under provisions of Division 01

2.2 MATERIALS
A. Doors, Panels and Pilasters:
   1. High density polyethylene (HDPE), fabricated from polymer resins compounded under high pressure, forming single thickness panel.
   2. Waterproof and nonabsorbent, with self-lubricating surface, resistant to marks by pens, pencils, markers, and other writing instruments.
   3. 1 inch thick with edges rounded to 1/4 inch radius.
   6. Texture: Orange Peel.
B. Aluminum Extrusions: ASTM B221, 6463-T5 alloy and temper.
C. Stainless Steel: ASTM A167, Type 304.

2.3 HARDWARE
A. Hinges:
   1. 8 inches long, fabricated from heavy-duty extruded aluminum with bright dip anodized finish, wrap-around flanges, adjustable on 30-degree increments, through bolted to doors and pilasters with stainless steel, Torx head sex bolts.
   2. Hinges operate on field-adjustable nylon cams, field adjustable in 30 degree increments.
B. Door Strike and Keeper:
   1. 6 inches long, fabricate from heavy-duty extruded aluminum with bright dip anodized finish, with wrap-around flanges secured to pilasters with stainless steel tamper resistant Torx head sex bolts.
   2. Bumper: Extruded black vinyl.
C. Latch and Housing:
   1. Heavy-duty extruded aluminum.
   2. Latch housing: Bright dip anodized finish.
   3. Slide bolt and button: Black anodized finish.
D. Coat Hook/Bumper:
   1. Combination type, chrome plated Zamak.
   2. Equip outswing handicapped doors with second door pull and door stop.
E. Door Pulls: Chrome plated Zamak.

2.4 COMPONENTS
A. Doors and Dividing Panels: 55 inches high, mounted 14 inches above finished floor, [with aluminum heat-sinc fastened to bottom edges.]
B. Pilasters: 82 inches high, fastened to pilaster sleeves with stainless steel tamper resistant Torx head sex bolt.

C. Pilaster Sleeves: 3 inches high, [one-piece molded HDPE,] [20 gage stainless steel,] secured to pilaster with stainless steel tamper resistant Torx head sex bolt.

D. Wall Brackets: 54 inches long, [Extruded PVC,] [heavy-duty aluminum, bright dip anodized finish,] fastened to pilasters and panels with stainless steel tamper resistant Torx head sex bolts.

E. Headrail: Heavy-duty extruded aluminum, anti-grip design, clear anodized finish, fastened to headrail bracket with stainless steel tamper resistant Torx head sex bolt and at top of pilaster with stainless steel tamper resistant Torx head screws.

F. Headrail Brackets: 20 gage stainless steel, satin finish, secured to wall with stainless steel tamper resistant Torx head screws.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install compartments in accordance with manufacturer’s instructions and approved Shop Drawings.

B. Install rigid, straight, plumb, and level.

C. Locate bottom edge of doors and panels 14 inches above finished floor.

D. Provide uniform, maximum 3/8 inch vertical clearance at doors.

E. Not Acceptable: Evidence of cutting, drilling, or patching.

3.2 ADJUSTING

A. Adjust doors and latches to operate correctly.

END OF SECTION 102113
SECTION 10 26 00
WALL AND EQUIPMENT PROTECTION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Wall and Equipment Guards:
   a. Wall mounted corner guards.
   b. Wall mounted bumper rails
   c. Cart bumper rail at Checkout

1.2 SUBMITTALS

A. Product Data: Include construction details, material descriptions, impact strength, dimensions of individual components and profiles, and finishes for each type of product indicated.

B. Submittal List:

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<th>Action</th>
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<td>1.2A</td>
<td>Product Data</td>
<td>X</td>
<td>R</td>
</tr>
</tbody>
</table>

X  Submit quantity specified in Division 01 Section Administrative Requirements.
R  Review each submittal, mark to indicate action taken, and return.
I  Submittal is for information or record purposes only. No action will be taken.

1.3 QUALITY ASSURANCE

A. Source Limitations: Obtain each type of wall and equipment guard unit through one source from a single manufacturer.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Store impact-resistant wall protection units in original undamaged packages and containers inside well-ventilated area protected from weather, moisture, soiling, extreme temperatures, and humidity.

1.5 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install wall and equipment guards until building is enclosed and weatherproof, wet work is complete and dry, and HVAC system is operating and
maintaining temperature at 70 deg F for not less than 72 hours before beginning installation and for the remainder of the construction period.

1.6 MAINTENANCE

A. Maintenance Instructions: Provide the manufacturer's instructions for maintenance of installed work. Include recommended methods and frequency for maintaining optimum condition under anticipated traffic and use conditions. Include precautions against cleaning materials and methods that may be detrimental to finishes and performance.

B. Replacement Materials: After completion of work, deliver not less than 2 percent of each type, color, and pattern of wall surface protection materials and components. Include accessory components as required. Replacement materials shall be from the same production run as materials installed. Package replacement materials with protective covering, identified with appropriate labels.

PART 2 - PRODUCTS

2.1 CORNER GUARDS

A. CS Acrovyn 4000 Model SM-20N: 90-degree surface mounted corner guard with 3” legs, ¼” radius cover and regrind PETG retainer; Color; #378 Brushed Nickel

1. High impact extruded material with Chameleon simulated pattern.
2. Height: From top of wall base to 4 feet above floor or as indicated on drawings.
3. Color matched end caps.
4. General Location: See drawings for locations.
5. Fasteners: Provide nonmagnetic, stainless steel screws.

2.2 WALL BUMPER

A. CS Acrovyn 4000 Model SCR-64N: 8 inch high, surface mounted, crash rail with continuous regrind PETG cushion for added absorption; Color; #378 Brushed Nickel

1. High impact extruded material with Chameleon simulated pattern.
2. Mount to wall with 1-1/2” wide aluminum clips.
3. Color matched end caps.
4. General Location: See drawings for locations.
5. Fasteners: Provide nonmagnetic, stainless steel screws.

2.3 CART BUMPER RAIL

A. McCue Corporation CartStopBR: Galvanized box rail with cast aluminum components

1. Modular design components.
4. General Location: Checkout Area. See drawings for locations.
5. Box rail 8 ft lengths.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and wall areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.

B. Examine walls to which impact-resistant wall protection will be attached for blocking, grounds, and other solid backing that have been installed in the locations required for secure attachment of support fasteners. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Complete finishing operations, before installing wall and equipment guards, including painting, before installing impact-resistant wall protection system components.

B. Before installation, clean substrate to remove dust, debris, and loose particles.

3.3 INSTALLATION

A. General

1. Install wall and equipment guard units level, plumb, and true to line without distortions. Do not use materials with chips, cracks, voids, stains, or other defects that might be visible in the finished Work.

2. Provide splices, mounting hardware, anchors, and other accessories required for a complete installation.

3. Install wall and equipment guards and impact-resistant wall protection units in locations and at mounting heights indicated on Drawings.
SECTION 10 28 13
TOILET ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Toilet Room accessories.

B. Related Sections:

1. Division 10 Section Toilet Compartments for compartment-door-mounted coat hooks.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated. Include the following:

1. Construction details, dimensions and profiles.
2. Anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.
3. Material and finish descriptions and thicknesses.
4. Features that will be included for Project.
5. Manufacturer's warranty.

B. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.

1. Use designations indicated in "Toilet Accessory Schedule" and room designations indicated on Drawings in product schedule.

C. Submittal List:

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</tr>
<tr>
<td>1.2B</td>
<td>Product Schedule</td>
<td>X</td>
<td>R</td>
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</table>

X Submit quantity specified in Division 01 Section Administrative Requirements.
R Review each submittal, mark to indicate action taken, and return.
I Submittal is for information or record purposes only. No action will be taken.
1.3 QUALITY ASSURANCE


B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

1.4 COORDINATION

A. Coordinate accessory locations with other work to prevent interference with clearances required for access by disabled persons, proper installation, adjustment, operation, cleaning, and servicing of accessories.

B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Products: To establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other manufacturers, a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation. Subject to compliance with requirements, provide either the named products or equal products.

2.2 MATERIALS

A. Stainless Steel: ASTM A 666, Type 304, with No. 4 finish (satin), in 0.031-inch minimum nominal thickness, unless otherwise indicated.

B. Steel Sheet: ASTM A 1008/A 1008M, Designation CS (cold rolled, commercial steel), 0.036-inch minimum nominal thickness.

C. Galvanized Steel Sheet: ASTM A 653/A 653M, with G60 hot-dip zinc coating.

D. Mirrors: ASTM C 1503, Mirror Glazing Quality, clear-glass mirrors, nominal 0.236-inch thick.


F. Fasteners: Screws, bolts, and other devices of same material as accessory unit, tamper and theft resistant when exposed, and of galvanized steel when concealed.

2.3 FABRICATION

A. General: One, maximum 1-1/2-inch- diameter, unobtrusive stamped manufacturer logo is permitted on exposed face of accessories. On interior surface not exposed to view or back surface of each accessory, provide printed, waterproof label or stamped nameplate indicating manufacturer's name and product model number.

B. Surface-Mounted and Partition-Mounted Toilet Accessories: Unless otherwise indicated, fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with continuous stainless-steel hinge. Provide concealed anchorage where possible.
C. Recessed Toilet Accessories: Unless otherwise indicated, fabricate units of all-welded construction, without mitered corners. Hang doors and access panels with full-length, stainless-steel hinge. Provide anchorage that is fully concealed when unit is closed.

D. Framed Glass-Mirror Units: Fabricate frames for glass-mirror units to accommodate glass edge protection material. Provide mirror backing and support system that permits rigid, tamper-resistant glass installation and prevents moisture accumulation.

1. Provide galvanized steel backing sheet, not less than 0.034 inch and full mirror size, with nonabsorptive filler material. Corrugated cardboard is not an acceptable filler material.

E. Mirror-Unit Hangers: Provide one of the following mirror-unit mounting systems that permits rigid, tamper- and theft-resistant installation, as follows:

1. One-piece, galvanized steel, wall-hanger device with spring-action locking mechanism to hold mirror unit in position with no exposed screws or bolts.
2. Heavy-duty wall brackets of galvanized steel, equipped with concealed locking devices requiring a special tool to remove.

F. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to Government’s representative.

2.4 PUBLIC-USE WASHROOM ACCESSORIES

A. Mark A – Automatic Paper Towel Dispenser, Surface Mounted

1. Georgia Pacific #59462 EnMotion Wall Mount Automated Touchless Towel Dispenser.
2. Battery operated: 4 Standard Alkaline D-Cell batteries.

B. Mark B - Stainless-Steel, Angle-Framed Mirror:

1. Where this designation is indicated on Drawings, provide mirror unit complying with the following:
   b. Size: 18” x 36”.
   c. Fabricate frame from minimum nominal 0.0375-inch-thick stainless-steel angles, with square corners mitered, welded, and ground smooth

C. Mark C - Liquid Soap Dispenser, Wall Mounted:

1. Eco Lab; Kay; touch free dispenser; Classic; White; 92211376.
2. Battery operated.

D. Mark D - Grab Bar Mounted Horizontally, Parallel to back of Water Closet:

1. Where this designation is indicated on Drawings, provide stainless-steel grab bar complying with the following:
   b. Gripping Surfaces: Smooth.
   c. Length: 36 inches.
   d. Outside Diameter: 1-1/2 inches for heavy-duty applications.
E. Mark E - Surface Mounted Toilet Seat-Cover Dispenser

F. Mark F - Grab Bar Mounted Horizontally, Parallel to side of Water Closet:
   1. Where this designation is indicated on Drawings, provide stainless-steel grab bar complying with the following:
      b. Gripping Surfaces: Smooth.
      c. Length: 42 inches.
      d. Outside Diameter: 1-1/2 inches for heavy-duty applications.
      e. Nominal Wall Thickness: Minimum 0.05 inch.
      f. Clearance: 1-1/2 inches between wall surface and inside face of bar.
      g. Mounting: Concealed with manufacturer's standard flanges and anchors.

G. Mark G – Toilet Tissue Dispenser, Surface Mounted

H. Mark H - Grab Bar Mounted Vertically, on Side of Water Closet:
   1. Where this designation is indicated on Drawings, provide stainless-steel grab bar complying with the following:
      b. Gripping Surfaces: Smooth.
      c. Length: 18 inches.
      d. Outside Diameter: 1-1/2 inches for heavy-duty applications.
      e. Nominal Wall Thickness: Minimum 0.05 inch.
      f. Clearance: 1-1/2 inches between wall surface and inside face of bar.
      g. Mounting: Concealed with manufacturer's standard flanges and anchors.

I. Not Used.

J. Mark J - Waste Receptacle, Surface Mounted:
   1. Where this designation is indicated, provide stainless-steel unit complying with the following:
      b. Designed for surface mounting.
      c. Operation: Equipped with LinerMate to accommodate disposable trash liners
      d. Material: 18-8, Type 304, 20 gage, stainless steel, satin finish.
      f. Hemmed top edge.

1. Where this designation is indicated, provide stainless-steel unit complying with the following:
   b. Designed for surface mounting.
   c. Operation: Self-closing panel covering each disposal opening.
   d. Material: 18-8, Type 304, 22 gage, stainless steel, satin finish.
   f. All welded construction.

L. Mark L - Baby Changing Station

1. “Koala Kare”; KB200-05; horizontal, wall mounted, white granite color.
2. FDA approved injection-molded polypropylene with Microban® antimicrobial additive embedded into the bed surface.
3. Reinforced steel-on-steel hinge mechanism and metal mounting chassis.

M. Mark M - Electric Hand Dryer

1. Where this designation is indicated, provide warm-air dryer complying with the following:
   b. Mounting: Surface.
   c. Cover Material: Zinc die cast
   d. Color Finish: Textured graphite painted
   e. Electrical Requirements: 110 - 120 Volts, 11.3 - 12.2 Amps, 50/60 Hz, 1240 - 1450 Watts.

N. Mark N – Child Protection Seat

1. “Koala Kare” KB102-00; Color: Cream;
2. Supports 50 lbs static weight.
3. Polyethylene seat surface exclusively contains Microban® antimicrobial, reducing odor causing bacteria.

O. Not used

P. Mark P – Not Used.

Q. Mark Q – Counter Mounted Soap Dispenser

1. Where this designation is indicated, provide soap dispenser complying with the following:
   b. Material: Type-304 Stainless Steel with Bright Polish Finish.
   d. Counter Mount.
R. Mark R - Toilet Partition - Specified in Division 10 Section "Toilet Compartments."

S. Mark S - Coat Hook Specified in Division 10 Section "Toilet Compartments."

T. Mark T – Urinal Screens - Specified in Division 10 Section "Toilet Compartments."

U. Mark U – Folding Utility Shelf

1. Where this designation is indicated, provide stainless-steel unit complying with the following:
   b. Shelf Material: 18-8, type-304, 18-gauge (1.2mm) stainless steel.
   c. Mounting Bracket: 18-8 S, type-304, 18-gauge (1.2mm) stainless steel with satin finish.
   d. Operation: Shelf automatically returns to upright position when object is removed.
   e. All welded construction.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.

B. Secure mirrors to walls in concealed, tamper-resistant manner with special hangers, toggle bolts, or screws. Set units level, plumb, and square at locations indicated, according to manufacturer's written instructions for substrate indicated.

C. Install grab bars to withstand a downward load of at least 250 lbf, when tested according to method in ASTM F 446.

3.2 ADJUSTING AND CLEANING

A. General: Adjust accessories for unencumbered, smooth operation and verify that mechanisms function properly. Replace damaged or defective items.

B. Remove temporary labels and protective coatings.

C. Clean and polish exposed surfaces according to manufacturer's written recommendations.

END OF SECTION
PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Portable fire extinguishers and mounting bracket.
2. Accessories.
3. Signage.

1.2 SUBMITTALS

A. Product Data:

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for fire-protection specialties.
2. Fire Extinguishers: Include rating and classification.
3. Cabinets: Include roughing-in dimensions, details showing mounting methods, relationships of box and trim to surrounding construction, door hardware, cabinet type, trim style, and panel style.

B. Submittal List:

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X Submit quantity specified in Division 01 Section Administrative Requirements.
R Review each submittal, mark to indicate action taken, and return.
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1.3 QUALITY ASSURANCE

A. Source Limitations:

1. Obtain fire extinguishers and brackets through one source from a single manufacturer.

B. NFPA Compliance:

1. Fabricate, install, and label fire extinguishers to comply with NFPA 10, "Standard for Portable Fire Extinguishers."
C. ABA Compliance:
   1. Install fire extinguishers and brackets in compliance with the ABA Accessibility Standard for Department of Defense Facilities.

D. Fire Extinguishers:
   1. Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Products:
   1. To establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other manufacturers, a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation. Subject to compliance with requirements, provide either the named products or equal products.
      1) Fire Extinguisher (New Type "K" and Relocate 1 existing)
      2) Fire-Protection Cabinet: Ambassador - Steel, Model 1017, door style S21 solid with pull handle.
      4) “Fire Extinguisher” sign on door.
      5) Signage:
      6) Interior Wall surface: Decal, 11-3/4- by 3-1/2-inches, vertical, red and white, FIRE EXTINGUISHER, #DRFA.
      7) Cabinet Door: Die cut, 3/4 by 18-inches, vertical, red, FIRE EXTINGUISHER, #FELVR.

B. J.L. Industries, Inc


D. General Fire Extinguisher Corporation.

2.2 MATERIALS

A. Cold-Rolled Steel Sheet:
   1. ASTM A 1008/A 1008M, Commercial Steel (CS), Type B.
2.3 PORTABLE FIRE EXTINGUISHERS

A. Where Type K is indicated provide the following:
   1. UL-rated 4A:60BC, 6 –liter (1.8 gal.) nominal capacity, in enameled-steel container.

2.4 MOUNTING BRACKET

   1. Manufacturers standard steel, designed to secure fire extinguisher to wall, of sizes required for type and capacity of indicated fire extinguisher, with red or black plated baked-enamel.

2.5 ACCESSORIES

   A. Signage:
      1. Wall Surface above Cabinet: Decal, 12 inches high x 3 1/2 inches, vertical, red and white, “FIRE EXTINGUISHER”

2.6 EXTINGUISHER CABINET: (For relocated fire extinguisher)

2.7 A. Cabinet with Steel Trim and Door: Ambassador Series, Model 1017S21

2.8 1. Cabinet Style: Surface-mounted.

2.9 2. Components:

2.10 a. Tub: Cold-rolled steel.

2.11 1) Finish: Factory-applied powder coat paint finish.


2.13 3) Surface-Mount Cabinet:

2.14 a) Standard Profile: Square edge.

2.15 4) Trim Dimensions: 1-3/4 inch (44.45 mm) face trim on frame and 1-1/4 inch (31.75 mm) face trim on door.
2.16 FINISHES, GENERAL

A. General:

1. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
2. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
3. Finish fire protection cabinets after assembly.

B. Appearance of Finished Work:

1. Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

C. Cabinet and Door Finishes:

1. Provide manufacturer's standard baked-enamel paint for the following:
   a. Exterior of cabinet, door, and trim.
   b. Interior of cabinets and doors.

2.17 STEEL FINISHES

A. Surface Preparation:

1. Clean surfaces of dirt, oil, grease, mill scale, rust, and other contaminants that could impair paint bond using manufacturer's standard methods.

B. Baked-Enamel Finish:

1. Immediately after cleaning and pretreating, apply manufacturer's standard two-coat, baked-enamel finish consisting of prime coat and thermosetting topcoat. Comply with paint manufacturer's written instructions for applying and baking to achieve a minimum dry film thickness of 2 mils.

PART 3 - EXECUTION

3.1 EXAMINATION

A. General:
1. Examine walls and partitions for suitable framing depth and blocking where recessed and semirecessed cabinets are to be installed.
2. Examine fire extinguishers for proper charging and tagging.
   a. Remove and replace damaged, defective, or undercharged units.
3. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION
A. General:
   1. Comply with manufacturer's written instructions for installing fire-protection specialties.
   2. Install in locations and at mounting heights indicated or, if not indicated, at heights acceptable to authorities having jurisdiction.
      a. Fasten mounting brackets to structure and cabinets, square and plumb.
   3. Signage: Apply decals and die cut lettering at locations indicated.

3.3 ADJUSTING, CLEANING, AND PROTECTION
A. Adjust cabinet doors that do not swing or operate freely. Refinish or replace cabinets and doors damaged during installation. Provide final protection and maintain conditions that ensure that cabinets and doors are without damage or deterioration at the time of final acceptance.

END OF SECTION
SECTION 10 50 20
CANOPIES

PART 1 - GENERAL

1.1 SUMMARY
A. Section Includes:
   1. Pre-engineered, pre-finished metal canopy.

1.2 DESCRIPTION OF WORK
A. Design, furnish and install a pre-finished metal canopy system complying with the requirements of applicable codes, wind loads, seismic design, and snow loads.

1.3 SUBMITTALS
A. Product Data: For each type of product indicated.
B. Shop Drawings:
   1. Dimensioned plans, elevations, material dimensions and large scale details.
C. Samples for Verification:
   1. Material sample coated with specified finish(es).
   2. Fascia sample showing profile and specified finish(es).
   3. Decking sample showing profile and specified finish(es).
D. Submittal List:

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I Submittal is for information or record purposes only. No action will be taken.
1.4 DELIVERY, STORAGE, HANDLING

A. Canopy components to be protected at all times.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Products: To establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other manufacturers, a specific manufacturer's product is named and accompanied by the words "basis of design", including make or model number or other designation. Subject to compliance with requirements, provide either the named products or equal products.

B. Basis-of-Design Product:

1. Mapes Canopies
   Lincoln, Nebraska
   Phone: 1-888-273-1132.
   Fax: 1-877-455-6572.

2.2 COMPONENTS, MATERIALS

A. Decking shall consist of 3" extruded flat soffit .078 decking.

B. Intermediate framing members shall be extruded aluminum, alloy 6063-T6, in profile and thickness shown in current Mapes brochures.

C. Hanger rods (2 TRIPLE ROD HANGERS) and attachment hardware shall be a standard finish (CHARCOAL GREY).

D. Fascia shall be standard extruded 12" Smooth Face style.

E. Other: Components as indicated or as required for system attachment and performance.

2.3 FINISHES

A. Finish type shall be 2-Coat Kynar Finish. (CHARCOAL GREY – SUBMIT SAMPLE TO MATCH “BERRIDGE” CHARCOAL GREY)

2.4 FABRICATION

A. All Mapes Super Lumideck extruded aluminum canopies are shipped with the materials precut to size for field assembly.

B. All connections shall be mechanically assembled utilizing 3/16 fasteners with a minimum shear stress of 350 lb. Pre-welded or factory-welded connections are not acceptable.

C. Decking shall be designed with interlocking roll-formed aluminum members.

D. Concealed drainage. Water shall drain from covered surfaces into intermediate trough and be directed to Downspout From Rear Gutter.
PART 3 - EXECUTION

3.1 INSPECTION
   A. Confirm that surrounding area is ready for the canopy installation.
   B. Installer shall confirm dimensions and elevations to be as shown on drawings provided by Mapes Industries.
   C. Erection shall be performed by an approved installer and scheduled after all concrete, masonry and roofing in the area is completed.

3.2 INSTALLATION
   A. Installation shall be in strict accordance with manufacturer's shop drawings. Particular attention should be given to protecting the finish during handling and erection.

3.3 ADJUSTING
   A. Touch up scratches and abrasions on finished surfaces to match original finish.
   B. Clean canopy per manufacturer's recommendations.

END OF SECTION
SECTION 12 48 16
ENTRANCE MATS AND GRATES

1.1 SUMMARY
A. Section Includes:
   1. Entrance Grating and Framing Assemblies.

1.2 Coordination
A. Coordinate removal of existing mat assembly within existing slab depression. Modify, cut, remove existing concrete slab to accommodate new frame and grate.

1.3 SUBMITTALS
A. Product Data:
   1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for fire-protection specialties.
   2. Show coordination with existing remaining frame.

B. Submittal List:

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1.4 QUALITY ASSURANCE
A. Source Limitations:
   1. Obtain all materials through one source from a single manufacturer.

B. ABA Compliance:
   1. Install top of walking surface within 1/4" of flush to surrounding floor finish.

C. Slip resistance in accordance with ASTM D-2047-96, Coefficient of Friction, minimum 0.60 for wet conditions.
PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Products:

1. To establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other manufacturers, a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation. Subject to compliance with requirements, provide either the named products or equal products.

2. Basis-of-Design Products:

a. Pawling Corporation, RG-500 Drain-Well Entrance grate

2.2 MATERIALS

A. Aluminum :

1. ASTM B 221, alloy 6105-T5 and 6063-T5 for extrusions.

2.3 Entrance Floor Grille

A. Structural Performance.

1. Uniform floor load of 300 lbf/sq. ft.
2. Wheel load of 350 lb per wheel.

B. General: Provide manufacturer's floor grille assembly consisting of treads and rails of type indicated, interlocked or joined by cross members. Provide manufacturer's standard support legs or beams.

C. Floor Grille: Provide manufacturer's standard floor grilles with extruded top members, top-surfaced tread rails, and as follows:

1. Tread Rails: Extruded aluminum; 1.5" centers.

D. Frame: RGF-500 extruded aluminum recessed framing.

E. Cross Supports: Extruded aluminum I beams 12" centers.
PART 3 - EXECUTION

3.1  EXAMINATION

A. General:

1. Examine substrates and floor conditions for compliance with requirements for location, size, minimum recess depth, and other conditions affecting installation of floor grilles and frames.

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

3.2  INSTALLATION

A. Install recessed floor grilles to comply with manufacturer's written instructions at locations indicated and with top of floor grilles and frames in relationship to one another and to adjoining finished flooring as indicated.

END OF SECTION
PART 1   GENERAL

1.1   REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 13 (2016) Standard for the Installation of Sprinkler Systems

UNIFIED FACILITIES CRITERIA (UFC)

UFC 3-600-01 (2016) Fire Protection Engineering for Facilities

UNDERWRITERS LABORATORIES (UL)

UL Fire Protection Equipment Directory

1.2   SYSTEM DESCRIPTION

Conduct a survey of the work area. Submit a record of existing conditions showing the results of the survey of work area conditions and features of existing structures and facilities within and adjacent to the jobsite.

Commencement of work constitutes acceptance of existing conditions.

Furnish piping offsets, fittings, and any other accessories as required to provide a complete installation and to eliminate interference with other construction. Install sprinkler system over and under ducts, piping and platforms when such equipment can negatively affect or disrupt the sprinkler discharge pattern and coverage.

Provide working installation plans in accordance with UFC 3-600-01 and NFPA 13 for all areas of the system which are being modified as part of this scope of work.

Provide wet pipe sprinkler system in areas indicated on the drawings. Except as modified herein, the system shall be designed and installed in accordance with NFPA 13.

Pipe sizes which are not indicated on drawings shall be determined by hydraulic calculation. Design any portions of the sprinkler system that are not indicated on the drawings including locating sprinklers, piping and equipment, and size piping and equipment when this information is not indicated on the drawings or is not specified herein. The design of the sprinkler system shall be based on hydraulic calculations, and the other provisions specified herein.

1.2.1   Hydraulic Design

Provide hydraulic calculations for all new sprinkler and piping installations, including specifically the new sprinkler installations below the mezzanine areas in the Merchandise Processing Area.
Hydraulically design the system to discharge a minimum density as indicated on the Fire Sprinkler Design Criteria on Sheet FP0.1. The minimum pipe size for branch lines in gridded systems shall be 1-1/4 inch. Hydraulic calculations shall be in accordance with the Area/Density Method of NFPA 13.

1.2.1.1 Hose Demand

Add an allowance for exterior hose streams as indicated on the Fire Sprinkler Design Schedule on Sheet FP0.1.

1.2.1.2 Basis for Calculations

The design of the system shall be based upon a water supply as indicated in the “Flow Test” schedule on Sheet FP0.1. Hydraulic calculations shall be based upon the Hazen-Williams formula with a "C" value of 120 for steel piping, 150 for copper tubing, 140 for new cement-lined ductile-iron piping, and 100 for existing underground piping.

1.2.1.3 Hydraulic Calculations

Submit hydraulic calculations, including a drawing showing hydraulic reference points and pipe segments and as outlined in NFPA 13, except that calculations shall be performed by computer using software intended specifically for fire protection system design using the design data shown on the drawings. Software that uses k-factors for typical branch lines is not acceptable.

Calculations shall be based on the water supply data shown on the drawings to substantiate that the design area used in the calculations is the most demanding hydraulically. Water supply curves and system requirements shall be plotted on semi-logarithmic graph paper so as to present a summary of the complete hydraulic calculation.

Provide a summary sheet listing sprinklers in the design area and their respective hydraulic reference points, elevations, actual discharge pressures and actual flows. Elevations of hydraulic reference points (nodes) shall be indicated. Documentation shall identify each pipe individually and the nodes connected thereto. Indicate the diameter, length, flow, velocity, friction loss, number and type fittings, total friction loss in the pipe, equivalent pipe length and Hazen-Williams coefficient for each pipe.

For gridded systems, calculations shall show peaking of demand area friction loss to verify that the hydraulically most demanding area is being used. Also for gridded systems, a flow diagram indicating the quantity and direction of flows shall be included. A drawing showing hydraulic reference points (nodes) and pipe designations used in the calculations shall be included and shall be independent of shop drawings.

1.2.2 Sprinkler Coverage

Sprinklers shall be uniformly spaced on branch lines. In buildings protected by automatic sprinklers, sprinklers shall provide coverage throughout 100 percent of the building. This includes, but is not limited to, telephone rooms, electrical equipment rooms, boiler rooms, switchgear rooms, transformer rooms, and other electrical and mechanical spaces. Coverage per sprinkler shall be in accordance with NFPA 13, but shall not exceed the values indicated in the Fire Sprinkler Design Criteria Schedule on Sheet FP0.1.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. Submit the following in accordance with Section 01 33 00

SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals
1.4 QUALITY ASSURANCE

Compliance with referenced NFPA standards is mandatory. In the event of a conflict between specific provisions of this specification and applicable NFPA standards, this specification governs. Interpret reference to "authority having jurisdiction" to mean the Contracting Officer.

1.4.1 Plans and Calculations

Perform work specified in this section under the supervision of and certified by the Fire Protection Specialist who is an individual registered professional engineer who has passed the fire protection engineering written examination administered by the National Council of Examiners for Engineering and Surveys (NCEES) in a related engineering discipline with a minimum of 5 years’ experience, or who is certified as a Level IV Technician by National Institute for Certification in Engineering Technologies (NICET) in the Automatic Sprinkler System Layout subfield of Fire Protection Engineering Technology in accordance with NICET 1014-7. Submit the name and documentation of certification of the proposed Fire Protection Specialists, no later than 14 days after the Notice to Proceed and prior to the submittal of the sprinkler system drawings and hydraulic calculations.

The Fire Protection Specialist shall prepare and submit a list of the fire protection related submittals, no later than 7 days after the approval of the Fire Protection Specialist, from the Contract Submittal Register that relate to the successful installation of the sprinkler systems(s). The submittals identified on this list shall be accompanied by a letter of approval signed and dated by the Fire Protection Specialist when submitted to the Government. The Fire Protection Specialist shall be regularly engaged in the design and installation of the type and complexity of system specified in the contract documents, and shall have served in a similar capacity for at least three systems that have performed in the manner intended for a period of not less than 6 months.

1.4.2 Sprinkler System Installer
Work specified in this section shall be performed by the Sprinkler System Installer who is regularly engaged in the installation of the type and complexity of system specified in the contract documents, and who has served in a similar capacity for at least three systems that have performed in the manner intended for a period of not less than 6 months. Submit the name and documentation of certification of the proposed Sprinkler System Installer, concurrent with submittal of the Fire Protection Specialist Qualifications.

1.4.3 Shop Drawings

Shop Drawings shall conform to the requirements established for working plans as prescribed in NFPA 13 and UFC 3-600-01. Submit 3 hard copies or 1 digital (PDF) copy of the Sprinkler System shop drawings, no later than 21 days prior to the start of sprinkler system installation. Drawings shall include plan and elevation views demonstrating that the equipment will fit the allotted spaces with clearance for installation and maintenance. Each set of drawings shall include the following:

a. Descriptive index of drawings in the submittal with drawings listed in sequence by drawing number. A legend identifying device symbols, nomenclature, and conventions used.

b. Floor plans drawn to a scale not less than 1/8" = 1'-0" which clearly show locations of sprinklers, risers, pipe hangers, seismic separation assemblies, sway bracing, inspector's test connections, drains, and other applicable details necessary to clearly describe the proposed arrangement. Each type of fitting used and the locations of bushings, reducing couplings, and welded joints shall be indicated.

c. Actual center-to-center dimensions between sprinklers on branch lines and between branch lines; from end sprinklers to adjacent walls; from walls to branch lines; from sprinkler feed mains, cross-mains and branch lines to finished floor and roof or ceiling. A detail shall show the dimension from the sprinkler and sprinkler deflector to the ceiling in finished areas.

d. Longitudinal and transverse building sections showing typical branch line and cross-main pipe routing as well as elevation of each typical sprinkler above finished floor.

e. Details of each type of riser assembly; pipe hanger; sway bracing for earthquake protection, and restraint of underground water main at point-of-entry into the building, and electrical devices and interconnecting wiring. Submit load calculations for sizing of sway bracing, for systems that are required to be protected against damage from earthquakes.

1.5 DELIVERY, STORAGE, AND HANDLING

All equipment delivered and placed in storage shall be housed in a manner to preclude any damage from the weather, humidity and temperature variations, dirt and dust, or other contaminants. Additionally, all pipes shall either be capped or plugged until installed.

1.6 EXTRA MATERIALS

Submit spare parts data for each different item of material and equipment specified. The data shall include a complete list of parts and supplies, with current unit prices and source of supply, and a list of parts recommended by the manufacturer to be replaced after 1 year and 3 years of service. Include a list of special tools and test equipment required for maintenance and testing of the products supplied.

PART 2 PRODUCTS

2.1 STANDARD PRODUCTS
Provide materials and equipment which are standard products of a manufacturer regularly engaged in the manufacture of such products and that essentially duplicate items that have been in satisfactory use for at least 2 years prior to bid opening.

2.2 REQUIREMENTS FOR FIRE PROTECTION SERVICE

Provide Materials and Equipment that have been tested by Underwriters Laboratories, Inc. and are listed in UL Fire Protection Directory or approved by Factory Mutual and listed in FM APP GUIDE. Where the terms "listed" or "approved" appear in this specification, such shall mean listed in THE UL Fire Protection Directory or FM APP GUIDE.

Submit manufacturer's catalog data included with the Sprinkler System Drawings for all items specified herein. The data shall be highlighted to show model, size, options, etc., that are intended for consideration. Data shall be adequate to demonstrate compliance with all contract requirements. In addition, provide a complete equipment list that includes equipment description, model number and quantity.

2.3 ABOVEGROUND PIPING COMPONENTS

Aboveground piping shall be steel.

2.3.1 Steel Piping Components

2.3.1.1 Steel Pipe

Except as modified herein, steel pipe shall be black as permitted by NFPA 13 and shall conform to applicable provisions of ASTM A795/A795M, ASTM A53/A53M, or ASTM A135/A135M. Pipe in which threads or grooves are cut or rolled formed shall be Schedule 40 or shall be listed by Underwriters' Laboratories to have a corrosion resistance ratio (CRR) of 1.0 or greater after threads or grooves are cut or rolled formed. Pipe shall be marked with the name of the manufacturer, kind of pipe, and ASTM designation.

2.3.1.2 Fittings for Non-Grooved Steel Pipe

Fittings shall be cast iron conforming to ASME B16.4, steel conforming to ASME B16.9 or ASME B16.11, or malleable iron conforming to ASME B16.3. Fittings into which sprinklers, drop nipples or riser nipples (sprigs) are screwed shall be threaded type. Plain-end fittings with mechanical couplings, fittings that use steel gripping devices to bite into the pipe and segmented welded fittings shall not be used.

2.3.1.3 Grooved Mechanical Joints and Fittings

Joints and fittings shall be designed for not less than 175 psi service and shall be the product of the same manufacturer; segmented welded fittings shall not be used. Fitting and coupling houses shall be malleable iron conforming to ASTM A47/A47M, Grade 32510; ductile iron conforming to ASTM A536, Grade 65-45-12. Gasket shall be the flush type that fills the entire cavity between the fitting and the pipe. Nuts and bolts shall be heat-treated steel conforming to ASTM A183 and shall be cadmium plated or zinc electroplated.

2.3.1.4 Flanges

Flanges shall conform to NFPA 13 and ASME B16.1. Gaskets shall be non-asbestos compressed material in accordance with ASME B16.21, 1/16-inch-thick, and full face or self-centering flat ring type.

2.3.1.5 Bolts, Nut, and Washers
Bolts shall be conform to ASTM A449, Type 1 and shall extend no less than three full threads beyond the nut with bolts tightened to the required torque. Nuts shall be hexagon type conforming to ASME B18.2.2, ASTM A193/A193M, Grade 5, or ASTM A563M ASTM A563, Grade C3 or DH3.

Washers shall meet the requirements of ASTM F436M ASTM F436. Flat circular washers shall be provided under all bolt heads and nuts.

2.4 SPRINKLERS

Sprinklers with internal O-rings shall not be used. Sprinklers shall be used in accordance with their listed coverage limitations. Temperature classification shall be ordinary unless required otherwise by a nearby heat source or where required by NFPA 13.

Sprinklers in high heat areas including attic spaces or in close proximity to unit heaters shall have temperature classification in accordance with NFPA 13. Extended coverage sprinklers shall not be used.

Sprinkler types shall be as indicated on Fire Sprinkler Schedule, Sheet FP0.1.

2.4.1 Recessed Sprinkler

Recessed sprinkler shall be white polyester and shall have a nominal 1/2 inch or 17/32-inch orifice.

2.4.2 Upright Sprinkler

Upright sprinkler shall be brass and shall have a nominal 1/2 inch or 17/32-inch orifice.

2.4.3 Intermediate Level Rack Sprinkler

Intermediate level rack sprinkler shall be of the upright or pendent type with nominal 1/2-inch orifice and minimum "K" factor of 5.5. The sprinkler shall be equipped with a deflector plate to shield the fusible element from water discharged above it.

2.5 ACCESSORIES

2.5.1 Sprinkler Cabinet

At least two sprinklers of each type on this project shall be added to the existing spare sprinkler cabinet.

2.5.2 Pendent Sprinkler Escutcheon

Escutcheon shall be one-piece metallic type with a depth of less than 3/4 inch and suitable for installation on pendent sprinklers. The escutcheon shall have a factory finish that matches the pendent sprinkler heads.

2.5.3 Pipe Escutcheon

Escutcheon shall be polished chromium-plated zinc alloy, or polished chromium-plated copper alloy. Escutcheons shall be either one-piece or split-pattern, held in place by internal spring tension or set screw.

2.5.4 Sprinkler Guard

Guard shall be a steel wire cage designed to encase the sprinkler and protect it from mechanical damage. Guards shall be provided on sprinklers located as indicated on the drawings.

2.6 EQUIPMENT

2.6.1 Aboveground Piping Materials
2.6.1.1 Type BCS - Black Carbon Steel

Pipe 1 through 2 inches: Schedule 40 furnace butt weld black-carbon steel conforming to ASTM A53/A53M, or ASTM A135/A135M, Type F furnace butt welded.

Pipe 2-1/2 through 8 inches, where indicated: Schedule 40 black carbon steel, conforming to ASTM A135/A135M, Grade B or Schedule 10 where not threaded.

Unions 2 inches and under: 300-pound per square inch gage (psig) working steam pressure (wsp) female, screwed, black malleable iron, with ground joint and brass-to-iron seat conforming to ASME B16.39.

Standard pipe couplings: Extra-heavy screwed black steel.

Grooved pipe couplings (all sizes): 175-psig minimum working pressure with a housing fabricated in two or more parts of black malleable-iron castings. Provide coupling gasket molded of synthetic rubber, conforming to requirements of ASTM D2000. Provide coupling bolts that are oval-neck, track-head type with heavy hexagonal nuts, conforming to ASTM A183.

Fittings 4 inches and under: 175-psig working pressure, cast iron, screwed, conforming to ASTM A126, Class A, and ASME B16.4.

Fittings 6 inches and larger: 175-psig working pressure, cast iron, conforming to ASTM A126, Class A, screwed, conforming to ASME B16.4, or flanged, conforming to ASME B16.1.

Grooved fittings (all sizes): ensure 175-psig working pressure fittings used with grooved couplings are fabricated of black malleable-iron castings. If a manufacturer's standard-size malleable-iron fitting pattern is not available, use fabricated fittings. Fabricate fittings from Grade B seamless-steel pipe and long-radius seamless welding fittings, with wall thickness to match pipe, conforming to ASTM A234/A234M and ASME B16.9.

2.6.1.2 Pipe Labeling

Pipe shall be labeled by painting enable bands or providing pre-printed labels every 20 feet and on both sides of wall, ceiling, or floor penetration, in accordance with UFC 3-600-01.

2.6.2 Supporting Elements

Provide piping system components and miscellaneous supporting elements, including, but not limited to, building-structure attachments; supplementary steel; hanger rods, stanchions, and fixtures; vertical-pipe attachments; horizontal-pipe attachments; restraining anchors; and guides. Ensure supporting elements are suitable for stresses imposed by systems pressures and temperatures, natural, and other external forces.

Provide FM approved or UL listed supporting elements conforming to ASME B31.1, MSS SP-58, and ASME B16.34.

PART 3 EXECUTION

3.1 FIELD MEASUREMENTS

After becoming familiar with all details of the work, verify all dimensions in the field, and advise the Contracting Officer of any discrepancy before performing the work.

3.2 INSTALLATION REQUIREMENTS
The installation shall be in accordance with the applicable provisions of NFPA 13 and publications referenced therein. Installation of in-rack sprinklers shall comply with applicable provisions of NFPA 13.

3.3 INSPECTION BY FIRE PROTECTION SPECIALIST

Prior to ceiling installation and concurrent with the Final Acceptance Test Report, certification by the Fire Protection Specialist that the sprinkler system is installed in accordance with the contract requirements, including signed approval of the Preliminary and Final Acceptance Test Reports.

The Fire Protection Specialist shall: 1) inspect the sprinkler system periodically during the installation to assure that the sprinkler system is being provided and installed in accordance with the contract requirements, 2) witness the preliminary and final tests, and sign the test results, 3) after completion of the system inspections and a successful final test, certify in writing that the system has been installed in accordance with the contract requirements. Any discrepancy shall be brought to the attention of the Contracting Officer in writing, no later than three working days after the discrepancy is discovered.

3.4 ABOVEGROUND PIPING INSTALLATION

3.4.1 Piping in Exposed Areas

Install exposed piping without diminishing exit access widths, corridors or equipment access. Exposed horizontal piping, including drain piping, shall be installed to provide maximum headroom.

3.4.2 Piping in Finished Areas

In areas with suspended or dropped ceilings and in areas with concealed spaces above the ceiling, piping shall be concealed above ceilings. Piping shall be inspected, tested and approved before being concealed. Risers and similar vertical runs of piping in finished areas shall be concealed.

3.4.3 Pendent Sprinklers

Drop nipples to pendent sprinklers shall consist of minimum 1-inch pipe with a reducing coupling into which the sprinkler shall be threaded. Hangers shall be provided on arm-overs to drop nipples supplying pendent sprinklers when the arm-over exceeds 12 inches for steel pipe.

Where sprinklers are installed below suspended or dropped ceilings, drop nipples shall be cut such that sprinkler ceiling plates or escutcheons are of a uniform depth throughout the finished space. The outlet of the reducing coupling shall not extend more than 1-inch below the underside of the ceiling. On pendent sprinklers installed below suspended or dropped ceilings, the distance from the sprinkler deflector to the underside of the ceiling shall not exceed 4 inches.

Recessed pendent sprinklers shall be installed such that the distance from the sprinkler deflector to the underside of the ceiling shall not exceed the manufacturer's listed range and shall be of uniform depth throughout the finished area. Pendent sprinklers in suspended ceilings shall be a minimum of 6 inches from ceiling grid.

3.4.4 Upright Sprinklers

Riser nipples or "sprigs" to upright sprinklers shall contain no fittings between the branch line tee and the reducing coupling at the sprinkler. Riser nipples exceeding 30 inches in length shall be individually supported.

3.4.5 Pipe Joints

Pipe joints shall conform to NFPA 13, except as modified herein. Not more than four threads shall show after joint is made up.
Welded joints will be permitted, only if welding operations are performed as required by NFPA 13 at the Contractor's fabrication shop, not at the project construction site.

Flanged joints shall be provided where indicated or required by NFPA 13.

Grooved pipe and fittings shall be prepared in accordance with the manufacturer's latest published specification according to pipe material, wall thickness and size. Grooved couplings, fittings and grooving tools shall be products of the same manufacturer. The diameter of grooves made in the field shall be measured using a "go/no-go" gauge, vernier or dial caliper, narrow-land micrometer, or other method specifically approved by the coupling manufacturer for the intended application.

Groove width and dimension of groove from end of pipe shall be measured and recorded for each change in grooving tool setup to verify compliance with coupling manufacturer's tolerances. Grooved joints shall not be used in concealed locations, such as behind solid walls or ceilings, unless an access panel is shown on the drawings for servicing or adjusting the joint.

3.4.6 Reducers

Reductions in pipe sizes shall be made with one-piece tapered reducing fittings. The use of grooved-end or rubber-gasketed reducing couplings will not be permitted. When standard fittings of the required size are not manufactured, single bushings of the face type will be permitted. Where used, face bushings shall be installed with the outer face flush with the face of the fitting opening being reduced. Bushings shall not be used in elbow fittings, in more than one outlet of a tee, in more than two outlets of a cross, or where the reduction in size is less than 1/2 inch.

3.4.7 Pipe Penetrations

Cutting structural members for passage of pipes or for pipe-hanger fastenings will not be permitted. Pipes that must penetrate concrete or masonry walls or concrete floors shall be core-drilled and provided with pipe sleeves. Each sleeve shall be Schedule 40 galvanized steel, ductile iron or cast-iron pipe and shall extend through its respective wall or floor and be cut flush with each wall surface. Sleeves shall provide required clearance between the pipe and the sleeve per NFPA 13. The space between the sleeve and the pipe shall be firmly packed with mineral wool insulation. Where pipes penetrate fire walls, fire partitions, or floors, pipes shall be fire stopped in accordance with Section 07 84 00 FIRESTOPPING. In penetrations that are not fire-rated or not a floor penetration, the space between the sleeve and the pipe shall be sealed at both ends with plastic waterproof cement that will dry to a firm but pliable mass or with a mechanically adjustable segmented elastomer seal.

3.4.8 Escutcheons

Escutcheons shall be provided for pipe penetration of ceilings and walls. Escutcheons shall be securely fastened to the pipe at surfaces through which piping passes.

3.4.9 Identification Signs

Signs shall be affixed to each control valve, inspector test valve, main drain, auxiliary drain, test valve, and similar valves as appropriate or as required by NFPA 13. Hydraulic design data nameplates shall be permanently affixed to each sprinkler riser as specified in NFPA 13.

3.5 PRELIMINARY TESTS

The system, including the underground water mains, and the aboveground piping and system components, shall be tested to assure that equipment and components function as intended. Submit proposed procedures for Preliminary Tests, no later than 14 days prior to the proposed start of the tests and proposed date and time to begin the preliminary tests. The aboveground interior piping systems and attached appurtenances subjected to system working pressure shall be tested in accordance with NFPA 13. Upon completion of specified tests, submit 3 copies of the completed Preliminary Test Report, no later than 7 days after the completion of the Tests. The
Report shall include both the Contractor's Material and Test Certificate for Aboveground Piping. All items in the Preliminary Tests Report shall be signed by the Fire Protection Specialist.

3.5.1 Aboveground Piping

3.5.1.1 Hydrostatic Testing

Aboveground piping shall be hydrostatically tested in accordance with NFPA 13 at not less than 200 psi or 50 psi in excess of maximum system operating pressure and shall maintain that pressure without loss for 2 hours. There shall be no drop-in gauge pressure or visible leakage when the system is subjected to the hydrostatic test. The test pressure shall be read from a gauge located at the low elevation point of the system or portion being tested.

3.5.1.2 Testing of Alarm Devices

Each alarm switch shall be tested by flowing water through the inspector's test connection. Each water-operated alarm devices shall be tested to verify proper operation.

3.5.1.3 Main Drain Flow Test

Following flushing of the underground piping, a main drain test shall be made to verify the adequacy of the water supply. Static and residual pressures shall be recorded on the certificate specified in paragraph SUBMITTALS. In addition, a main drain test shall be conducted each time after a main control valve is shut and opened.

3.6 FINAL ACCEPTANCE TEST

Begin the Final Acceptance Test only when the Preliminary Test Report has been approved. Submit proposed procedures for Final Acceptance Test, no later than 14 days prior to the proposed start of the tests, and proposed date and time to begin the Test, submitted with the procedures. Notification shall be provided at least 14 days prior to the proposed start of the test.

Notification shall include a copy of the Contractor's Material & Test Certificates. The Fire Protection Specialist shall conduct the Final Acceptance Test and shall provide a complete demonstration of the operation of the system. This shall include operation of control valves and flowing of inspector's test connections to verify operation of associated waterflow alarm switches.

After operation of control valves has been completed, the main drain test shall be repeated to assure that control valves are in the open position. Submit as-built shop drawings, at least 14 days after completion of the Final Tests, updated to reflect as-built conditions after all related work is completed. In addition, the representative shall have available copies of as-built drawings and certificates of tests previously conducted. The installation shall not be considered accepted until identified discrepancies have been corrected and test documentation is properly completed and received.

Submit 3 copies of the completed Final Acceptance Test Report no later than 7 days after the completion of the Final Acceptance Tests. All items in the Final Acceptance Report shall be signed by the Fire Protection Specialist.as specified.

3.7 ONSITE TRAINING

The Fire Protection Specialist shall conduct a training course for operating and maintenance personnel as designated by the Contracting Officer. Submit proposed schedule, at least 14 days prior to the start of related training. Training shall be provided for a period of 4 hours of normal working time and shall start after the system is functionally complete and after the Final Acceptance Test. Submit 6 Operating and Maintenance Manuals listing step-by-step procedures required for system startup, operation, shutdown, and routine maintenance, at least 14 days prior to field training. The manuals shall include the manufacturer's name, model number, parts list, list of parts and tools that should be kept in stock by the owner for routine maintenance including the name of a local supplier, simplified wiring and controls diagrams, troubleshooting guide, and
recommended service organization (including address and telephone number) for each item of equipment. Each service organization submitted shall be capable of providing 4-hour on-site response to a service call on an emergency basis. The Onsite Training shall cover all of the items contained in the approved manuals.

-- End of Section --
SECTION 22 05 10

GENERAL PROVISIONS - PLUMBING

PART 1 - GENERAL

1.1 WORK INCLUDES

A. General administrative and procedural requirements for the plumbing installations.

B. Related Sections:
   1. General Provisions of the contract, including the Division 00 and Division 01, shall apply to Division 22 specification sections.

1.2 QUALITY CONTROL

A. The following publications form a part of this specification to the extent they are applicable.
   1. All work must be performed in accordance with the requirements of local, county, state and national codes and regulations including the requirements of the following:
      (b) National Electrical Code, 2014.
      (c) International Plumbing Code, 2012.
      (d) International Mechanical Code, 2012.
      (e) Occupational Safety and Health Act of 1970.
      (f) For work not specifically listed above, use standards and codes of the National Fire Protection Association.

1.3 REGULATORY REQUIREMENTS

A. All equipment, apparatus and systems shall be rated, tested, fabricated and/or installed in accordance with the applicable industry standard mentioned. The following list will serve to clarify abbreviations that appear in other sections of this specification:
   (1) AGA American Gas Association.
   (2) ARI Air Conditioning and Refrigeration Institute
   (3) ANSI American National Standards Institute
   (4) ASE Association of Safety Engineers
   (5) ASHRAE American Society of Heating, Refrigerating and Air Conditioning Engineer
   (6) ASME American Society of Mechanical Engineers
   (7) AWWA American Water Works Association
   (8) EPA Environmental Protection Agency
   (9) FS Federal Specifications
   (10) IBR Institute of Boiler and Radiator Manufacturers
   (11) IEEE Institute of Electrical and Electronics Engineers
   (12) MCAA Mechanical Contractors' Association of American
   (13) NEMA National Electrical Manufacturers Association
   (14) NFPA National Fire Protection Association
   (15) NSC National Safety Council
   (16) NSF National Sanitation Foundation
   (17) SBI Steel Boiler Institute Industry
   (18) UL Underwriters Laboratories
1.4 DEFINITIONS
A. FURNISH: The term furnish means supply and deliver to the Project Site, ready for unloading, unpacking, assembly, installation and similar operations.
B. INSTALL: The term install describes operations at the Project Site including the actual unloading, unpacking, assembly, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning and similar operations.
C. PROVIDE: The term provides means to furnish and install, complete and ready for intended use.

1.5 SHOP DRAWINGS AND SUBMITTALS
A. See Division 01 for requirements for shop drawings and product data.
B. Asbestos-Free Material/Product: Prior to approval of the material/product to be used, the manufacturer/supplier shall furnish the Architect/Engineer with written certification that the material/product contains no asbestos. This certificate is mandatory before approval will be issued. Submittals furnished without the asbestos-free certification will be returned to the Contractor with no action taken until such certification is provided.
C. See applicable sections to this Division for items requiring shop drawings.

1.6 MATERIALS AND WORKMANSHIP
A. Materials, the style, make or quality of which is specifically designated, shall be as specified.
B. Contractor shall furnish necessary materials in ample quantities and as frequently as required to avoid delay in the progress of the Work, and shall so store them as to prevent interference with other work.

1.7 DEFECTIVE WORK AND MATERIAL
A. All materials or work found to be defective or not in strict conformity with the drawings or different from requirements of the drawings and specifications or defaced or injured through negligence of Contractor or his employees, or through action of fire or weather will be rejected and shall be immediately removed from premises by Contractor and satisfactory materials and work substituted without delay.
B. All defective work or imperfect work shall be corrected immediately on notice from Architect/Engineer. No previous inspection or certificate on account shall be held to relieve Contractor from his obligation to furnish sound materials and to perform good and satisfactory work.

1.8 COOPERATION AND COORDINATION
A. Contractor shall confer with other contractors at the site before installing his work to avoid interferences so that maximum head room and clearances may be maintained. In event that interferences develop between work of various contractors, Architect/Engineer's decision will be final and no additional compensation will be allowed for changes required.
B. Particular attention shall be paid to situations where recessed equipment, pipes and lights occur, or where the work of several trades occurs together above suspended ceilings, in pipe shafts or in areas where space is limited.
C. All fixtures, equipment, devices, switches, outlets, pumps, etc., shall be positioned to avoid all interferences with and to assure proper coordination with work of all other trades, cases, partitions, wall, floor and ceiling patterns, architectural features, etc. All recessed devices, fixtures, etc., shall be coordinated with all wall, floor and ceiling patterns. Architect/Engineer will reconcile conflicts and adjustments where such adjustments are warranted.

1.9 PROTECTION OF EQUIPMENT AND SYSTEMS

A. Contractor shall keep all his respective pipe openings closed by means of plugs or caps to prevent entrance of foreign matter during construction and cover all fixtures, equipment, and apparatus as required to protect them against dirt, water, chemical or mechanical damage both before and after installation. Any such fixtures, equipment or apparatus damaged prior to final acceptance of the Work shall be restored to its original condition or replaced by Contractor at no cost to Owner.

1.10 CONTRACT DRAWINGS

A. The layout shown on the Contract Drawings is necessarily diagrammatic but shall be followed as closely as actual construction and as other work will allow. The dimensions of work as shown on the Contract Drawings are not as-built dimensions. No measurements shall be scaled from the drawings and used as definite dimensions for laying out or fitting work in place.

B. The layout of manufactured equipment as shown on the drawings shall be checked and the exact location shall be determined from the dimensions of equipment shop drawings approved by the Architect/Engineer.

1.11 MAINTENANCE MANUAL AND OPERATING INSTRUCTIONS

A. Upon completion of the Work, Contractors shall provide the Architect/Engineer with three copies of maintenance manual for all equipment furnished and installed under his Work. Manuals shall be in substantial 3-ring binders with project name and number inscribed on face and hinged back. Manual shall include roster of all Owner training session attendees. The manual shall, however, first be approved by the Architect/Engineer.

B. The manual shall include manufacturer's lubricating and operating instructions and parts list and serial numbers for all operating machinery, including drive information, and motor horsepower, amperage, and voltage readings on all phases, valve chart, sequence of operation, index following the order listed in the specifications, warranties in the name of the Installation, and a list of manufacturers, service firms and subcontractors names and telephone numbers.

C. Training attendance rosters for each training session shall be included in manuals. Roster will identify training subject, date, attendees name, job title, office symbol, grade/rank, and telephone number.

D. All switches, controls, and safety devices shall be clearly and permanently marked with embossed or printed plates as to purpose and as to operation and shall be tested in the presence of the Architect/Engineer designated representative to ensure that he understands their function and purpose.

E. Upon completion of the Work, Contractors shall put the systems into service. Contractors shall be entirely responsible for the equipment during all testing operations including the lubricating and turning on and off of such apparatus.

1.12 PROJECT RECORD AND CLOSEOUT DOCUMENTS
A. Refer to Division 01 Closeout procedures for requirements. The following paragraphs supplement the requirements of Division 01.

B. Mark Drawings to indicate revisions to piping and ductwork, size and location both exterior and interior; including locations of coils, dampers and other control devices, filters, boxes, and similar units requiring periodic maintenance or repair; actual equipment locations, dimensioned for column lines; actual inverts and locations of underground piping; concealed equipment, dimensioned to column lines; mains and branches of piping systems, with valves and control devices located and numbered, concealed unions located, and with items requiring maintenance located (i.e., traps, strainers, expansion compensators, tanks, etc.); Change Orders; concealed control system devices.

C. Mark Specifications to indicate addenda, approved substitutions, change orders, actual equipment and materials used.

1.13 DELIVERY, STORAGE AND HANDLING

A. Deliver products to project properly identified with names, model numbers, types, grades, compliance labels, and similar information needed for distinct identifications; adequately packaged and protected to prevent damage during shipment, storage and handling.

B. Store equipment and materials at the site, unless off-site storage is authorized in writing. Protect stored equipment and materials from damage.

C. Coordinate deliveries of plumbing materials and equipment to minimize construction site congestion. Limit each shipment of materials and equipment to the items and quantities needed for the smooth and efficient flow of installations.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 ACCESSIBILITY

A. Install equipment and materials to provide required access for servicing and maintenance. Coordinate the final location of concealed equipment and devices requiring access with final location of required access panels and doors. Allow ample space for removal of all parts that require replacement or servicing.

B. Extend all grease fittings to an accessible location.

C. Refer to the Division 08: Access Doors and Frames.

3.2 ROUGH-IN

A. Verify final locations for rough-ins with field measurements and with the requirements of the actual equipment to be connected.
B. Refer to equipment specifications in Divisions 02 through 33 for rough-in requirements.

3.3 PLUMBING INSTALLATIONS

A. General: sequence, coordinate, and integrate the various elements of plumbing systems, materials, and equipment. Comply with the following requirements:

1. Coordinate plumbing equipment and materials installation with other building components.
2. Verify all dimensions by field measurements.
3. Arrange for chases, slots, and openings in other building components to allow for plumbing installation.
4. Coordinate the installation of required supporting devices and sleeves to be set in poured in place concrete and other structural components, as they are constructed.
5. Sequence, coordinate and integrate installations of plumbing materials and equipment for efficient flow of the Work. Give particular attention to large equipment requiring positioning prior to closing-in the building.
6. Coordinate the cutting and patching of building components to accommodate the installation of plumbing equipment and materials.
7. Where mounting heights are not detailed or dimensioned, install plumbing services and overhead equipment to provide maximum headroom possible.
8. Install plumbing equipment to facilitate maintenance and repair or replacement of equipment components. As much as practical, connect equipment for ease of disconnecting, with minimum of interference with other installations.
9. Coordinate the installation of plumbing materials and equipment above ceiling with suspension system, light fixtures, and other installations.
10. Install access panel or doors where units are concealed behind finished surface. Access panels and doors are specified in Division 8 Section "Access Doors and Frames."
11. Install systems, materials, and equipment giving right-of-way priority to systems required to be installed at a specified slope.
12. Coordinate connection of plumbing systems with exterior underground and overhead utilities and services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies. Provide required connection for each service.
13. Install systems, materials, and equipment to conform with approved submittal data, including coordination drawings, to greatest extent possible. Conform to arrangements indicated by the Contract Documents, recognizing that portions of the Work are shown only in diagrammatic form. Where coordination requirements conflict with individual system requirements, refer conflict to the Architect/Engineer.
14. Install systems, materials, and equipment level and plumb, parallel and perpendicular to other building systems and components, where installed expose in finished spaces.

3.4 CUTTING AND PATCHING

A. This Article specifies the cutting and patching of mechanical equipment, components, and materials to include removal and legal disposal of selected materials, components, and equipment.

B. Refer to Section 01 7329 for general requirements for cutting and patching.

C. Refer to Division 26 for requirements for cutting and patching electrical equipment, components, and materials.
D. Do not endanger or damage installed Work through procedures and processes of cutting and patching.

E. Arrange for repairs required to restore other work, because of damage caused as a result of plumbing installations.

F. No additional compensation will be authorized for cutting and patching Work that is necessitated by ill-timed, defective, or non-conforming installations.

G. Perform cuttings, fittings, and patching of plumbing equipment and materials required to:

(1) Uncover Work to provide for installation of ill-timed work.
(2) Remove and replace defective work.
(3) Remove and replace Work not conforming to requirements of the Contract Documents.
(4) Remove samples of installed Work as specified for testing.
(5) Upon written instruction from the Architect/Engineer, uncover and restore Work to provide for Architect/Engineer’s representative observation of concealed work.

H. Provide and maintain temporary partitions or dust barriers adequate to prevent the spread of dust and dirt to adjacent areas.

3.5 CLEANING

A. Refer to the Division 01 for general requirements for final cleaning.

END OF SECTION 22 05 10
SECTION 22 05 12

COMMON WORK RESULTS FOR PLUMBING

PART 1 - GENERAL

1.1 WORK INCLUDES

A. This Section includes the following:
   1. Piping materials and installation instructions common to most piping systems.
   2. Transition fittings
   3. Sleeves.
   4. Escutcheons.
   5. Grout.
   6. Equipment installation requirements common to equipment sections.
   7. Painting and finishing.

1.2 DEFINITIONS

A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe chases, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.

B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.

C. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in chases.

D. The following are industry abbreviations for plastic materials:
   2. CPVC: Chlorinated polyvinyl chloride plastic.
   3. PE: Polyethylene plastic.
   4. PVC: Polyvinyl chloride plastic.

E. The following are industry abbreviations for rubber materials:
   1. EPDM: Ethylene-propylene-diene terpolymer rubber.
   2. NBR: Acrylonitrile-butadiene rubber.

1.3 SUBMITTALS

A. Product Data: For the following:
   1. Escutcheons.
   2. Transition Fittings.
1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.

B. Store plastic pipes protected from direct sunlight. Support to prevent sagging and bending.

1.5 COORDINATION

A. Arrange for pipe spaces, chases, slots, and openings in building structure during progress of construction, to allow for plumbing installations.

B. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components as they are constructed.

C. Coordinate locations and size requirements for access panels and doors for plumbing items requiring access that are concealed behind finished surfaces. Access panels and doors are specified in Division 8 Section "Access Doors and Frames."

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. Subject to compliance with requirements, provide products by the manufacturers specified.

2.2 PIPE, TUBE, AND FITTINGS

A. Refer to individual Division 22 piping Sections for pipe, tube, and fitting materials and joining methods.

B. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

2.3 JOINING MATERIALS

A. Refer to individual Division 22 piping Sections for special joining materials not listed below.

B. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.

C. Brazing Filler Metals: AWS A5.8, BCuP Series, copper-phosphorus alloys for general-duty brazing, unless otherwise indicated.

D. Solvent Cements for Joining Plastic Piping:

1. PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.
2. Comply with LEED requirements.
2.4 TRANSITION FITTINGS

A. Flexible Transition Couplings for Underground Nonpressure Drainage Piping: ASTM C 1173 with elastomeric sleeve, ends same size as piping to be joined, and corrosion-resistant metal band on each end.

1. Manufacturers:
   b. Fernco, Inc.
   d. Plastic Oddities, Inc.

2.5 SLEEVES

A. Galvanized-Steel Sheet: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.

B. Steel Pipe: ASTM A 53, Type E, Grade B, Schedule 40, galvanized, plain ends.

C. Cast Iron: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.

2.6 ESCUTCHEONS

A. Description: Manufactured wall and ceiling escutcheons and floor plates, with an ID to closely fit around pipe, tube, and insulation of insulated piping and an OD that completely covers opening.

B. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass with polished chrome-plated finish.

C. One-Piece, Cast-Brass Type: With set screw.

   1. Finish: Polished chrome-plated and rough brass.

D. Split-Casting, Cast-Brass Type: With concealed hinge and set screw.

   1. Finish: Polished chrome-plated and rough brass.

2.7 GROUT

A. Description: ASTM C 1107, Grade B, nonshrink and nonmetallic, dry hydraulic-cement grout.

   2. Design Mix: 5000-psi, 28-day compressive strength.
PART 3 - EXECUTION

3.1 PIPING SYSTEMS - COMMON REQUIREMENTS

A. Install piping according to the following requirements and Division 22 Sections specifying piping systems.

B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved.

C. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.

D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

F. Install piping to permit valve servicing.

G. Install piping at indicated slopes.

H. Install piping free of sags and bends.

I. Install fittings for changes in direction and branch connections.

J. Install piping to allow application of insulation.

K. Install piping to avoid running above electrical panels.

L. Select system components with pressure rating equal to or greater than system operating pressure.

M. Install escutcheons for penetrations of walls, ceilings, and floors according to the following:

   1. New Piping:
      a. Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep-pattern type.
      b. Chrome-Plated Piping: One-piece, cast-brass type with polished chrome-plated finish.
      c. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, cast-brass type with polished chrome-plated finish.
      d. Bare Piping at Ceiling Penetrations in Finished Spaces: One-piece or split-casting, cast-brass type with polished chrome-plated finish.
      e. Bare Piping in Unfinished Service Spaces: One-piece, cast-brass type with rough-brass finish.
      f. Bare Piping in Equipment Rooms: One-piece, cast-brass type.

N. Sleeves are not required for core-drilled holes.

O. Install sleeves for pipes passing through concrete and masonry walls and concrete floor.
P. Install sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, and concrete floor and roof slabs.

1. Cut sleeves to length for mounting flush with both surfaces.
   a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches (50 mm) above finished floor level. Extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified.

2. Install sleeves in new walls and slabs as new walls and slabs are constructed.

3. Install sleeves that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation. Use the following sleeve materials:
   a. Steel Pipe Sleeves: For pipes smaller than NPS 6.
   b. Steel Sheet Sleeves: For pipes NPS 6 and larger, penetrating gypsum-board partitions.

4. Except for underground wall penetrations, seal annular space between sleeve and pipe or pipe insulation, using joint sealants appropriate for size, depth, and location of joint. Refer to Division 7 Section "Joint Sealants" for materials and installation.

Q. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Refer to Division 7 Section "Firestopping" for materials.

R. Verify final equipment locations for roughing-in.

S. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.

3.2 PIPING JOINT CONSTRUCTION

A. Join pipe and fittings according to the following requirements and Division 22 Sections specifying piping systems.

B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

D. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.


F. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
   1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
   2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
G. Plastic Piping Solvent-Cement Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:

1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
2. ABS Piping: Join according to ASTM D 2235 and ASTM D 2661 Appendixes.
3. CPVC Piping: Join according to ASTM D 2846/D 2846M Appendix.
4. PVC Pressure Piping: Join schedule number ASTM D 1785, PVC pipe and PVC socket fittings according to ASTM D 2672. Join other-than-schedule-number PVC pipe and socket fittings according to ASTM D 2855.
5. PVC Nonpressure Piping: Join according to ASTM D 2855.
6. PVC to ABS Nonpressure Transition Fittings: Join according to ASTM D 3138 Appendix.

3.3 PIPING CONNECTIONS

A. Make connections according to the following, unless otherwise indicated:

1. Install unions, in piping NPS 2 and smaller, adjacent to each valve and at final connection to each piece of equipment.
2. Dry Piping Systems: Install dielectric unions and flanges to connect piping materials of dissimilar metals.
3. Wet Piping Systems: Install dielectric coupling and nipple fittings to connect piping materials of dissimilar metals.

3.4 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

A. Install equipment to allow maximum possible headroom unless specific mounting heights are not indicated.
B. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.
C. Install plumbing equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations. Extend grease fittings to accessible locations.
D. Install equipment to allow right of way for piping installed at required slope.

3.5 PAINTING

A. Painting of plumbing systems, equipment, and components is specified in Division 9 Section "Painting."
B. Damage and Touchup: Repair marred and damaged factory-painted finishes with materials and procedures to match original factory finish.

END OF SECTION 22 05 12
SECTION 22 05 29

HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
   A. General administrative and procedural requirements for the plumbing installations.
   B. General Provisions of the contract, including Division 00 and Division 01, shall apply to Division 22 specifications sections.

1.2 WORK INCLUDES
   A. Metal pipe hangers and supports.
   B. Trapeze pipe hangers.
   C. Thermal-hanger shield inserts.
   D. Fastener systems.
   E. Pipe positioning systems.
   F. Equipment supports.
   G. Related Sections:
      1. Division 5 Section "Metal Fabrications" for structural-steel shapes and plates for trapeze hangers for pipe and equipment supports.

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

1.4 PERFORMANCE REQUIREMENTS
   A. Structural Performance: Hangers and supports for plumbing piping and equipment shall withstand the effects of gravity loads and stresses within limits and under conditions indicated according to ASCE/SEI 7.

1.5 SUBMITTALS
   A. Product Data: For each type of product indicated.
   B. Welding certificates.
PART 2 - PRODUCTS

2.1 METAL PIPE HANGERS AND SUPPORTS

A. Carbon-Steel Pipe Hangers and Supports:

1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
2. Galvanized Metallic Coatings: Pregalvanized or hot dipped.
3. Nonmetallic Coatings: Plastic coating, jacket, or liner.
4. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.

B. Copper Pipe Hangers:

1. Description: MSS SP-58, Types 1 through 58, copper-coated-steel, factory-fabricated components.

2.2 TRAPEZE PIPE HANGERS

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

2.3 THERMAL-HANGER SHIELD INSERTS

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

1. Carpenter & Paterson, Inc.
3. ERICO International Corporation.
5. PHS Industries, Inc.
6. Pipe Shields, Inc.; a subsidiary of Piping Technology & Products, Inc.
7. Piping Technology & Products, Inc.
8. Rilco Manufacturing Co., Inc.
9. Value Engineered Products, Inc.

B. Insulation-Insert Material for Cold Piping: ASTM C 552, Type II cellular glass with 100-psig minimum compressive strength and vapor barrier.

C. Insulation-Insert Material for Hot Piping: ASTM C 552, Type II cellular glass with 100-psig minimum compressive strength.

D. For Trapeze or Clamped Systems: Insert and shield shall cover entire circumference of pipe.

E. For Clevis or Band Hangers: Insert and shield shall cover lower 180 degrees of pipe.

F. Insert Length: Extend 2 inches beyond sheet metal shield for piping operating below ambient air temperature.
2.4 MISCELLANEOUS MATERIALS

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

B. Grout: ASTM C 1107, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink and nonmetallic grout; suitable for interior and exterior applications.
   2. Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.

PART 3 - EXECUTION

3.1 HANGER AND SUPPORT INSTALLATION

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

B. Metal Trapeze Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Arrange for grouping of parallel runs of horizontal piping, and support together on field-fabricated trapeze pipe hangers.
   1. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified for individual pipe hangers.
   2. Field fabricate from ASTM A 36/A 36M, carbon-steel shapes selected for loads being supported. Weld steel according to AWS D1.1/D1.1M.

C. Thermal-Hanger Shield Installation: Install in pipe hanger or shield for insulated piping.

D. Install hangers and supports complete with necessary attachments, inserts, bolts, rods, nuts, washers, and other accessories.

E. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.

F. Install lateral bracing with pipe hangers and supports to prevent swaying.

G. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, NPS 2-1/2 and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.

H. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.

I. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and to not exceed maximum pipe deflections allowed by ASME B31.9 for building services piping.

J. Insulated Piping:
1. Attach clamps and spacers to piping.
   a. Piping Operating above Ambient Air Temperature: Clamp may project through insulation.
   b. Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.
   c. Do not exceed pipe stress limits allowed by ASME B31.9 for building services piping.

2. Install MSS SP-58, Type 39, protection saddles if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.
   a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.

3. Install MSS SP-58, Type 40, protective shields on cold piping with vapor barrier. Shields shall span an arc of 180 degrees.
   a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.

4. Shield Dimensions for Pipe: Not less than the following:
   a. NPS 1/4 to NPS 3-1/2: 12 inches long and 0.048 inch thick.

5. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.

3.2 METAL FABRICATIONS

A. Cut, drill, and fit miscellaneous metal fabrications for trapeze pipe hangers and equipment supports.

B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.

C. Field Welding: Comply with AWS D1.1/D1.1M procedures for shielded, metal arc welding; appearance and quality of welds; and methods used in correcting welding work; and with the following:
   1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
   2. Obtain fusion without undercut or overlap.
   3. Remove welding flux immediately.
   4. Finish welds at exposed connections so no roughness shows after finishing and so contours of welded surfaces match adjacent contours.

3.3 ADJUSTING

A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

B. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches.
3.4 PAINTING

A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.

   1. Apply paint by brush or spray to provide a minimum dry film thickness of 2.0 mils.

B. Touchup: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal are specified in Division 9 painting Sections.

C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

3.5 HANGER AND SUPPORT SCHEDULE

A. Specific hanger and support requirements are in Sections specifying piping systems and equipment.

B. Comply with MSS SP-69 for pipe-hanger selections and applications that are not specified in piping system Sections.

C. Use hangers and supports with galvanized metallic coatings for piping and equipment that will not have field-applied finish.

D. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.

E. Use carbon-steel pipe hangers and supports and metal trapeze pipe hangers and attachments for general service applications.

F. Use copper-plated or epoxy coated pipe hangers and attachments for copper piping and tubing.

G. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

   1. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated, stationary pipes.
   2. Steel Pipe Clamps (MSS Type 4): For suspension of cold and hot pipes NPS 1/2 to NPS 24 if no insulation is required.
   3. Pipe Hangers (MSS Type 5): For suspension of pipes NPS 1/2 to NPS 4, to allow off-center closure for hanger installation before pipe erection.
   4. Adjustable, Swivel Split- or Solid-Ring Hangers (MSS Type 6): For suspension of noninsulated, stationary pipes NPS 3/4 to NPS 8 (DN 20 to DN 200).

H. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

   1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers NPS 3/4 to NPS 24.
   2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers NPS 3/4 to NPS 24 if longer ends are required for riser clamps.
I. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches for heavy loads.
2. Steel Clevises (MSS Type 14): For 120 to 450 deg F piping installations.
3. Swivel Turnbuckles (MSS Type 15): For use with MSS Type 11, split pipe rings.
4. Malleable-Iron Sockets (MSS Type 16): For attaching hanger rods to various types of building attachments.
5. Steel Weldless Eye Nuts (MSS Type 17): For 120 to 450 deg F (49 to 232 deg C) piping installations.

J. Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Top-Beam C-Clamps (MSS Type 19): For use under roof installations with bar-joist construction, to attach to top flange of structural shape.

K. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel-Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.
2. Protection Shields (MSS Type 40): Of length recommended in writing by manufacturer to prevent crushing insulation.
3. Thermal-Hanger Shield Inserts: For supporting insulated pipe.

L. Comply with MSS SP-69 for trapeze pipe-hanger selections and applications that are not specified in piping system Sections.

M. Comply with MFMA-103 for metal framing system selections and applications that are not specified in piping system Sections.

N. Use powder-actuated fasteners or mechanical-expansion anchors instead of building attachments where required in concrete construction.

END OF SECTION 22 05 29
SECTION 22 07 19

PLUMBING INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. General administrative and procedural requirements for the plumbing installations.
B. Drawings and general provisions of the contract, including general and supplementary conditions and Division 00 and Division 01, shall apply to this section.

1.2 WORK INCLUDES

A. Insulation of plumbing piping, including the following:
   1. Insulation Materials:
      a. Flexible elastomeric.
      b. Mineral fiber.
   2. Adhesives.
   3. Sealants.
   4. Factory-applied jackets.
   5. Field-applied PVC fitting covers.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated. Include thermal conductivity, thickness, and jackets (both factory and field applied, if any).

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the Department of Labor, Bureau of Apprenticeship and Training.

B. Fire-Test-Response Characteristics: Insulation and related materials shall have fire-test-response characteristics indicated, as determined by testing identical products per ASTM E 84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing and inspecting agency.
   1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.

1.5 DELIVERY, STORAGE, AND HANDLING

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

A. Coordinate size and location of supports, hangers, and insulation shields specified in Division 22 Section "Hangers and Supports for Plumbing Piping and Equipment."

B. Coordinate clearance requirements with piping Installer for piping insulation application and equipment Installer for equipment insulation application. Before preparing piping Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.

1.7 SCHEDULING

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

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

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS

A. Comply with requirements in Part 3 schedule articles for where insulating materials shall be applied.

B. Products shall not contain asbestos, lead, mercury, or mercury compounds.

C. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.

D. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.

E. Flexible Elastomeric: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type I for tubular materials and Type II for sheet materials.

   1. Manufacturer: Subject to compliance with requirements, provide insulation by one of the following:
      a. Aeroflex USA Inc.
      b. Armacell LLC.
      c. RBX Corporation.
      d. Halstead.

2.2 ADHESIVES

A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated, unless otherwise indicated.

B. Flexible Elastomeric Adhesive: Comply with MIL-A-24179A, Type II, Class I.
1. Manufacturer: Subject to compliance with requirements, provide products by one of the following:
   a. Aeroflex USA Inc.
   b. Armacell LCC.
   c. Foster Products Corporation, H. B. Fuller Company.
   d. RBX Corporation.
   e. Halstead.

2. For indoor applications, use adhesive that has a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

PART 3 - EXECUTION

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

3.2 PREPARATION
   
   A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.
   
   B. Surface Preparation: Clean and prepare surfaces to be insulated. Before insulating, apply a corrosion coating to insulated surfaces as follows:
      1. Carbon Steel: Coat carbon steel operating at a service temperature between 32 and 300 deg F with an epoxy coating. Consult coating manufacturer for appropriate coating materials and application methods for operating temperature range.
      
   C. Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless-steel surfaces, use demineralized water.

3.3 GENERAL INSTALLATION REQUIREMENTS
   
   A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of equipment and piping including fittings, valves, and specialties.
   
   B. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of equipment and pipe system as specified in insulation system schedules.
   
   C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.
   
   D. Install insulation with longitudinal seams at top and bottom of horizontal runs.
E. Install multiple layers of insulation with longitudinal and end seams staggered.

F. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.

G. Keep insulation materials dry during application and finishing.

H. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.

I. Install insulation with least number of joints practical.

J. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.
   1. Install insulation continuously through hangers and around anchor attachments.
   2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
   3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
   4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.

K. Apply adhesives, mastics, and sealants at manufacturer’s recommended coverage rate and wet and dry film thicknesses.

L. Install insulation with factory-applied jackets as follows:
   1. Draw jacket tight and smooth.
   2. Cover circumferential joints with 3-inch wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches o.c.
   3. Overlap jacket longitudinal seams at least 1-1/2 inches. Install insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 4 inches o.c.
      a. For below ambient services, apply vapor-barrier mastic over staples.
   4. Cover joints and seams with tape as recommended by insulation material manufacturer to maintain vapor seal.
   5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to pipe flanges and fittings.

M. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.

N. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.

O. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

P. For above ambient services, do not install insulation to the following:
1. Vibration-control devices.
2. Testing agency labels and stamps.
3. Nameplates and data plates.
5. Handholes.
6. Cleanouts.

3.4 PENETRATIONS

A. Insulation Installation at Interior Wall and Partition Penetrations (Not Fire Rated): Install insulation continuously through walls and partitions.

B. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Install insulation continuously through penetrations of fire-rated walls and partitions.

   1. Comply with requirements in Division 07 Section "Penetration Firestopping" firestopping and fire-resistive joint sealers.

3.5 GENERAL PIPE INSULATION INSTALLATION

A. Requirements in this article generally apply to all insulation materials except where more specific requirements are specified in various pipe insulation material installation articles.

B. Insulation Installation on Fittings, Valves, Strainers, Flanges, and Unions:

   1. Install insulation over fittings, valves, strainers, flanges, unions, and other specialties with continuous thermal and vapor-retarder integrity, unless otherwise indicated.

   2. Insulate pipe elbows using preformed fitting insulation or mitered fittings made from same material and density as adjacent pipe insulation. Each piece shall be butted tightly against adjoining piece and bonded with adhesive. Fill joints, seams, voids, and irregular surfaces with insulating cement finished to a smooth, hard, and uniform contour that is uniform with adjoining pipe insulation.

   3. Insulate tee fittings with preformed fitting insulation or sectional pipe insulation of same material and thickness as used for adjacent pipe. Cut sectional pipe insulation to fit. But each section closely to the next and hold in place with tie wire. Bond pieces with adhesive.

   4. Insulate valves using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. For valves, insulate up to and including the bonnets, valve stuffing-box studs, bolts, and nuts. Fill joints, seams, and irregular surfaces with insulating cement.

   5. Insulate strainers using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. Fill joints, seams, and irregular surfaces with insulating cement. Insulate strainers so strainer basket flange or plug can be easily removed and replaced without damaging the insulation and jacket. Provide a removable reusable insulation cover. For below ambient services, provide a design that maintains vapor barrier.

   6. Insulate flanges and unions using a section of oversized preformed pipe insulation. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker.
7. Cover segmented insulated surfaces with a layer of finishing cement and coat with a mastic. Install vapor-barrier mastic for below ambient services and a breather mastic for above ambient services. Reinforce the mastic with fabric-reinforcing mesh. Trowel the mastic to a smooth and well-shaped contour.

8. For services not specified to receive a field-applied jacket except for flexible elastomeric install fitted PVC cover over elbows, tees, strainers, valves, flanges, and unions. Terminate ends with PVC end caps. Tape PVC covers to adjoining insulation facing using PVC tape.

C. Insulate instrument connections for thermometers, pressure gages, pressure temperature taps, test connections, flow meters, sensors, switches, and transmitters on insulated pipes, vessels, and equipment. Shape insulation at these connections by tapering it to and around the connection with insulating cement and finish with finishing cement, mastic, and flashing sealant.

3.6 FLEXIBLE ELASTOMERIC INSULATION INSTALLATION

A. Seal longitudinal seams and end joints with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

B. Insulation Installation on Pipe Flanges:
   1. Install pipe insulation to outer diameter of pipe flange.
   2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
   3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of sheet insulation of same thickness as pipe insulation.
   4. Secure insulation to flanges and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

C. Insulation Installation on Pipe Fittings and Elbows:
   1. Install mitered sections of pipe insulation.
   2. Secure insulation materials and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

D. Insulation Installation on Valves and Pipe Specialties:
   1. Install preformed valve covers manufactured of same material as pipe insulation when available.
   2. When preformed valve covers are not available, install cut sections of pipe and sheet insulation to valve body. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
   3. Install insulation to flanges as specified for flange insulation application.
   4. Secure insulation to valves and specialties and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

3.7 FINISHES

A. Exterior Flexible Elastomeric Thermal Insulation: After adhesive has fully cured, apply two coats of insulation manufacturer's recommended protective coating.
3.8 PIPING INSULATION SCHEDULE, GENERAL

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

B. Items Not Insulated: Unless otherwise indicated, do not install insulation on the following:
   1. Underground piping.
   2. Chrome-plated pipes and fittings unless there is a potential for personnel injury.

3.9 INDOOR PIPING INSULATION SCHEDULE

A. Domestic Cold Water:
   1. Piping in wall spaces and chases only:
      a. Flexible Elastomeric: 1 inch thick.

B. Domestic Hot and Recirculated Hot Water:
   1. Piping in wall spaces and chases only:
      a. Flexible Elastomeric: 1 inch thick.

C. Sanitary Vent Piping in Ceiling Spaces:
   1. New piping above ceilings:
      a. Flexible Elastomeric: ½ inch thick.

END OF SECTION 22 07 19
SECTION 22 11 16

DOMESTIC WATER PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
   A. General administrative and procedural requirements for the plumbing installations.
   B. General Provisions of the contract, including Division 00 and Division 01, shall apply to Division 22 specifications sections.

1.2 WORK INCLUDES
   A. Aboveground domestic water pipes, tubes, fittings, and specialties inside the building.

1.3 PERFORMANCE REQUIREMENTS
   A. Seismic Performance: Domestic water piping and support and installation shall withstand effects of earthquake motions determined according to ASCE/SEI 7.

1.4 SUBMITTALS
   A. Product Data: For the following products:
      1. Piping.
      2. Fittings.
   B. Water Test Reports: Specified in "Cleaning" Article.

1.5 QUALITY ASSURANCE
   A. Piping materials shall bear label, stamp, or other markings of specified testing agency.
   B. Comply with NSF 61 for potable domestic water piping and components.

1.6 PROJECT CONDITIONS
   A. Interruption of Existing Water Service: Do not interrupt water service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary water service according to requirements indicated:
      1. Notify Contracting Officer no fewer than seven days in advance of proposed interruption of water service.
      2. Do not proceed with interruption of water service without Contracting Officer’s written permission.
1.7 COORDINATION

A. Coordinate sizes and locations of concrete bases with actual equipment provided.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

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

2.2 COPPER TUBE AND FITTINGS

A. Hard Copper Tube: ASTM B 88, Type L water tube, drawn temper.
   4. Copper Unions: MSS SP-123, cast-copper-alloy, hexagonal-stock body, with ball-and-socket, metal-to-metal seating surfaces, and solder-joint or threaded ends.

2.3 PIPING JOINING MATERIALS

A. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.
   B. Brazing Filler Metals: AWS A5.8/A5.8M, BCuP Series, copper-phosphorus alloys for general-duty brazing unless otherwise indicated.

PART 3 - EXECUTION

3.1 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of domestic water piping. Indicated locations and arrangements are used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.

B. Install domestic water piping with 0.25 percent slope downward toward drain, and plumb.

C. Install piping concealed from view and protected from physical contact by building occupants unless otherwise indicated and except in equipment rooms and service areas.

D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal, and coordinate with other services occupying that space.
F. Install piping adjacent to equipment and specialties to allow service and maintenance.

G. Install piping to permit valve servicing.

H. Install nipples, unions, special fittings, and valves with pressure ratings the same as or higher than system pressure rating used in applications below unless otherwise indicated.

I. Install piping free of sags and bends.

J. Install fittings for changes in direction and branch connections.

K. Install unions in copper tubing at final connection to each piece of equipment, machine, and specialty.

L. Install piping to avoid running above electric panels.

3.2 JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs.

B. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.

C. Brazed Joints: Join copper tube and fittings according to CDA's "Copper Tube Handbook," "Brazed Joints" Chapter.

D. Soldered Joints: Apply ASTM B 813, water-flushable flux to end of tube. Join copper tube and fittings according to ASTM B 828 or CDA's "Copper Tube Handbook."

E. Dissimilar-Material Piping Joints: Make joints using adapters compatible with materials of both piping systems.

3.3 VALVE INSTALLATION

A. General-Duty Valves: Comply with requirements in Division 22 Section "General-Duty Valves for Plumbing Piping" for valve installations.

B. Install shutoff valve close to water main on each branch and riser serving plumbing fixtures or equipment, on each water supply to equipment, and on each water supply to plumbing fixtures that do not have supply stops. Use ball valves.

C. Install drain valves for equipment at base of each water riser, at low points in horizontal piping, and where required to drain water piping. Drain valves are specified in Division 22 Section "Domestic Water Piping Specialties."

1. Hose-End Drain Valves: At low points in water mains, risers, and branches.

3.4 HANGER AND SUPPORT INSTALLATION

A. Comply with requirements in Division 22 Section "Hangers and Supports for Plumbing Piping and Equipment" for pipe hanger and support products and installation.
1. Vertical Piping: MSS Type 8 or 42, clamps.
2. Individual, Straight, Horizontal Piping Runs:
   a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.
   b. Longer Than 100 Feet: MSS Type 43, adjustable roller hangers.
3. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls.
   Support pipe rolls on trapeze.
4. Base of Vertical Piping: MSS Type 52, spring hangers.

B. Support vertical piping and tubing at base and at each floor.

C. Rod diameter may be reduced one size for double-rod hangers, to a minimum of 3/8 inch.

D. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:
   1. NPS 3/4 and Smaller: 60 inches with 3/8-inch rod.
   2. NPS 1 and NPS 1-1/4: 72 inches with 3/8-inch rod.
   3. NPS 1-1/2 and NPS 2: 96 inches with 3/8-inch rod.
   4. NPS 2-1/2: 108 inches with 1/2-inch rod.

E. Install supports for vertical copper tubing every 6 feet.

3.5 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Install piping adjacent to equipment and machines to allow service and maintenance.

C. Connect domestic water piping to water-service piping with shutoff valve; extend and connect to the following:
   1. Water Heaters: Cold-water inlet and hot-water outlet piping in sizes indicated, but not smaller than sizes of water heater connections.
   2. Plumbing Fixtures: Cold- and hot-water supply piping in sizes indicated, but not smaller than required by plumbing code. Comply with requirements in Division 22 plumbing fixture Sections for connection sizes.
   3. Equipment: Cold- and hot-water supply piping as indicated, but not smaller than equipment connections. Provide shutoff valve and union for each connection. Use flanges instead of unions for NPS 2-1/2 and larger.

3.6 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Piping Inspections:
   1. Do not enclose, cover, or put piping into operation until it has been inspected and approved by authorities having jurisdiction.
   2. During installation, notify authorities having jurisdiction at least one day before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction:
a. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.

b. Final Inspection: Arrange final inspection for authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.

3. Reinspection: If authorities having jurisdiction find that piping will not pass tests or inspections, make required corrections and arrange for reinspection.

4. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

C. Piping Tests:

1. Fill domestic water piping. Check components to determine that they are not air bound and that piping is full of water.

2. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit a separate report for each test, complete with diagram of portion of piping tested.

3. Leave new, altered, extended, or replaced domestic water piping uncovered and unconcealed until it has been tested and approved. Expose work that was covered or concealed before it was tested.

4. Cap and subject piping to static water pressure of 50 psig above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and allow to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.

5. Repair leaks and defects with new materials and retest piping or portion thereof until satisfactory results are obtained.

6. Prepare reports for tests and for corrective action required.

D. Domestic water piping will be considered defective if it does not pass tests and inspections.

E. Prepare test and inspection reports.

3.7 ADJUSTING

A. Perform the following adjustments before operation:

1. Close drain valves, hydrants, and hose bibbs.

2. Open shutoff valves to fully open position.

3. Open throttling valves to proper setting.

4. Adjust balancing valves in hot-water-circulation return piping to provide adequate flow.

   a. Manually adjust ball-type balancing valves in hot-water-circulation return piping to provide flow of hot water in each branch.

   b. Adjust calibrated balancing valves to flows indicated.

5. Remove plugs used during testing of piping and for temporary sealing of piping during installation.


7. Remove filter cartridges from housings and verify that cartridges are as specified for application where used and are clean and ready for use.

8. Check plumbing specialties and verify proper settings, adjustments, and operation.
3.8 CLEANING

A. Clean and disinfect potable domestic water piping as follows:
   1. Purge new piping and parts of existing piping that have been altered, extended, or repaired before using.
   2. Use purging and disinfecting procedures prescribed by authorities having jurisdiction; if methods are not prescribed, use procedures described in either AWWA C651 or AWWA C652 or follow procedures described below:
      a. Flush piping system with clean, potable water until dirty water does not appear at outlets.
      b. Fill and isolate system according to either of the following:
         1) Fill system or part thereof with water/chlorine solution with at least 50 ppm of chlorine. Isolate with valves and allow to stand for 24 hours.
         2) Fill system or part thereof with water/chlorine solution with at least 200 ppm of chlorine. Isolate and allow to stand for three hours.
      c. Flush system with clean, potable water until no chlorine is in water coming from system after the standing time.
      d. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedures if biological examination shows contamination.

B. Prepare and submit reports of purging and disinfecting activities.

C. Clean interior of domestic water piping system. Remove dirt and debris as work progresses.

3.9 PIPING SCHEDULE

A. Transition and special fittings with pressure ratings at least equal to piping rating may be used in applications below unless otherwise indicated.

B. Flanges and unions may be used for aboveground piping joints unless otherwise indicated.

C. Aboveground domestic water piping, NPS 4 and smaller shall be the following:
   1. Hard copper tube, ASTM B 88, Type L (ASTM B 88M, Type B); cast- or wrought- copper solder-joint fittings joints.

END OF SECTION 22 11 16
SECTION 22 13 16

SANITARY WASTE AND VENT PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. General administrative and procedural requirements for the plumbing installations.

B. General Provisions of the contract, including Division 00 and Division 01, shall apply to Division 22 specifications sections.

1.2 WORK INCLUDES

A. Soil, waste, and vent piping inside the building including the following:
   1. Pipe, tube, and fittings.
   2. Special pipe fittings.

1.3 DEFINITIONS


B. EPDM: Ethylene-propylene-diene terpolymer rubber.

C. LLDPE: Linear, low-density polyethylene plastic.

D. NBR: Acrylonitrile-butadiene rubber.

E. PE: Polyethylene plastic.

F. PVC: Polyvinyl chloride plastic.

G. TPE: Thermoplastic elastomer.

1.4 PERFORMANCE REQUIREMENTS

A. Components and installation shall be capable of withstanding the following minimum working pressure, unless otherwise indicated:

B. Seismic Performance: Soil, waste, and vent piping and support and installation shall be capable of withstanding the effects of seismic events determined according to ASCE 7, "Minimum Design Loads for Buildings and Other Structures."
1.5 SUBMITTALS

A. Product Data: For pipe, tube, fittings, and couplings.

B. Field quality-control inspection and test reports.

1.6 QUALITY ASSURANCE

A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

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. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 PIPING MATERIALS

A. Refer to Part 3 "Piping Applications" Article for applications of pipe, tube, fitting, and joining materials.

2.3 PVC PIPE AND FITTINGS

A. Solid-wall PVC Pipe: ASTM D 2665, drain, waste, and vent.

1. PVC Socket Fittings: ASTM D 2665, socket type, made to ASTM D 3311, drain, waste, and vent patterns.

B. Solvent Cement and Adhesive Primer:

1. Use PVC solvent cement that has a VOC content of 510 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2. Use adhesive primer that has a VOC content of 550 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

PART 3 - EXECUTION

3.1 EXCAVATION

A. Refer to Division 2 Section "Earthwork" for excavating, trenching, and backfilling.

3.2 PIPING APPLICATIONS

A. Aboveground, soil, waste and vent piping shall be the following:
1. Solid wall PVC pipe, PVC socket fittings, and solvent cemented joints.

B. Underground, soil, waste, and vent piping shall be the following:
   1. Solid wall PVC pipe, PVC socket fittings, and solvent-cemented joints.

3.3 PIPING INSTALLATION

A. Basic piping installation requirements are specified in Division 22 Section "Common Work Results for Plumbing."

B. Install cleanouts at grade and extend to where building sanitary drains connect to building sanitary sewers.

C. Make changes in direction for soil and waste drainage and vent piping using appropriate branches, bends, and long-sweep bends. Sanitary tees and short-sweep 1/4 bends may be used on vertical stacks if change in direction of flow is from horizontal to vertical. Use long-turn, double Y-branch and 1/8-bend fittings if 2 fixtures are installed back to back or side by side with common drain pipe. Straight tees, elbows, and crosses may be used on vent lines. Do not change direction of flow more than 90 degrees. Use proper size of standard increasers and reducers if pipes of different sizes are connected. Reducing size of drainage piping in direction of flow is prohibited.

D. Lay buried building drainage piping beginning at low point of each system. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream. Install required gaskets according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements. Maintain swab in piping and pull past each joint as completed.

E. Install soil and waste drainage and vent piping at the following minimum slopes, unless otherwise indicated:
   1. Horizontal Sanitary Drainage Piping 2-1/2" and smaller: 2 percent downward in direction of flow.
   2. Horizontal Sanitary Drainage Piping 3" to 6": 1 percent downward in direction of flow.
   3. Horizontal Sanitary Drainage Piping 8" and larger: 1/2 percent downward in direction of flow.
   4. Vent Piping: 1 percent down toward vertical fixture vent or toward vent stack.

F. Install underground PVC soil and waste drainage piping according to ASTM D 2321.

G. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.

3.4 JOINT CONSTRUCTION

A. Basic piping joint construction requirements are specified in Division 22 Section "Common Work Results for Plumbing."

B. PVC Nonpressure Piping Joints: Join piping according to ASTM D 2665.
3.5 HANGER AND SUPPORT INSTALLATION

A. Pipe hangers and supports are specified in Division 22 Section "Hangers and Supports for Plumbing Piping and Equipment." Install the following:
   1. Vertical Piping: MSS Type 8 or Type 42, clamps.
   2. Install individual, straight, horizontal piping runs according to the following:
      a. MSS Type 1, adjustable, steel clevis hangers.
   3. Base of Vertical Piping: MSS Type 52, spring hangers.

B. Install supports according to Division 22 Section "Hangers and Supports."

C. Support vertical piping and tubing at base and at each floor.

D. Rod diameter may be reduced 1 size for double-rod hangers, with 3/8-inch minimum rods.

E. Install hangers for PVC piping with the following maximum horizontal spacing and minimum rod diameters:
   1. NPS 1-1/2 and NPS 2: 48 inches with 3/8-inch rod.
   2. NPS 3: 48 inches with 1/2-inch rod.
   3. NPS 4 and 5: 48 inches with 5/8-inch rod.

F. Install supports for vertical PVC piping every 48 inches.

G. Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.

3.6 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Connect soil and waste piping to exterior sanitary sewerage piping. Use transition fitting to join dissimilar piping materials.

C. Connect drainage and vent piping to the following:
   1. Plumbing Fixtures: Connect drainage piping in sizes indicated, but not smaller than required by plumbing code.
   2. Plumbing Fixtures and Equipment: Connect atmospheric vent piping in sizes indicated, but not smaller than required by authorities having jurisdiction.
   3. Plumbing Specialties: Connect drainage and vent piping in sizes indicated, but not smaller than required by plumbing code.
   4. Equipment: Connect drainage piping as indicated. Provide shutoff valve, if indicated, and union for each connection. Use flanges instead of unions for connections NPS 2-1/2 and larger.

3.7 FIELD QUALITY CONTROL

A. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction.
1. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.

2. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.

B. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.

C. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

D. Test sanitary drainage and vent piping according to procedures of authorities having jurisdiction or, in absence of published procedures, as follows:

1. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.

2. Leave uncovered and unconcealed new, altered, extended, or replaced drainage and vent piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.

3. Roughing-in Plumbing Test Procedure: Test drainage and vent piping, except outside leaders, on completion of roughing-in. Close openings in piping system and fill with water to point of overflow, but not less than 10-foot head of water. From 15 minutes before inspection starts to completion of inspection, water level must not drop. Inspect joints for leaks.

4. Finished Plumbing Test Procedure: After plumbing fixtures have been set and traps filled with water, test connections and prove they are gastight and watertight. Plug vent-stack openings on roof and building drains where they leave building. Introduce air into piping system equal to pressure of 1-inch wg. Use U-tube or manometer inserted in trap of water closet to measure this pressure. Air pressure must remain constant without introducing additional air throughout period of inspection. Inspect plumbing fixture connections for gas and water leaks.

5. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.

6. Prepare reports for tests and required corrective action.

3.8 CLEANING

A. Clean interior of piping. Remove dirt and debris as work progresses.

B. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.

C. Place plugs in ends of uncompleted piping at end of day and when work stops.

3.9 PROTECTION

A. Exposed PVC Piping: Protect plumbing vents exposed to sunlight with two coats of water-based latex paint.

END OF SECTION 22 13 16
SECTION 22 13 19

SANITARY WASTE PIPING SPECIALTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. General administrative and procedural requirements for the plumbing installations.

B. General Provisions of the contract, including Division 00 and Division 01, shall apply to Division 22 specifications sections.

1.2 WORK INCLUDES

A. Cleanouts.

B. Floor drains.

C. Miscellaneous sanitary drainage piping specialties.

1.3 DEFINITIONS


B. FOG: Fats, oils, and greases.

C. FRP: Fiberglass-reinforced plastic.

D. HDPE: High-density polyethylene plastic.

E. PE: Polyethylene plastic.

F. PP: Polypropylene plastic.

G. PVC: Polyvinyl chloride plastic.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, and accessories for the following:

1. Cleanouts.
2. Floor drains.
1.5 QUALITY ASSURANCE

A. Drainage piping specialties shall bear label, stamp, or other markings of specified testing agency.


1.6 COORDINATION

A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 3.

B. Coordinate size and location of roof penetrations.

PART 2 - PRODUCTS

2.1 CLEANOUTS

A. Cleanouts:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   c. Tyler Pipe; Wade Div.
   d. Zurn Plumbing Products Group; Specification Drainage Operation.

2. Standard: ASME A112.36.2M for cast iron for cleanout test tee.
3. See schedule on drawings.

2.2 FLOOR DRAINS

A. Cast-Iron Floor Drains:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   c. Tyler Pipe; Wade Div.
   d. Zurn Plumbing Products Group; Specification Drainage Operation.

2. Standard: ASME A112.6.3.
3. See schedule on drawings.

2.3 MISCELLANEOUS SANITARY DRAINAGE PIPING SPECIALTIES

A. Open Hub Drains:
1. Description: Shop or field fabricate from ASTM A 74, Service class, hub-and-spigot, cast-iron, soil-pipe fittings. Include deep seal P-trap, hub-and-spigot riser section; and where required, increaser fitting joined with ASTM C 564, rubber gaskets.

2. Size: Same as connected waste piping with increaser fitting of size indicated.

B. Deep-Seal Traps:

1. Description: Cast-iron or bronze casting, with inlet and outlet matching connected piping and cleanout trap-seal primer valve connection.

2. Size: Same as connected waste piping.
   a. NPS 2: 4-inch-minimum water seal.
   b. NPS 2-1/2 and Larger: 5-inch- minimum water seal.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Refer to Division 22 Section "Common Work Results for Plumbing" for piping joining materials, joint construction, and basic installation requirements.

B. Install cleanouts in aboveground piping and building drain piping according to the following, unless otherwise indicated:

1. Size same as drainage piping up to NPS 4. Use NPS 4 for larger drainage piping unless larger cleanout is indicated.
2. Locate at each change in direction of piping greater than 45 degrees.
3. Locate at minimum intervals of 50 feet for piping NPS 4 and smaller and 100 feet for larger piping.
4. Locate at base of each vertical soil and waste stack.

C. For floor cleanouts for piping below floors, install cleanout deck plates with top flush with finished floor.

D. For cleanouts located in concealed piping, install cleanout wall access covers, of types indicated, with frame and cover flush with finished wall.

E. Install floor drains at low points of surface areas to be drained. Set grates of drains flush with finished floor, unless otherwise indicated. Install floor sinks square with walls.

1. Position floor drains for easy access and maintenance.
2. Set floor drains below elevation of surrounding finished floor to allow floor drainage. Set with grates depressed according to the following drainage area radii:
   a. Radius, 30 Inches or Less: Equivalent to 1 percent slope, but not less than 1/4-inch total depression.
   b. Radius, 30 to 60 Inches: Equivalent to 1 percent slope.
   c. Radius, 60 Inches or Larger: Equivalent to 1 percent slope, but not greater than 1-inch total depression.

3. Install floor-drain flashing collar or flange so no leakage occurs between drain and adjoining flooring. Maintain integrity of waterproof membranes where penetrated.
4. Install individual traps for floor drains connected to sanitary building drain, unless otherwise indicated.
F. Assemble open hub drain fittings and install with top of hub 1 inch above floor.

G. Install deep-seal traps on floor drains and other waste outlets, where indicated.

H. Install traps on plumbing specialty drain outlets. Omit traps on indirect wastes unless trap is indicated.

I. Install escutcheons at wall, floor, and ceiling penetrations in exposed finished locations and within cabinets and millwork. Use deep-pattern escutcheons if required to conceal protruding pipe fittings.

3.2 CONNECTIONS

A. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Install piping adjacent to equipment to allow service and maintenance.

3.3 PROTECTION

A. Protect drains during remainder of construction period to avoid clogging with dirt or debris and to prevent damage from traffic or construction work.

B. Place plugs in ends of uncompleted piping at end of each day or when work stops.

END OF SECTION 22 13 19
SECTION 22 42 13

COMMERCIAL PLUMBING FIXTURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and General Provisions of the contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 WORK INCLUDES

A. Faucets and flush valves for fixtures.
B. Fixture supports.
C. Fixtures.
D. Owner-furnished fixtures.

1.3 DEFINITIONS

B. Accessible Fixture: Plumbing fixture that can be approached, entered, and used by people with disabilities.
C. Cast Polymer: Cast-filled-polymer-plastic material. This material includes cultured-marble and solid-surface materials.
D. Cultured Marble: Cast-filled-polymer-plastic material with surface coating.
E. Fitting: Device that controls the flow of water into or out of the plumbing fixture. Fittings specified in this Section include supplies and stops, faucets and spouts, shower heads and tub spouts, drains and tailpieces, and traps and waste pipes. Piping and general-duty valves are included where indicated.
F. FRP: Fiberglass-reinforced plastic.
G. PMMA: Polymethyl methacrylate (acrylic) plastic.
H. PVC: Polyvinyl chloride plastic.
1.4 SUBMITTALS

A. Product Data: For each type of plumbing fixture indicated. Include selected fixture and trim, fittings, accessories, appliances, appurtenances, equipment, and supports. Indicate materials and finishes, dimensions, construction details, and flow-control rates.

B. Operation and Maintenance Data: For plumbing fixtures to include in emergency, operation, and maintenance manuals.

C. Warranty: Special warranty specified in this Section.

1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain plumbing fixtures, faucets, and other components of each category through one source from a single manufacturer.

1. Exception: If fixtures, faucets, or other components are not available from a single manufacturer, obtain similar products from other manufacturers specified for that category.


D. NSF Standard: Comply with NSF 61, "Drinking Water System Components—Health Effects," for fixture materials that will be in contact with potable water.

E. Select combinations of fixtures and trim, faucets, fittings, and other components that are compatible.

F. Comply with the following applicable standards and other requirements specified for plumbing fixtures:

1. Enameled, Cast-Iron Fixtures: ASME A112.19.1M.
2. Porcelain-Enameled, Formed-Steel Fixtures: ASME A112.19.4M.
6. Vitreous-China Fixtures: ASME A112.19.2M.

G. Comply with the following applicable standards and other requirements specified for lavatory and sink faucets:

1. Backflow Protection Devices for Faucets with Side Spray: ASME A112.18.3M.
2. Backflow Protection Devices for Faucets with Hose-Thread Outlet: ASME A112.18.3M.
5. Hose-Connection Vacuum Breakers: ASSE 1011.

H. Comply with the following applicable standards and other requirements specified for miscellaneous fittings:

2. Brass and Copper Supplies: ASME A112.18.1.

I. Comply with the following applicable standards and other requirements specified for miscellaneous components:

2. Floor Drains: ASME A112.6.3.
5. Off-Floor Fixture Supports: ASME A112.6.1M.

PART 2 - PRODUCTS

2.1 PLUMBING FIXTURES

A. Schedule: See schedule on drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

B. Examine roughing-in of water supply and sanitary drainage and vent piping systems to verify actual locations of piping connections before plumbing fixture installation.

C. Examine cabinets, counters, floors, and walls for suitable conditions where fixtures will be installed.

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

3.2 AAFES FURNISHED CONTRACTOR INSTALLED EQUIPMENT

A. Provide rough-ins and final connections to all Exchange furnished equipment including shut off valves, piping, traps, etc. necessary to connect up equipment after it has been installed in place.
B. Install all faucets, sinks drains, tailpieces, overflows, traps, etc. furnished loose with all Exchange furnished equipment.

C. All exposed piping readily visible for Exchange furnished equipment shall be chrome plated red brass pipe and fittings. Braces for support of exposed piping shall be chrome plated.

D. Pending installation of Exchange furnished equipment, all service lines shall be suitably capped, plugged and protected. All water lines shall be valved.

E. Furnish vacuum breakers, pressure regulators solenoid valves, traps, piping, etc. as required for installation of equipment.

3.3 INSTALLATION

A. Assemble plumbing fixtures, trim, fittings, and other components according to manufacturers' written instructions.

B. Install off-floor supports, affixed to building substrate, for wall-mounting fixtures.
   1. Use carrier supports with waste fitting and seal for back-outlet fixtures.
   2. Use carrier supports without waste fitting for fixtures with tubular waste piping.
   3. Use chair-type carrier supports with rectangular steel uprights for accessible fixtures.

C. Install back-outlet, wall-mounting fixtures onto waste fitting seals and attach to supports.

D. Install floor-mounting fixtures on closet flanges or other attachments to piping or building substrate.

F. Install wall-mounting fixtures with tubular waste piping attached to supports.

G. Install floor-mounting, back-outlet water closets attached to building floor substrate and wall bracket and onto waste fitting seals.

H. Install counter-mounting fixtures in and attached to casework.

I. Install fixtures level and plumb according to roughing-in drawings.

J. Install water-supply piping with stop on each supply to each fixture to be connected to water distribution piping. Attach supplies to supports or substrate within pipe spaces behind fixtures. Install stops in locations where they can be easily reached for operation.
   1. Exception: Use ball, gate, or globe valves if supply stops are not specified with fixture.

K. Install trap and tubular waste piping on drain outlet of each fixture to be directly connected to sanitary drainage system.

L. Install tubular waste piping on drain outlet of each fixture to be indirectly connected to drainage system.

M. Install faucet-spout fittings with specified flow rates and patterns in faucet spouts if faucets are not available with required rates and patterns. Include adapters if required.
N. Install water-supply flow-control fittings with specified flow rates in fixture supplies at stop valves.

O. Install faucet flow-control fittings with specified flow rates and patterns in faucet spouts if faucets are not available with required rates and patterns. Include adapters if required.

P. Install traps on fixture outlets.
   1. Exception: Omit trap on fixtures with integral traps.
   2. Exception: Omit trap on indirect wastes, unless otherwise indicated.

Q. Install escutcheons at piping wall ceiling penetrations in exposed, finished locations and within cabinets and millwork. Use deep-pattern escutcheons if required to conceal protruding fittings. Escutcheons are specified in Division 22.

R. Set service basins in leveling bed of cement grout. Grout is specified in Division 22.

S. Seal joints between fixtures and walls, floors, and countertops using sanitary-type, one-part, mildew-resistant silicone sealant. Match sealant color to fixture color. Sealants are specified in Division 7 Section "Joint Sealants."

3.4 CONNECTIONS

A. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Connect fixtures with water supplies, stops, and risers, and with traps, soil, waste, and vent piping. Use size fittings required to match fixtures.

3.5 FIELD QUALITY CONTROL

A. Verify that installed plumbing fixtures are categories and types specified for locations where installed.

B. Check that plumbing fixtures are complete with trim, faucets, fittings, and other specified components.

C. Inspect installed plumbing fixtures for damage. Replace damaged fixtures and components.

D. Test installed fixtures after water systems are pressurized for proper operation. Replace malfunctioning fixtures and components, then retest. Repeat procedure until units operate properly.

3.6 ADJUSTING

A. Operate and adjust faucets and controls. Replace damaged and malfunctioning fixtures, fittings, and controls.

B. Adjust water pressure at faucets and flushometer valves to produce proper flow and stream.

C. Replace washers and seals of leaking and dripping faucets and stops.
3.7 CLEANING

A. Clean fixtures, faucets, and other fittings with manufacturers' recommended cleaning methods and materials. Do the following:

1. Remove faucet spouts and strainers, remove sediment and debris, and reinstall strainers and spouts.
2. Remove sediment and debris from drains.

B. After completing installation of exposed, factory-finished fixtures, faucets, and fittings, inspect exposed finishes and repair damaged finishes.

3.8 PROTECTION

A. Provide protective covering for installed fixtures and fittings.

B. Do not allow use of plumbing fixtures for temporary facilities unless approved in writing by Owner.

END OF SECTION 22 42 13
SECTION 23 01 00

MECHANICAL - GENERAL PROVISIONS

PART 1 - GENERAL

1.1 WORK INCLUDES

A. General Provisions of the contract, including the following, shall apply to Division 23 Specification Sections: Solicitation Documents and Division 00 and Division 01 of the specifications.

B. The Work to be performed under this Division shall include all labor, materials, equipment, transportation, construction plant, and facilities necessary to provide a complete and satisfactory system ready to use. Wherever the words "the Contractor" or "this Contractor" appears in this Division, they refer to the Contractor for the work specified in that Section. This Contractor shall examine all Drawings and all Sections of the Specifications and shall be responsible for ascertaining to what extent other Drawings and Sections affect the Work herein specified.

1.2 CODES, REGULATIONS, AND STANDARDS

A. All work must be performed in accordance with the requirements of local, county, state and national codes and regulations including the requirements of the following:

4. 2015 International Mechanical Code.
5. Occupational Safety and Health Act. of 1970
6. Wright-Patterson AFB Regulations.
8. For work not specifically listed above, use standards and codes of the National Fire Protection Association.

B. All equipment, apparatus and systems shall be rated, tested, fabricated and/or installed in accordance with the applicable industry standard mentioned. The following list will serve to clarify abbreviations that appear in other sections of this specification:

1. AABC Associated Air Balance Council
2. ADC Air Diffusion Council
3. AGA American Gas Association.
4. AMCA Air Moving and Conditioning Association
5. ARI Air Conditioning and Refrigeration Institute
6. ANSI American National Standards Institute
7. ASE Association of Safety Engineers
8. ASHRAE American Society of Heating, Refrigerating and Air Conditioning Engineer
9. ASME American Society of Mechanical Engineers
10. AWWA American Water Works Association
11. EPA Environmental Protection Agency
12. FS Federal Specifications
13. IBR Institute of Boiler and Radiator Manufacturers
14. IEEE  Institute of Electrical and Electronics Engineers  
15. MCAA  Mechanical Contractors' Association of American  
16. NEMA  National Electrical Manufacturers Association  
17. NSC  National Safety Council  
18. NSF  National Sanitation Foundation  
19. SBI  Steel Boiler Institute Industry  
20. SMACNA  Sheet Metal and Air Conditioning Contractors National Association  
21. UL  Underwriters Laboratories  
23. NEBB  National Environmental Balancing Bureau.  

1.3 DEFINITIONS  
A. FURNISH: The term furnish means supply and deliver to the Project Site, ready for unloading, unpacking, assembly, installation and similar operations.  
B. INSTALL: The term install describes operations at the Project Site including the actual unloading, unpacking, assembly, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning and similar operations.  
C. PROVIDE: The term provides means to furnish and install, complete and ready for intended use.  

1.4 SHOP DRAWINGS AND SUBMITTALS  
A. See Division 01 for requirements for shop drawings and product data.  
B. Asbestos-Free Material/Product: Prior to approval of the material/product to be used, the manufacturer/supplier shall furnish the Contracting Officer with written certification that the material/product contains no asbestos. This certificate is mandatory before approval will be issued. Submittals furnished without the asbestos-free certification will be returned to the Contractor with no action taken until such certification is provided.  
C. See applicable sections to this Division for items requiring shop drawings.  

1.5 MATERIALS AND WORKMANSHP  
A. Materials, the style, make or quality of which is specifically designated, shall be as specified.  
B. Contractor shall furnish necessary materials in ample quantities and as frequently as required to avoid delay in the progress of the Work, and shall so store them as to prevent interference with other work.  

1.6 DEFECTIVE WORK AND MATERIAL  
A. All materials or work found to be defective or not in strict conformity with the drawings or different from requirements of the drawings and specifications or defaced or injured through negligence of Contractor or his employees, or through action of fire or weather will be rejected and shall be immediately removed from premises by Contractor and
satisfactory materials and work substituted without delay.

B. All defective work or imperfect work shall be corrected immediately on notice from Architect/Engineer. No previous inspection or certificate on account shall be held to relieve Contractor from his obligation to furnish sound materials and to perform good and satisfactory work.

1.7 COOPERATION AND COORDINATION

A. Contractor shall confer with other contractors at the site before installing his work to avoid interferences so that maximum head room and clearances may be maintained. In event that interferences develop between work of various contractors, Architect/Engineer’s decision will be final and no additional compensation will be allowed for changes required.

B. Particular attention shall be paid to situations where recessed equipment, pipes and lights occur, or where the work of several trades occurs together above suspended ceilings, in pipe shafts or in areas where space is limited.

C. All fixtures, equipment, devices, switches, outlets, pumps, etc., shall be positioned to avoid all interferences with and to assure proper coordination with work of all other trades, cases, partitions, wall, floor and ceiling patterns, architectural features, etc. All recessed devices, fixtures, etc., shall be coordinated with all wall, floor and ceiling patterns.

1.8 PROTECTION OF EQUIPMENT AND SYSTEMS

A. Contractor shall keep all his respective pipe openings closed by means of plugs or caps to prevent entrance of foreign matter during construction and cover all fixtures, equipment, and apparatus as required to protect them against dirt, water, chemical or mechanical damage both before and after installation. Any such fixtures, equipment or apparatus damaged prior to final acceptance of the Work shall be restored to its original condition or replaced by Contractor at no cost to Owner.

1.9 CONTRACT DRAWINGS

A. The layout shown on the Contract Drawings is necessarily diagrammatic but shall be followed as closely as actual construction and as other work will allow. The dimensions of work as shown on the Contract Drawings are not as-built dimensions. No measurements shall be scaled from the drawings and used as definite dimensions for laying out or fitting work in place.

B. The layout of manufactured equipment as shown on the drawings shall be checked and the exact location shall be determined from the dimensions of equipment shop drawings.

1.10 MAINTENANCE MANUAL AND OPERATING INSTRUCTIONS

A. Upon completion of the Work, Contractors shall provide with three copies of maintenance manual for all equipment furnished and installed under his Work. Manuals shall be in substantial 3-ring binders with project name and number inscribed on face and hinged back.

B. The manual shall include manufacturer’s lubricating and operating instructions and parts list and serial numbers for all operating machinery, including drive information, and motor
horsepower, amperage, and voltage readings on all phases, valve chart, sequence of operation, index following the order listed in the specifications, warranties in the name of the Installation, and a list of manufacturers, service firms and subcontractors names and telephone numbers.

C. Training attendance rosters for each training session shall be included in manuals. Roster will identify training subject, date, attendees name, job title, office symbol, grade/rank, and telephone number.

D. All switches, controls, and safety devices shall be clearly and permanently marked with embossed or printed plates as to purpose and as to operation and shall be tested in the presence of the Owner designated representative to ensure that he understands their function and purpose.

E. Upon completion of the Work, Contractors shall put the systems into service. Contractors shall be entirely responsible for the equipment during all testing operations including the lubricating and turning on and off of such apparatus.

1.11 PROJECT RECORD AND CLOSEOUT DOCUMENTS

A. See Division 01 for red lining of all documents during construction to reflect "as-built" conditions.

END OF SECTION 23 01 00
SECTION 23 05 00

COMMON WORK RESULTS FOR HVAC

PART 1 - GENERAL

1.1 WORK INCLUDES

A. Base Bid:

1. Heating Contractor and Ventilating Contractor:
   a. Provide piping materials and installation instructions common to most piping systems.
   b. Provide sleeves.
   c. Provide escutcheons.
   d. Provide grout.
   e. Provide equipment installation requirements common to equipment sections.
   f. Provide painting and finishing where indicated.
   g. Provide concrete bases.
   h. Provide supports and anchorages.

B. Alternate Bid: None.

1.2 DEFINITIONS

A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct chases, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.

B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.

C. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.

D. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and chases.

E. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.

F. The following are industry abbreviations for plastic materials:

1. CPVC: Chlorinated polyvinyl chloride plastic.
2. PE: Polyethylene plastic.
3. PVC: Polyvinyl chloride plastic.
G. The following are industry abbreviations for rubber materials:

1. EPDM: Ethylene-propylene-diene terpolymer rubber.
2. NBR: Acrylonitrile-butadiene rubber.

1.3 SUBMITTALS

A. **Product Data:** For the following:

1. Mechanical sleeve seals.
2. Escutcheons.

B. Welding certificates.

1.4 QUALITY ASSURANCE

A. **Steel Support Welding:** Qualify processes and operators according to AWS D1.1, "Structural Welding Code--Steel."

B. **Steel Pipe Welding:** Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."

1. Comply with provisions in ASME B31 Series, "Code for Pressure Piping."
2. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.

C. **Electrical Characteristics for HVAC Equipment:** Equipment of higher electrical characteristics may be furnished provided such proposed equipment is approved in writing and connecting electrical services, circuit breakers, and conduit sizes are appropriately modified. If minimum energy ratings or efficiencies are specified, equipment shall comply with requirements.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.

B. Store plastic pipes protected from direct sunlight. Support to prevent sagging and bending.

1.6 COORDINATION

A. Arrange for pipe spaces, chases, slots, and openings in building structure during progress of construction, to allow for HVAC installations.

B. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components as they are constructed.
2. PRODUCTS

2.1 PIPE, TUBE, AND FITTINGS

A. Refer to individual Division 23 piping Sections for pipe, tube, and fitting materials and joining methods.

B. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

2.2 JOINING MATERIALS

A. Refer to individual Division 23 piping Sections for special joining materials not listed below.

2.3 SLEEVES

A. Galvanized-Steel Sheet: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.

B. Steel Pipe: ASTM A 53, Type E, Grade B, Schedule 40, galvanized, plain ends.

C. Cast Iron: Cast or fabricated “wall pipe” equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.

2.4 ESCUTCHEONS

A. Description: Manufactured wall and ceiling escutcheons and floor plates, with an ID to closely fit around pipe, tube, and insulation of insulated piping and an OD that completely covers opening.

B. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass with polished chrome-plated finish.

C. One-Piece, Cast-Brass Type: With set screw.

   1. Finish: Rough brass.

D. Split-Casting, Cast-Brass Type: With concealed hinge and set screw.

   1. Finish: Rough brass.

E. One-Piece, Stamped-Steel Type: With set screw or spring clips and chrome-plated finish.

F. Split-Plate, Stamped-Steel Type: With exposed-rivet hinge, set screw or spring clips, and chrome-plated finish.

G. One-Piece, Floor-Plate Type: Cast-iron floor plate.
H. Split-Casting, Floor-Plate Type: Cast brass with concealed hinge and set screw.

2.5 GROUT

A. Description: ASTM C 1107, Grade B, nonshrink and nonmetallic, dry hydraulic-cement grout.

2. Design Mix: 5000-psi, 28-day compressive strength.

3. EXECUTION

3.1 PIPING SYSTEMS - COMMON REQUIREMENTS

A. Install piping according to the following requirements and Division 23 Sections specifying piping systems.

B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations.

C. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.

D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

F. Install piping to permit valve servicing.

G. Install piping at indicated slopes.

H. Install piping free of sags and bends.

I. Install fittings for changes in direction and branch connections.

J. Install piping to allow application of insulation.

K. Select system components with pressure rating equal to or greater than system operating pressure.

L. Install escutcheons for penetrations of walls, ceilings, and floors according to the following:

1. New Piping:
a. Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep-pattern type.

b. Insulated Piping: One-piece, stamped-steel type with spring clips.

c. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, cast-brass type with polished chrome-plated finish.

d. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, stamped-steel type.

e. Bare Piping in Unfinished Service Spaces: One-piece, cast-brass type with rough-brass finish.

f. Bare Piping in Equipment Rooms: One-piece, cast-brass type.

g. Bare Piping at Floor Penetrations in Equipment Rooms: One-piece, floor-plate type.

M. Sleeves are not required for core-drilled holes.

N. Permanent sleeves are not required for holes formed by removable PE sleeves.

O. Install sleeves for pipes passing through concrete and masonry walls and concrete floor and roof slabs.

P. Install sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, and concrete floor and roof slabs.

1. Cut sleeves to length for mounting flush with both surfaces.

2. Install sleeves in new walls and slabs as new walls and slabs are constructed.

3. Install sleeves that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation. Use the following sleeve materials:

   a. Steel Pipe Sleeves: For pipes smaller than NPS 6.

   b. Steel Sheet Sleeves: For pipes NPS 6 and larger, penetrating gypsum-board partitions.

4. Except for underground wall penetrations, seal annular space between sleeve and pipe or pipe insulation, using joint sealants appropriate for size, depth, and location of joint. Refer to Division 07 Section "Joint Sealants" for materials and installation.

Q. Aboveground, Exterior-Wall Pipe Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.

1. Install steel pipe for sleeves smaller than 6 inches in diameter.

2. Install cast-iron "wall pipes" for sleeves 6 inches and larger in diameter.

3. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

R. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Refer to Division 07 Section "Penetration Firestopping" for materials.

S. Verify final equipment locations for roughing-in.
T. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.

3.2 PIPING JOINT CONSTRUCTION

A. Join pipe and fittings according to the following requirements and Division 23 Sections specifying piping systems.

B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

D. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.


F. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
   1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
   2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

G. Welded Joints: Construct joints according to AWS D10.12, using qualified processes and welding operators according to Part 1 "Quality Assurance" Article.

H. Plastic Piping Solvent-Cement Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:
   1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
   2. CPVC Piping: Join according to ASTM D 2846/D 2846M Appendix.
   3. PVC Pressure Piping: Join schedule number ASTM D 1785, PVC pipe and PVC socket fittings according to ASTM D 2672. Join other-than-schedule-number PVC pipe and socket fittings according to ASTM D 2855.
   4. PVC Nonpressure Piping: Join according to ASTM D 2855.

I. Plastic Pressure Piping Gasketed Joints: Join according to ASTM D 3139.

3.3 PIPING CONNECTIONS

A. Make connections according to the following, unless otherwise indicated:
1. Install unions, in piping NPS 2 and smaller, adjacent to each valve and at final connection to each piece of equipment.
2. Install flanges, in piping NPS 2-1/2 and larger, adjacent to flanged valves and at final connection to each piece of equipment.
3. Wet Piping Systems: Install dielectric unions and couplings to connect piping materials of dissimilar metals.

3.4 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS
A. Install equipment to allow maximum possible headroom unless specific mounting heights are not indicated.
B. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.
C. Install HVAC equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations. Extend grease fittings to accessible locations.
D. Install equipment to allow right of way for piping installed at required slope.

3.5 PAINTING
A. Damage and Touchup: Repair marred and damaged factory-painted finishes with materials and procedures to match original factory finish.

3.6 CONCRETE BASES
A. Concrete Bases: Anchor equipment to concrete base according to equipment manufacturer's written instructions and according to seismic codes at Project.
1. Construct concrete bases of dimensions indicated, but not less than 4 inches larger in both directions than supported unit.
2. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of the base.
3. Install epoxy-coated anchor bolts for supported equipment that extend through concrete base, and anchor into structural concrete floor.
4. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
5. Install anchor bolts to elevations required for proper attachment to supported equipment.
6. Install anchor bolts according to anchor-bolt manufacturer's written instructions.
7. Use 3000-psi, 28-day compressive-strength concrete and reinforcement.

3.7 GROUTING
A. Mix and install grout for HVAC equipment base bearing surfaces, pump and other equipment base plates, and anchors.
B. Clean surfaces that will come into contact with grout.
C. Provide forms as required for placement of grout.
D. Avoid air entrapment during placement of grout.
E. Place grout, completely filling equipment bases.
F. Place grout on concrete bases and provide smooth bearing surface for equipment.
G. Place grout around anchors.
H. Cure placed grout.

END OF SECTION 23 05 00
SECTION 23 05 19

METERS AND GAGES FOR HVAC PIPING

PART 1 - GENERAL

1.1 WORK INCLUDES

A. Base Bid:

1. Heating Contractor Provide:
   a. Thermometers.
   b. Gages.
   c. Test plugs.

B. Alternate Bid: None.

1.2 DEFINITIONS

A. CR: Chlorosulfonated polyethylene synthetic rubber.

B. EPDM: Ethylene-propylene-diene terpolymer rubber.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated; include performance curves.

B. Shop Drawings: Schedule for thermometers and gages indicating manufacturer's number, scale range, and location for each.

PART 2 - PRODUCTS

2.1 METAL-CASE, LIQUID-IN-GLASS THERMOMETERS

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

   1. Palmer - Wahl Instruments Inc.
   2. Trerice, H. O. Co.
   3. Weiss Instruments, Inc.
   4. Weksler Instruments Operating Unit; Dresser Industries; Instrument Div.

B. Case: Die-cast aluminum 7 inches long.

C. Tube: Red or blue reading, organic-liquid filled, with magnifying lens.

D. Tube Background: Satin-faced, nonreflective aluminum with permanently etched scale markings.
E. Window: Plastic.

F. Connector: Adjustable type, 180 degrees in vertical plane, 360 degrees in horizontal plane, with locking device.

G. Stem: Copper-plated steel, aluminum, or brass for thermowell installation and of length to suit installation.

H. Accuracy: Plus or minus 1 percent of range or plus or minus 1 scale division to maximum of 1.5 percent of range.

2.2 THERMOWELLS

A. Manufacturers: Same as manufacturer of thermometer being used.

B. Description: Pressure-tight, socket-type metal fitting made for insertion into piping and of type, diameter, and length required to hold thermometer. Provide extended necks as required to clear insulation.

2.3 PRESSURE GAGES

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

1. AMETEK, Inc.; U.S. Gauge Div.
3. Ernst Gage Co.
4. Eugene Ernst Products Co.
5. KOBOLD Instruments, Inc.
7. Miljoco Corp.
8. Noshok, Inc.
10. REO TEMP Instrument Corporation.
11. Trerice, H. O. Co.
12. Weiss Instruments, Inc.
13. Weksler Instruments Operating Unit; Dresser Industries; Instrument Div.
14. WIKA Instrument Corporation.
15. Winters Instruments.

B. Direct-Mounting, Dial-Type Pressure Gages: Indicating-dial type complying with ASME B40.100.

1. Case: Dry type, cast aluminum 4-1/2-inch diameter.
2. Pressure-Element Assembly: Bourdon tube, unless otherwise indicated.
3. Pressure Connection: Brass, NPS 1/4, bottom-outlet type unless back-outlet type is indicated.
4. Movement: Mechanical, with link to pressure element and connection to pointer.
8. Ring: Metal.
9. Accuracy: Grade A, plus or minus 1 percent of middle half scale.
10. Range for Fluids under Pressure: Two times operating pressure.

C. Pressure-Gage Fittings:

1. Valves: NPS 1/4 brass or stainless-steel needle type.
2. Snubbers: ASME B40.5, NPS 1/4 brass bushing with corrosion-resistant, porous-metal disc of material suitable for system fluid and working pressure.

2.4 TEST PLUGS

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

1. Flow Design, Inc.
2. MG Piping Products Co.
4. Peterson Equipment Co., Inc.
5. Sisco Manufacturing Co.
6. Trerice, H. O. Co.

B. Description: Corrosion-resistant brass or stainless-steel body with core inserts and gasketed and threaded cap, with extended stem for units to be installed in insulated piping.

C. Minimum Pressure and Temperature Rating: 500 psig at 200 deg F.

D. Core Inserts: One or two self-sealing rubber valves.

1. Insert material for air, water, oil, or gas service at 20 to 200 deg F shall be CR.
2. Insert material for air or water service at minus 30 to plus 275 deg F shall be EPDM.

E. Test Kit: Furnish one test kit(s) containing one pressure gage and adaptor, two thermometer(s), and carrying case. Pressure gage, adapter probes, and thermometer sensing elements shall be of diameter to fit test plugs and of length to project into piping:

1. Pressure Gage: Small bourdon-tube insertion type with 2- to 3-inch diameter dial and probe. Dial range shall be 0 to 200 psig.
2. Low-Range Thermometer: Small bimetallic insertion type with 1- to 2-inch diameter dial and tapered-end sensing element. Dial ranges shall be 25 to 125 deg F.
3. High-Range Thermometer: Small bimetallic insertion type with 1- to 2-inch diameter dial and tapered-end sensing element. Dial ranges shall be 0 to 220 deg F.
4. Carrying case shall have formed instrument padding.
PART 3 - EXECUTION

3.1 THERMOMETER APPLICATIONS

A. Install liquid-in-glass thermometers in the following locations:
   1. Inlet and outlet of each hydronic coil in air-handling units and built-up central systems.
   2. As indicated on plans.

B. Provide the following temperature ranges for thermometers:
   1. Heating Hot Water: 30 to 240 deg F, with 2-degree scale divisions.
   2. Chilled Water: 0 to 100 deg F, with 2-degree scale divisions.

3.2 GAGE APPLICATIONS

A. Install dry case-type pressure gages at air handling unit coil inlets and outlets.

B. Install dry case-type pressure gages at suction and discharge of each pump.

3.3 INSTALLATIONS

A. Install direct-mounting thermometers and adjust vertical and tilted positions.

B. Install thermowells with socket extending a minimum of 2 inches into fluid and in vertical position in piping tees where thermometers are indicated.

C. Install direct-mounting pressure gages in piping tees with pressure gage located on pipe at most readable position.

D. Install needle-valve and snubber fitting in piping for each pressure gage for fluids.

E. Install test plugs in piping as indicated.

3.3 CONNECTIONS

A. Install meters and gages adjacent to machines and equipment to allow service and maintenance for meters, gages, machines, and equipment.

3.4 ADJUSTING

A. Adjust faces of meters and gages to proper angle for best visibility.

END OF SECTION 23 05 19
SECTION 23 05 23

GENERAL-DUTY VALVES FOR HVAC PIPING

PART - GENERAL

1.1 WORK INCLUDES

A. Base Bid:
   1. Heating contractor provide:
      a. Bronze ball valves.
      b. Iron, single-flange butterfly valves.
      c. Bronze swing check valves.
      d. Iron swing check valves.

B. Alternate Bid: None.

1.2 DEFINITIONS

A. CWP: Cold working pressure.

B. EPDM: Ethylene propylene copolymer rubber.

C. NBR: Acrylonitrile-butadiene, Buna-N, or nitrile rubber.

D. NRS: Nonrising stem.

E. RS: Rising stem.

1.3 SUBMITTALS

A. Product Data: For each type of valve indicated.

1.4 QUALITY ASSURANCE

A. Source Limitations for Valves: Obtain each type of valve from single source from single manufacturer.

B. ASME Compliance:
   1. ASME B16.10 and ASME B16.34 for ferrous valve dimensions and design criteria.
   2. ASME B31.1 for power piping valves.
   3. ASME B31.9 for building services piping valves.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Prepare valves for shipping as follows:
1. Protect internal parts against rust and corrosion.
2. Protect threads, flange faces, grooves, and weld ends.
4. Set butterfly valves closed or slightly open.
5. Block check valves in either closed or open position.

B. Use the following precautions during storage:

1. Maintain valve end protection.
2. Store valves indoors and maintain at higher than ambient dew point temperature. If outdoor storage is necessary, store valves off the ground in watertight enclosures.

C. Use sling to handle large valves; rig sling to avoid damage to exposed parts. Do not use handwheels or stems as lifting or rigging points.

2. PRODUCTS

2.1 GENERAL REQUIREMENTS FOR VALVES

A. Valve Pressure and Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.

B. Valve Sizes: Same as upstream piping unless otherwise indicated.

C. Valve Actuator Types:
   1. Handlever: For quarter-turn valves NPS 6 and smaller.

D. Valves in Insulated Piping: With 2-inch stem extensions and the following features:
   1. Ball Valves: With extended operating handle of non-thermal-conductive material, and protective sleeve that allows operation of valve without breaking the vapor seal or disturbing insulation.

E. Valve-End Connections:
   1. Flanged: With flanges according to ASME B16.1 for iron valves.
   2. Grooved: With grooves according to AWWA C606.
   4. Threaded: With threads according to ASME B1.20.1.

2.2 BRONZE BALL VALVES

A. Two-Piece, Full-Port, Bronze Ball Valves with Bronze Trim:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. American Valve, Inc.
   b. Conbraco Industries, Inc.; Apollo Valves.
   c. Crane Co.; Crane Valve Group; Crane Valves.
   d. Hammond Valve.
2. Description:
   b. SWP Rating: 150 psig (1035 kPa).
   c. CWP Rating: 600 psig (4140 kPa).
   d. Body Design: Two piece.
   e. Body Material: Bronze.
   f. Ends: Threaded or sweat.
   g. Seats: PTFE or TFE.
   h. Stem: Bronze.
   i. Ball: Chrome-plated brass.
   j. Port: Full.

2.3 IRON, SINGLE-FLANGE BUTTERFLY VALVES

A. 150 CWP, Iron, Single-Flange Butterfly Valves with EPDM Seat and Aluminum-Bronze Disc:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. ABZ Valve and Controls; a division of ABZ Manufacturing, Inc.
   b. Bray Controls; a division of Bray International.
   c. Conbraco Industries, Inc.; Apollo Valves.
   d. Cooper Cameron Valves; a division of Cooper Cameron Corp.
   e. Crane Co.; Crane Valve Group; Jenkins Valves.
   f. Crane Co.; Crane Valve Group; Stockham Division.
   g. DeZurik Water Controls.
   h. Hammond Valve.
   i. Kitz Corporation.
   j. Milwaukee Valve Company.
   k. NIBCO INC.
   l. Norriseal; a Dover Corporation company.
   m. Red-White Valve Corporation.
   n. Spence Strainers International; a division of CIRCOR International.
   o. Tyco Valves & Controls; a unit of Tyco Flow Control.
   p. Watts Regulator Co.; a division of Watts Water Technologies, Inc.

2. Description:
   a. Standard: MSS SP-67, Type I.
   b. CWP Rating: 150 psig.
   c. Body Design: Lug type; suitable for bidirectional dead-end service at rated pressure without use of downstream flange.
   d. Body Material: ASTM A 126, cast iron or ASTM A 536, ductile iron.
   e. Seat: EPDM.
   f. Stem: One- or two-piece stainless steel.
   g. Disc: Aluminum bronze.
2.4 BRONZE SWING CHECK VALVES

A. Class 125, Bronze Swing Check Valves with Bronze Disc:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. American Valve, Inc.
   b. Crane Co.; Crane Valve Group; Crane Valves.
   c. Crane Co.; Crane Valve Group; Jenkins Valves.
   d. Crane Co.; Crane Valve Group; Stockham Division.
   e. Hammond Valve.
   f. Kitz Corporation.
   g. Milwaukee Valve Company.
   h. NIBCO INC.
   i. Powell Valves.
   j. Red-White Valve Corporation.
   k. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
   l. Zy-Tech Global Industries, Inc.

2. Description:
   a. Standard: MSS SP-80, Type 3.
   b. CWP Rating: 200 psig.
   c. Body Design: Horizontal flow.
   e. Ends: Threaded or sweat.
   f. Disc: Bronze.

2.5 IRON SWING CHECK VALVES

A. Class 125, Iron Swing Check Valves with Metal Seats:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Crane Co.; Crane Valve Group; Crane Valves.
   b. Crane Co.; Crane Valve Group; Jenkins Valves.
   c. Crane Co.; Crane Valve Group; Stockham Division.
   d. Hammond Valve.
   e. Kitz Corporation.
   f. Legend Valve.
   g. Milwaukee Valve Company.
   h. NIBCO INC.
   i. Powell Valves.
   j. Red-White Valve Corporation.
   k. Sure Flow Equipment Inc.
   l. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
   m. Zy-Tech Global Industries, Inc.

2. Description:
   a. Standard: MSS SP-71, Type I.
   b. NPS 2-1/2 to NPS 12, CWP Rating: 200 psig.
   c. NPS 14 to NPS 24, CWP Rating: 150 psig.
   d. Body Design: Clear or full waterway.
   e. Body Material: ASTM A 126, gray iron with bolted bonnet.
3. EXECUTION

3.1 EXAMINATION

A. Examine valve interior for cleanliness, freedom from foreign matter, and corrosion. Remove special packing materials, such as blocks, used to prevent disc movement during shipping and handling.

B. Operate valves in positions from fully open to fully closed. Examine guides and seats made accessible by such operations.

C. Examine threads on valve and mating pipe for form and cleanliness.

D. Examine mating flange faces for conditions that might cause leakage. Check bolting for proper size, length, and material. Verify that gasket is of proper size, that its material composition is suitable for service, and that it is free from defects and damage.

E. Do not attempt to repair defective valves; replace with new valves.

3.2 VALVE INSTALLATION

A. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.

B. Locate valves for easy access and provide separate support where necessary.

C. Install valves in horizontal piping with stem at or above center of pipe.

D. Install valves in position to allow full stem movement.

E. Install check valves for proper direction of flow and as follows:
   1. Swing Check Valves: In horizontal position with hinge pin level.

3.3 ADJUSTING

A. Adjust or replace valve packing after piping systems have been tested and put into service but before final adjusting and balancing. Replace valves if persistent leaking occurs.

3.4 GENERAL REQUIREMENTS FOR VALVE APPLICATIONS

A. If valve applications are not indicated, use the following:
   1. Shutoff Service: Ball, butterfly valves.
   3. Throttling Service: Ball, or butterfly valves.
B. If valves with specified SWP classes or CWP ratings are not available, the same types of valves with higher SWP classes or CWP ratings may be substituted.

C. Select valves, except wafer types, with the following end connections:

1. For Copper Tubing, NPS 2 and Smaller: Threaded ends or solder-joint valve-end.
2. For Copper Tubing, NPS 2-1/2 to NPS 4: Flanged ends or grooved ends.
3. For Copper Tubing, NPS 5 and Larger: Flanged ends or grooved ends.
4. For Steel Piping, NPS 2 and Smaller: Threaded ends.
5. For Steel Piping, NPS 2-1/2 to NPS 4: Flanged ends or grooved ends.
6. For Steel Piping, NPS 5 and Larger: Flanged ends or grooved ends.

3.5 CHILLED WATER VALVE SCHEDULE

A. Pipe NPS 2 and Smaller:

1. Bronze Valves: May be provided with solder-joint ends instead of threaded ends.
2. Ball Valves: Full port, bronze with bronze trim.
3. Bronze Swing Check Valves: Class 150, bronze disc.

B. Pipe NPS 2-1/2 and Larger:

2. Iron Swing Check Valves: Class 125, metal seats.

3.6 HEATING-WATER VALVE SCHEDULE

A. Pipe NPS 2 and Smaller:

1. Bronze Valves: May be provided with solder-joint ends instead of threaded ends.
2. Ball Valves: Full port, bronze with bronze trim.
3. Bronze Swing Check Valves: Class 150, bronze disc.

B. Pipe NPS 2-1/2 and Larger:

2. Iron Swing Check Valves: Class 125, metal seats.

END OF SECTION 23 05 23
SECTION 23 05 29

HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 WORK INCLUDES

A. Base Bid:
   1. Heating and Ventilating Contractors provide:
      a. Steel pipe hangers and supports for piping smaller than 1-1/2" dia.
      b. Trapeze pipe hangers.
      c. Metal framing systems.
      d. Thermal-hanger shield inserts.
      e. Fastener systems.

B. Alternate Bid: None.

C. See Section 23 05 48 for pipe hangers and supports for piping larger than 1-1/4" dia.

1.2 DEFINITIONS

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

B. Terminology: As defined in MSS SP-90, "Guidelines on Terminology for Pipe Hangers and Supports."

1.3 PERFORMANCE REQUIREMENTS

A. Design supports for multiple pipes, including pipe stands, capable of supporting combined weight of supported systems, system contents, and test water.

B. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.

1.4 SUBMITTALS

A. Product Data: For the following:
   1. Steel pipe hangers and supports.
   2. Thermal hanger shield inserts.
   3. Sheet metal pipe insulation saddles.

1.5 QUALITY ASSURANCE

B. **Welding:** Qualify procedures and personnel according to the following:

1. AWS D1.1, "Structural Welding Code—Steel."

**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. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

### 2.2 STEEL PIPE HANGERS AND SUPPORTS

A. **Description:** MSS SP-58, Types 1 through 58, factory-fabricated components. Refer to Part 3 "Hanger and Support Applications" Article for where to use specific hanger and support types.

B. **Manufacturers:**

1. AAA Technology & Specialties Co., Inc.
2. Bergen-Power Pipe Supports.
4. Carpenter & Paterson, Inc.
5. Empire Industries, Inc.
6. ERICO/Michigan Hanger Co.
7. Globe Pipe Hanger Products, Inc.
8. Grinnell Corp.
9. GS Metals Corp.
11. PHD Manufacturing, Inc.
12. PHS Industries, Inc.
13. Piping Technology & Products, Inc.
14. Tolco Inc.

C. **Galvanized, Metallic Coatings:** Pregalvanized or hot dipped.

D. **Nonmetallic Coatings:** Plastic coating, jacket, or liner.

### 2.3 TRAPEZE PIPE HANGERS

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

### 2.4 METAL FRAMING SYSTEMS

A. **Description:** MFMA-3, shop- or field-fabricated pipe-support assembly made of steel channels and other components.

B. **Manufacturers:**
2. ERICO/Michigan Hanger Co.; ERISTRUT Div.
3. GS Metals Corp.
5. Thomas & Betts Corporation.
6. Tolco Inc.
7. Unistrut Corp.; Tyco International, Ltd.

C. Coatings: Manufacturer's standard finish, unless bare metal surfaces are indicated.
D. Nonmetallic Coatings: Plastic coating, jacket, or liner.

2.5 THERMAL-HANGER SHIELD INSERTS
A. Description: 100-psig minimum, compressive-strength insulation insert encased in sheet metal shield.
B. Manufacturers:
   1. Carpenter & Paterson, Inc.
   2. ERICO/Michigan Hanger Co.
   3. PHS Industries, Inc.
   4. Pipe Shields, Inc.
   5. Rilco Manufacturing Company, Inc.
   6. Value Engineered Products, Inc.
C. Insulation-Insert Material for Cold Piping: Water-repellent treated, ASTM C 533, Type I calcium silicate or ASTM C 552, Type II cellular glass with vapor barrier.
D. Insulation-Insert Material for Hot Piping: Water-repellent treated, ASTM C 533, Type I calcium silicate.
E. For Trapeze or Clamped Systems: Insert and shield shall cover entire circumference of pipe.
F. For Clevis or Band Hangers: Insert and shield shall cover lower 180 degrees of pipe.
G. Insert Length: Extend 2 inches beyond sheet metal shield for piping operating below ambient air temperature.

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

2.7 MISCELLANEOUS MATERIALS
A. Structural Steel: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.
B. Grout: ASTM C 1107, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink and nonmetallic grout; suitable for interior and exterior applications.
2. Design Mix: 5000-psi, 28-day compressive strength.

PART 3 - EXECUTION

3.1 HANGER AND SUPPORT APPLICATIONS

A. Specific hanger and support requirements are specified in Sections specifying piping systems and equipment.

B. Comply with MSS SP-69 for pipe hanger selections and applications that are not specified in piping system Sections.

C. Use hangers and supports with galvanized, metallic coatings for piping and equipment that will not have field-applied finish.

D. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.

E. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated stationary pipes, NPS 1/2 to NPS 30.
2. Pipe Hangers (MSS Type 5): For suspension of pipes, NPS 1/2 to NPS 4, to allow off-center closure for hanger installation before pipe erection.
3. Pipe Saddle Supports (MSS Type 36): For support of pipes, NPS 4 to NPS 36, with steel pipe base stanchion support and cast-iron floor flange.
4. Pipe Stanchion Saddles (MSS Type 37): For support of pipes, NPS 4 to NPS 36, with steel pipe base stanchion support and cast-iron floor flange and with U-bolt to retain pipe.
5. Adjustable, Pipe Saddle Supports (MSS Type 38): For stanchion-type support for pipes, NPS 2-1/2 to NPS 36, if vertical adjustment is required, with steel pipe base stanchion support and cast-iron floor flange.

F. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers, NPS 3/4 to NPS 20.
2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers, NPS 3/4 to NPS 20, if longer ends are required for riser clamps.

G. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches for heavy loads.
2. Steel Clevises (MSS Type 14): For 120 to 450 deg F piping installations.
3. Malleable-Iron Sockets (MSS Type 16): For attaching hanger rods to various types of building attachments.
4. Steel Weldless Eye Nuts (MSS Type 17): For 120 to 450 deg F piping installations.

H. Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Top-Beam C-Clamps (MSS Type 19): For use under roof installations with bar-joist construction to attach to top flange of structural shape.
2. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.
3. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.
4. C-Clamps (MSS Type 23): For structural shapes.
5. Top-Beam Clamps (MSS Type 25): For top of beams if hanger rod is required tangent to flange edge.
6. Side-Beam Clamps (MSS Type 27): For bottom of steel I-beams.
7. Steel-Beam Clamps with Eye Nuts (MSS Type 28): For attaching to bottom of steel I-beams for heavy loads.
8. Malleable Beam Clamps with Extension Pieces (MSS Type 30): For attaching to structural steel.

I. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.
2. Protection Shields (MSS Type 40): Of length recommended in writing by manufacturer to prevent crushing insulation.
3. Thermal-Hanger Shield Inserts: For supporting insulated pipe.

J. Comply with MSS SP-69 for trapeze pipe hanger selections and applications that are not specified in piping system Sections.

K. Comply with MFMA-102 for metal framing system selections and applications that are not specified in piping system Sections.

3.2 HANGER AND SUPPORT INSTALLATION

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

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

1. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified above for individual pipe hangers.
2. Field fabricate from ASTM A 36/A 36M, steel shapes selected for loads being supported. Weld steel according to AWS D1.1.

C. Metal Framing System Installation: Arrange for grouping of parallel runs of piping and support together on field-assembled metal framing systems.
D. Thermal-Hanger Shield Installation: Install in pipe hanger or shield for insulated piping.

E. Pipe Stand Installation:
   1. Pipe Stand: Assemble components and mount on smooth roof surface. Do not penetrate roof membrane.

F. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers, and other accessories.


H. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units. Coordinate with Section 23 05 48.

I. Install lateral bracing with pipe hangers and supports to prevent swaying.

J. Attach building attachments to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, NPS 2-1/2 and larger and at changes in direction of piping.

K. Load Distribution: Install hangers and supports so piping live and dead loads and stresses from movement will not be transmitted to connected equipment.

L. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and so maximum pipe deflections allowed by ASME B31.9 (for building services piping) are not exceeded.

M. Insulated Piping: Comply with the following:
   1. Install MSS SP-58, Type 39, protection saddles if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.
      a. Thermal-hanger shield inserts shall be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.
   2. Install MSS SP-58, Type 40, protective shields on cold piping with vapor barrier. Shields shall span an arc of 180 degrees.
      a. Thermal-hanger shield inserts shall be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.
   3. Shield Dimensions for Pipe: Not less than the following:
      a. NPS 1/4 to NPS 3-1/2: 12 inches long and 0.048 inch thick.
      b. NPS 4: 12 inches long and 0.06 inch thick.
      c. NPS 5 and NPS 6: 18 inches long and 0.06 inch thick.
   4. Insert Material: Length at least as long as protective shield.
   5. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.
3.3 EQUIPMENT SUPPORTS

A. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.

B. Grouting: Place grout under supports for equipment and make smooth bearing surface.

C. Provide lateral bracing, to prevent swaying, for equipment supports.

3.4 METAL FABRICATIONS

A. Cut, drill, and fit miscellaneous metal fabrications for trapeze pipe hangers and equipment supports.

B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.

C. Field Welding: Comply with AWS D1.1 procedures for shielded metal arc welding, appearance and quality of welds, and methods used in correcting welding work, and with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. Finish welds at exposed connections so no roughness shows after finishing and contours of welded surfaces match adjacent contours.

3.4 ADJUSTING

A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

B. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches.

3.5 PAINTING

A. Touch Up: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.

1. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils.

B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780

END OF SECTION 23 05 29
SECTION 23 05 53
IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 WORK INCLUDES

A. Base Bid:
   1. Heating Contractor:
      a. Provide equipment labels.
      b. Provide pipe labels.
      c. Provide valve tags.
   2. Ventilating Contractor:
      a. Provide equipment labels.
      b. Provide duct labels.

B. Alternate Bid: None.

1.2 SUBMITTALS

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

B. Samples: For color, letter style, and graphic representation required for each identification material and device.

C. Equipment Label Schedule: Include a listing of all equipment to be labeled with the proposed content for each label.

D. Valve numbering scheme.

E. Valve Schedules: For each piping system to include in maintenance manuals.

1.3 COORDINATION

A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

B. Coordinate installation of identifying devices with locations of access panels and doors.

C. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.1 EQUIPMENT LABELS

A. Plastic Labels for Equipment:
   1. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch thick, and having predrilled holes for attachment hardware.
4. Maximum Temperature: Able to withstand temperatures up to 160 deg F.
5. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
6. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
8. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

B. Label Content: Include equipment's Drawing designation or unique equipment number, Drawing numbers where equipment is indicated (plans, details, and schedules), plus the Specification Section number and title where equipment is specified.

C. Equipment Label Schedule: For each item of equipment to be labeled, on 8-1/2-by-11-inch bond paper. Tabulate equipment identification number and identify Drawing numbers where equipment is indicated (plans, details, and schedules), plus the Specification Section number and title where equipment is specified. Equipment schedule shall be included in operation and maintenance data.

2.2 PIPE LABELS

A. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service, and showing flow direction.

B. Pretensioned Pipe Labels: Precoiled, semirigid plastic formed to cover full circumference of pipe and to attach to pipe without fasteners or adhesive.

C. Self-Adhesive Pipe Labels: Printed plastic with contact-type, permanent-adhesive backing.

D. Pipe Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings, pipe size, and an arrow indicating flow direction.

1. Flow-Direction Arrows: Integral with piping system service lettering to accommodate both directions, or as separate unit on each pipe label to indicate flow direction.
2. Lettering Size: At least 1-1/2 inches high.

2.3 DUCT LABELS

A. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch thick, and having predrilled holes for attachment hardware.


C. Background Color: Yellow.

D. Maximum Temperature: Able to withstand temperatures up to 160 deg F.
E. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.

F. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.


H. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

I. Duct Label Contents: Include identification of duct service using same designations or abbreviations as used on Drawings, duct size, and an arrow indicating flow direction.
   1. Flow-Direction Arrows: Integral with duct system service lettering to accommodate both directions, or as separate unit on each duct label to indicate flow direction.
   2. Lettering Size: At least 1-1/2 inches high.

2.4 STENCILS

A. Stencils: Prepared with letter sizes according to ASME A13.1 for piping; minimum letter height of 1-1/4 inches for ducts; and minimum letter height of 3/4 inch for access panel and door labels, equipment labels, and similar operational instructions.
   1. Stencil Material: Fiberboard or metal.
   2. Identification Paint: Exterior, alkyd enamel in colors according to ASME A13.1 unless otherwise indicated.

2.5 VALVE TAGS

A. Valve Tags: Stamped or engraved with 1/4-inch letters for piping system abbreviation and 1/2-inch numbers.
   1. Tag Material: Brass, 0.032-inch minimum thickness, and having predrilled or stamped holes for attachment hardware.
   2. Fasteners: Brass wire-link or beaded chain; or S-hook.

B. Valve Schedules: For each piping system, on 8-1/2-by-11-inch bond paper. Tabulate valve number, piping system, system abbreviation (as shown on valve tag), location of valve (room or space), normal-operating position (open, closed, or modulating), and variations for identification. Mark valves for emergency shutoff and similar special uses.
   1. Valve-tag schedule shall be included in operation and maintenance data.
PART 3 - EXECUTION

3.1 PREPARATION

A. Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.

3.2 EQUIPMENT LABEL INSTALLATION

A. Install or permanently fasten labels on each major item of mechanical equipment.

B. Locate equipment labels where accessible and visible.

3.3 PIPE LABEL INSTALLATION

A. Stenciled Pipe Label Option: Stenciled labels may be provided instead of manufactured pipe labels, at Installer's option. Install stenciled pipe labels complying with ASME A13.1, on each piping system.

1. Identification Paint: Use for contrasting background.

B. Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:

1. Near each valve and control device.
2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
3. Near penetrations through walls, floors, ceilings, and inaccessible enclosures.
4. At access doors, manholes, and similar access points that permit view of concealed piping.
5. Near major equipment items and other points of origination and termination.
6. Spaced at maximum intervals of 50 feet along each run. Reduce intervals to 25 feet in areas of congested piping and equipment.

C. Pipe Label Color Schedule:

1. Hot, and chilled water piping:
   a. Background Color: Green.
   b. Letter Color: Black.

3.4 DUCT LABEL INSTALLATION

A. Install plastic-laminated duct labels with permanent adhesive on air ducts in the following color codes:

1. Blue: For cold-air supply ducts.
2. Yellow: For hot-air supply ducts.
4. ASME A13.1 Colors and Designs: For hazardous material exhaust.

B. Stenciled Duct Label Option: Stenciled labels, showing service and flow direction, may be provided instead of plastic-laminated duct labels, at Installer's option, if lettering larger than 1 inch high is needed for proper identification because of distance from normal location of required identification.

C. Locate labels near points where ducts enter into concealed spaces and at maximum intervals of 50 feet in each space where ducts are exposed or concealed by removable ceiling system.

3.5 VALVE-TAG INSTALLATION

A. Install tags on valves and control devices in piping systems, except check valves; valves within factory-fabricated equipment units; shutoff valves; faucets; convenience and lawn-watering hose connections; and HVAC terminal devices and similar roughing-in connections of end-use fixtures and units. List tagged valves in a valve schedule.

B. Valve-Tag Application Schedule: Tag valves according to size, shape, and color scheme and with captions similar to those indicated in the following subparagraphs:

1. Valve-Tag Size and Shape:

2. Valve-Tag Color:
   a. Refrigerant: Natural.
   b. Water: Natural.

3. Letter Color:
   a. Refrigerant: Black.
   b. Water: Black.

END OF SECTION 23 05 53
SECTION 23 05 94

AIR SYSTEMS TESTING, ADJUSTING AND BALANCING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Contractor provide:

1. Test, adjust and balance of air systems as indicated on the drawings.
2. Any changes in pulleys, belts and dampers or the addition of dampers as required for correct balance of the system as recommended by TAB Agency, at no cost to AAFES.

1.3 JOB CONDITIONS

A. Heating, ventilating, air conditioning equipment shall be completely installed and in continuous operation to accomplish the testing, adjusting and balancing work specified. Complete air balancing prior to piping systems balancing.

B. Perform testing, adjusting and balancing when outside conditions approximate design conditions for heating and cooling functions or when the system is operating at design capacity.

C. The Architect's Representative will be present during testing and balancing to verify that specified procedures are followed.

1.4 QUALITY ASSURANCE

A. Employ only qualified personnel to perform testing and balancing work.

B. Submit evidence that the personnel who will perform the testing and balancing of the project systems are qualified personnel for review and approval by the Architect prior to performing the work.

C. Submit a list of completed projects successfully tested and balanced by the submitted qualified personnel for review and approval, by the Architect, prior to performing the work.

D. When the Contractor does not have qualified personnel on his staff he shall employ them from other firms or subcontract the work to a test and balance firm for this type of work.

E. Perform all corrective measures caused by faulty installation. Retest, readjust and rebalance systems until satisfactory results are achieved.

1.5 DEFINITION

A. Qualified personnel are:
1. Personnel who have been certified by one of the following organizations.
   b. NEBB - National Environmental Balancing Bureau, Illinois Chapter.

1.6 SUBMITTALS

A. Submit Data Sheet on each item of testing equipment for Architect's approval. Include name of device, manufacturer's name, model number, latest date of calibration, and correction factors.

B. Submit a report containing all test data and other related information recorded during testing and balancing, placed on appropriate forms for Architect's review and approval. Reports shall certify that the methods used and results achieved are as specified.

1.7 REVERIFICATION

A. During Substantial Completion Inspection, a percentage (not more than 5%) of the recorded data will be subject to reverification by the Architect/Engineer. Take instrument readings as directed. Test points will be in normally accessible locations and randomly selected by the Architect.

PART 2 - PRODUCTS

2.1 AIR BALANCE INSTRUMENTS: (Ranges shown are guides. Actual ranges used are subject to Architect's approval)

A. Velometer with probes and pitot tube.

B. Rotating vane anemometer.

C. ASHRAE Standard pitot tubes, stainless steel 5/16 in. outside diameter, lengths 18" and 36".

D. Magnehelic differential air pressure gages, 0 to 0.5", 0 to 1.0" and 0 to 5.0" water pressure ranges, each arranged as a portable unit for use with a standard Pitot tube.

E. Combination inclined-vertical portable manometer, range 0 to 5.0" water.

F. Portable type hook gage, range 0 to 12" water.

G. Portable flexible U-tube manometer, magnetic mounting clips, range 0 to 18" water.

H. Static pressure probe for induction Unit.

I. Conical or pyramidal shaped hood.

2.2 SYSTEM PERFORMANCE MEASURING INSTRUCTIONS

A. Insertion thermometers, with graduations at 0.5 F.

B. Sling psychrometer.

C. Tachometer, centrifugal type.
D. Revolution counter.
E. Clamp-On volt-ammeter.
F. Portable recorders for temperature and humidity.

PART 3 - EXECUTION

3.1 AIR SYSTEMS: Test, adjust and balance systems in accord with the following:

A. Preliminary:
   1. Identify and list size, type and manufacturer of all equipment to be tested, including air terminals. Inspect all system components for proper installation and operation.
   2. Use manufacturers’ ratings for all equipment to make calculations except where field test shows ratings to be impractical.
   3. Verify that all instruments are accurately calibrated and maintained.
   4. Install clean filters.

B. Central System:
   1. Test, adjust and record supply fan RPM to design requirements within the limits of mechanical equipment provided.
   2. Test and record motor voltage and running amperes including motor nameplate data and starter heater ratings.
   3. Make pitot tube traverse of main supply, exhaust and return ducts, determine and record cfm at fans and adjust fans to design cfm.
   4. Test and record system static pressure, suction and discharge.
   5. Test and adjust system for design outside air, cfm.
   6. Test and adjust systems for design recirculated air, cfm.

C. Distribution: Adjust zones or branch ducts to proper design cfm, supply and return.

D. Air Terminals:
   1. Identify each air terminal from reports as to location and determine required flow reading.
   2. Test and adjust each air terminal to within 10% of design requirement.
   3. Test procedure on air terminals shall include comparison of specified fpm velocity and observed velocity, adjustment of terminal, and comparison of specified cfm and observed cfm after adjustment.
   4. Adjust flow patterns from air terminal units to minimize drafts to extend design and equipment permits.

E. Verification:
   1. Prepare summation of readings of observed cfm for each system, compare with specified cfm and verify that duct losses are within specified allowable range. Determine coil and filter static pressure drops.
   2. Verify design cfm at fans as described in 3.01.B.3 above.

3.2 AUTOMATIC CONTROL SYSTEM

A. The ventilating contractor shall set and adjust automatically operated devices to achieve
specified sequence of operations.

B. Testing organization shall verify all controls for proper calibration and list those controls requiring adjustment by the contractor.

3.3 REPORT SUBMITTAL

A. Fill in test results on appropriate forms.

B. Submit three certified copies of test reports to the Architect for approval.

C. Include in report a list of instruments used and last date of calibration.

END OF SECTION 23 05 94
SECTION 23 07 00
MECHANICAL INSULATION

PART 1 - GENERAL

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

1.2 WORK INCLUDES
A. External insulation of ductwork, where indicated and specified.
B. Insulation of interior condensate drain piping.
C. Insulation of chilled and hot water piping.
D. Insulation of refrigerant suction piping.

1.3 DEFINITIONS
A. Hot Surfaces: Normal operating temperatures of 100 deg F or higher.
B. Dual-Temperature Surfaces: Normal operating temperatures that vary from hot to cold.
C. Cold Surfaces: Normal operating temperatures less than 75 deg. F.
D. Thermal Resistivity: $r$-values represent the reciprocal of thermal conductivity ($k$-value). Thermal conductivity is the rate of heat flow through a homogenous material exactly 1 inch thick. Thermal resistivities are expressed by the temperature difference in degrees F between two exposed faces required to cause one Btu to flow through one square foot of material, in one hour, at a given mean temperature.
E. Density: Is expressed in lb/sq.ft.

1.4 SUBMITTALS
A. General: Submit the following according to Division 1 requirements.

1.5 QUALITY ASSURANCE
A. Fire Performance Characteristics: Conform to the following characteristics for insulation including facings, cements, and adhesives, when tested according to ASTM E 84, by UL or other testing or inspecting organization acceptable to the authority having jurisdiction. Label insulation with appropriate markings of testing laboratory.
   1. Interior Insulation: Flame spread rating of 25 or less and a smoke developed rating of 50 or less.
   2. Exterior Insulation: Flame spread rating of 75 or less and a smoke developed rating of 150 or less.

1.6 SEQUENCING AND SCHEDULING
A. Schedule insulation application after testing of piping and duct systems.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Glass Fiber:
   a. Certain Teed Corporation.
   b. Knauf Fiberglas GmbH.
   d. Owens-Corning Fiberglass Corporation.

2. Flexible Elastomeric Cellular:
   a. Armstrong World Industries, Inc.
   b. Halstead Industrial Products.
   c. Rubatex Corporation.
   d. Aeroflex.

2.2 GLASS FIBER

A. Materials: Inorganic glass fibers, bonded with a thermosetting resin.


C. Blanket: ASTM C 553, Type II, Class F-1, jacketed flexible blankets.
   1. Thermal Conductivity: 0.32 average maximum, at 75 deg F. mean temperature.

D. Adhesive: Produced under the UL Classification and follow up service.
   1. Type: Non-flammable, solvent-based.
   2. Service Temperature Range: Minus 20 to 180 deg F.

E. Vapor Barrier Coating: Waterproof coating recommended by insulation manufacturer for outside service.

2.3 FLEXIBLE ELASTOMERIC CELLULAR

A. Material: Flexible expanded closed-cell structure with smooth skin on both sides.
   1. Tubular Materials: ASTM C 534, Type I.
   2. Sheet Materials: ASTM C 534, Type II.

B. Thermal Conductivity: 0.25 average maximum at 75 deg F.

C. Coating: Water based latex enamel coating recommended by insulation manufacturer.

2.4 ADHESIVES

A. Flexible Elastomeric Cellular Insulation Adhesive: Solvent-based, contact adhesive
recommended by insulation manufacturer.

2.5 JACkETS

A. General: ASTM C 921, Type 1, except as otherwise indicated.

   1. Water Vapor Permeance: 0.02 perm maximum, when tested according to ASTM E 96.
   2. Puncture Resistance: 50 beach units minimum, when tested according to ASTM D 781.

2.6 ACCESSORIES AND ATTACHMENTS

A. Glass Cloth and Tape: Woven glass fiber fabrics, plain weave, presized a minimum of 8 ounces per sq.yd.
   1. Tape Width: 4 inches.
   2. Cloth Standard: MIL-C-20079H, Type I.
   3. Tape Standard: MIL-C-20079H, Type II.

B. Bands: 3/4 inch wide, in one of the following materials compatible with jacket:
   1. Stainless Steel: Type 304, 0.020 inch thick.
   2. Galvanized Steel: 0.005 inch thick.
   3. Aluminum: 0.007 inch thick.
   4. Brass: 0.01 inch thick.
   5. Nickel-Copper Alloy: 0.005 inch thick.

C. Wire: 14 gage nickel copper alloy, 16 gage, soft-annealed stainless steel, or 16 gage, soft-annealed galvanized steel.

D. Corner Angles: 28 gage, 1 inch by 1 inch aluminum, adhered to 2 inch by 2 inch Kraft paper.

E. Anchor Pins: Capable of supporting 20 pounds each. Provide anchor pins and speed washers of sizes and diameters as recommended by the manufacturer for insulation type and thickness.

F. Coating: Ultra-violet light protective finish for exterior elastomeric insulation.

2.8 SEALING COMPOUNDS

A. Vapor Barrier Compound: Water-based, fire-resistive composition:
   1. Water Vapor Permeance: 0.08 perm maximum.
   2. Temperature Range: Minus 20 to 180 deg F.

B. Weatherproof Sealant: Flexible-elastomer-based, vapor-barrier sealant designed to seal metal joints.
   1. Water Vapor Permeance: 0.02 perm maximum.
   2. Temperature Range: Minus 50 to 250 deg F.
PART 3 - EXECUTION

3.1 PREPARATION

A. Surface Preparation: Clean, dry, and remove foreign materials such as rust, scale, and dirt.

B. Mix insulating cements with clean potable water. Mix insulating cements contacting stainless-steel surfaces with demineralized water.
   1. Follow cement manufacturers printed instructions for mixing and portions.

3.2 INSTALLATION, GENERAL

A. Refer to schedules at the end of this Section for materials, forms, jackets, and thicknesses required for each mechanical system.

B. Select accessories compatible with materials suitable for the service. Select accessories that do no corrode, soften, or otherwise attack the insulation or jacket in either the wet or dry state.

C. Install vapor barriers on insulated pipes, ducts, and equipment having surface operating temperatures below 60 deg. F.

D. Apply insulation material, accessories, and finishes according to the manufacturers printed instructions.

E. Install insulation with smooth, straight, and even surfaces.

F. Seal joints and seams to maintain vapor barrier on insulation requiring a vapor barrier.

G. Seal penetrations for hangers, supports, anchors, and other projections in insulation requiring a vapor barrier.

H. Seal Ends: Except for flexible elastomeric insulation, taper ends at 45 degree angle and seal with lagging adhesive. Cut ends of flexible elastomeric cellular insulation square and seal with adhesive.

I. Apply adhesives and coatings at manufacturers recommended coverage-per-gallon rate.

J. Keep insulation materials dry during application and finishing.

K. Item Not Insulated: Unless otherwise indicated do not apply insulation to the following systems, materials, and equipment.
   1. Metal ducts with duct liner.
   2. Factory-insulated flexible ducts.
   3. Factory-insulated plenums, casings, terminal boxes, and filter boxes and sections.
   4. Flexible connectors for ducts and pipes.
   5. Vibration control devices.
   6. Testing laboratory labels and stamps.
   7. Nameplates and data plates.
   8. Access panels and doors in air distribution systems.
   9. Piping specialties including air chambers, unions, plug valves, and flow regulators.
3.3 PIPE INSULATION INSTALLATION, GENERAL

A. Tightly butt longitudinal seams and end joints. Bond with adhesive.

B. Stagger joints on double layers of insulation.

C. Apply insulation continuously over fittings, valves, and specialties, except as otherwise indicated.

D. Apply insulation with a minimum number of joints.

E. Roof Penetrations: Apply insulation for interior applications to a point even with the top of the roof flashing. Seal with vapor barrier coating. Apply insulation for exterior applications butted tightly to interior insulation ends. Extend metal jacket for exterior insulation outside roof flashing at least 2 inches below top of roof flashing. Seal metal jacket to roof flashing with vapor barrier coating.

F. Exterior Wall Penetrations: For penetrations of below grade exterior walls, extend metal jacket for exterior insulation through penetration to a point 2 inches from interior surface of wall inside the building. Seal ends of metal jacket with vapor barrier coating. Secure metal jacket ends with metal band. At point where insulation metal jacket contacts mechanical sleeve seal, insert cellular glass preformed pipe insulation to allow sleeve seal tightening against metal jacket. Tighten and seal sleeve to jacket to form a watertight seal.

G. Interior Walls and Partitions Penetrations: Apply insulation continuously through walls and partitions, except fire-rated walls and partitions. Apply an aluminum jacket with factory-applied moisture over insulation. Extend 2 inches from both surfaces of wall or partition. Secure aluminum jacket with metal bands at both ends. Seal ends of jacket with vapor barrier coating. Seal around penetration with joint sealer. Refer to Division 7 Section Joint Sealants.

H. Fire-Rated Walls and Partitions Penetrations: Terminate insulation at penetrations through fire-rated walls and partitions. Seal insulation ends with vapor barrier coating. Seal around penetration with firestopping or fire-resistant joint sealer. Refer to Division 7 for firestopping and fire-resistant joint sealers.

I. Flanges, Fittings, and Valves - Interior Exposed and Concealed: Coat pipe insulation ends with vapor barrier coating. Apply premolded, precut, or field-fabricated segments of insulation around flanges, unions, valves, and fittings. Make joints tight. Bond with adhesive.

1. Use same material and thickness as adjacent pipe insulation.
2. Overlap nesting insulation by 2 inches or 1-pipe diameter, which ever is greater.
3. Apply materials with adhesive, fill voids with mineral fiber insulating cement. Secure with wire or tape.
4. Insulate elbows and tees smaller than 3 inches pipe size with premolded insulation.
5. Insulate elbows and tees 3 inches and larger with premolded insulation or insulation material segments. Use at least 3 segments for each elbow.
6. Cover insulation, except for metal jacketed insulation, with PVC fitting covers and seal circumferential joints with butt strips.
7. Cover insulation, except for metal jacketed insulation, with 2 layers of lagging adhesive to a minimum thickness of 1/16 inch. Install glass cloth between layers. Overlap adjacent insulation by 2 inches in both directions from joint with glass cloth and lagging adhesive.

J. Hangers and Anchors: Apply insulation continuously through hangers and around anchor
Attachments. Install saddles, shields, and inserts as specified in section 23 05 29.

1. Inserts and Shields: Cover hanger inserts and shields with jacket material matching adjacent pipe insulation.

3.4 FLEXIBLE ELASTOMERIC CELLULAR PIPE INSULATION INSTALLATION

A. Slip insulation on the pipe before making connections wherever possible. Seal joints with adhesive. Where the slip-on technique is not possible, cut one side longitudinally and apply to the pipe. Seal seams and joints with adhesive.

B. Valves, Fittings, and Flanges: Cut insulation segments from pipe or sheet insulation. Bond to valve, fitting, and flange and seal joints with adhesive.

1. Miter cut materials to cover soldered elbows and tees.

3.5 DUCT INSULATION

A. Blanket Insulation: Install tight and smooth. Secure to ducts having long sides or diameters as follows:

1. Smaller Than 24 Inches: Bonding adhesive applied in 6 inch wide transverse strips on 12 inch centers.
2. 24 Inches and Larger: Anchor pins spaced 12 inches apart each way. Apply bonding adhesive to prevent sagging of the insulation.
3. Overlap joints 3 inches.
4. Seal joints, breaks, and punctures with vapor barrier compound.

3.6 FINISHES

A. Paint finished insulation as specified in Division 9.

B. Flexible Elastomeric Cellular Insulation: After adhesive has fully cured, apply 2 coats of protective coating to exposed insulation.

3.7 APPLICATIONS

A. General: Materials and thicknesses are specified in schedules at the end of this Section.

B. Interior, Piping Systems: Unless otherwise indicated, insulate the following piping systems:

1. Chilled water piping.
2. Heating hot water piping.

C. Duct Systems: Unless otherwise indicated, insulate the following duct systems:

1. Interior concealed rigid supply and tempered outside air ductwork.

3.8 PIPE INSULATION SCHEDULES

A. General: Abbreviations used in the following schedules include:

B. CHILLED WATER PIPING

<table>
<thead>
<tr>
<th>PIPE SIZES (NPS)</th>
<th>MATERIALS</th>
<th>THICKNESS</th>
<th>VAPOR BARRIER</th>
<th>FIELD-APPLIED</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-1/2&quot; and lgr</td>
<td>Flexible Elastomeric</td>
<td>1</td>
<td>Yes</td>
<td>None</td>
</tr>
</tbody>
</table>

C. HEATING HOT WATER PIPING

<table>
<thead>
<tr>
<th>PIPE SIZES (NPS)</th>
<th>MATERIALS</th>
<th>THICKNESS</th>
<th>VAPOR BARRIER</th>
<th>FIELD-APPLIED</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 1-1/4&quot;</td>
<td>Glass Fiber</td>
<td>1-1/2</td>
<td>No</td>
<td>None</td>
</tr>
<tr>
<td>1-1/2&quot; and lgr</td>
<td>Glass Fiber</td>
<td>2</td>
<td>No</td>
<td>None</td>
</tr>
</tbody>
</table>

D. Refrigerant Suction Piping: ½” thick flexible elastomeric with vapor tight joints and UV protectant finish when located outdoors.

E. Condensate Drain Piping: ½” thick flexible elastomeric.

3.9 DUCT SYSTEMS INSULATION SCHEDULE

A. INTERIOR CONCEALED RIGID HVAC SUPPLY AND TEMPERED OUTSIDE AIR DUCTS AND PLENUMS

<table>
<thead>
<tr>
<th>MATERIAL</th>
<th>THICKNESS</th>
<th>VAPOR BARRIER</th>
<th>FIELD-APPLIED</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glass Fiber</td>
<td>Blanket</td>
<td>2</td>
<td>Yes</td>
</tr>
</tbody>
</table>

END OF SECTION 23 07 00
SECTION 23 09 50

CONTROLS AND INSTRUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 WORK INCLUDES

A. Provide as herein specified, modification and extension of the existing Johnson Controls Direct Digital Control (DDC) temperature control system and electric control subsystems. The control systems shall be installed by competent control technicians. The control system shall consist of all sensors controllers, damper operators, switches, control panels, and other accessory equipment along with a complete system of electrical wiring to fill the intent of the specification and provide for a complete and operable system. All control equipment shall be fully proportioning, except as otherwise noted.

B. New VAV box control panels, damper actuators, sensors, and room sensors.

C. Interlock wiring for new toilet exhaust fans.

D. Power wiring to variable volume (VAV) box controls.

E. Reconfiguration of the existing air handling unit controller.

1.2 SUBMITTALS

A. The contractor shall submit copies of complete temperature control diagrams with written "sequence of control" and factory printed specification data sheets, covering each control device proposed to be used, for engineer's approval, prior to installation of any equipment or part of system.

1.3 MANUFACTURERS

A. Johnson Controls.

PART 2 - PRODUCT

2.1 MATERIALS AND EQUIPMENT

A. General: Provide DDC and electric control products in sizes and capacities indicated, consisting of thermostats, sensors, controllers, and other components as required for complete installation. Except as otherwise indicated, provide manufacturer's standard control system components as indicated by published product information, designed and constructed as recommended by manufacturer. Provide electric control systems with the following functional and construction features as indicated.

B. Air Handling Unit Controls:
1. The system shall be reconfigured to provide control, monitoring and communication of the following information:
   a. Analog Input Points
      1. Outside air temperature.
      2. Supply air temperature.
      3. Return air temperature.
      4. Supply temperature setpoint.
      5. Duct differential pressure.
   b. Binary Input Points
      1. Supply fan on/off status.
      2. Supply fan failure.
      3. Dirty filter.
   c. Analog Output Points
      1. Outside air return air relief damper position.
      2. Supply fan speed.
      3. Cooling coil valve position.
   d. Binary Output Points
      1. Fan on/off.
      2. Interlocked toilet exhaust fan.

2. The system control panel shall provide the following control functions for each unit.
   a. Schedule unit for optimum start and provide a program that automatically adjusts on a daily basis the morning start-up time based on the zone temperature versus the occupied setpoint and the historical recovery rate for each unit.

3. Room sensors shall have timed over-ride button and setpoint adjustment. Room temperature readout shall be concealed.

C. VAV Boxes: Provide new controllers.
   1. Analog input points.
      a. Space temperature.
      b. Space temperature setpoint.
      c. Supply air temperature.
   2. Binary input points.
      a. Over-ride button.
      b. Communication network status.
   3. Analog output points.
      a. Damper actuator.
      b. Reheat valve actuator.

D. Actuators:
   1. Electric Motors: Size to operate with sufficient reserve power to provide smooth modulating action or two-position action.
      a. Permanent Split-Capacitor or Shaded-Pole Type: Gear trains completely
oil immersed and sealed. Equip spring-return motors with integral spiral-spring mechanism in housings designed for easy removal for service or adjustment of limit switches, auxiliary switches, or feedback potentiometer.

b. Nonspring-Return Motors for Valves Larger Than NPS 2-1/2: Size for running torque of 150 in. x lbf and breakaway torque of 300 in. x lbf.

c. Spring-Return Motors for Valves Larger Than NPS 2-1/2: Size for running and breakaway torque of 150 in. x lbf.

d. Nonspring-Return Motors for Dampers Larger Than 25 Sq. Ft: Size for running torque of 150 in. x lbf and breakaway torque of 300 in. x lbf.

e. Spring-Return Motors for Dampers Larger Than 25 Sq. Ft.: Size for running and breakaway torque of 150 in. x lbf.

2. Electronic Actuators: Direct-coupled type designed for minimum 60,000 full-stroke cycles at rated torque.

a. Valves: Size for torque required for valve close off at maximum pump differential pressure.

b. Dampers: Size for running torque calculated as follows:

1. Parallel-Blade Damper with Edge Seals: 7 inch-lb/sq. ft. of damper.
2. Opposed-Blade Damper with Edge Seals: 5 inch-lb/sq. ft. of damper.
4. Opposed-Blade Damper without Edge Seals: 3 inch-lb/sq. ft. of damper.
5. Dampers with 2 to 3 Inch wg of Pressure Drop or Face Velocities of 1000 to 2500 fpm: Increase running torque of 1.5.
6. Dampers with 3 to 4 Inch wg of Pressure Drop or face Velocities of 2500 to 3000 fpm: Increase running torque of 2.0.

c. Coupling: V-bolt and V-shaped, toothed cradle.

d. Overload-Protection: Electronic overload or digital rotation-sensing circuitry.

e. Fail-Safe Operation: Mechanical, spring-return mechanism. Provide external, manual gear release on nonspring-return actuators.

E. Dampers:

1. Mixing dampers for existing air handling unit shall remain.

2. VAV Terminals: Provided with terminals.

PART 3 - EXECUTION

3.1 INSPECTION

A. Examine areas and conditions under which control systems are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

3.2 INSTALLATION OF CONTROL SYSTEMS

A. General: Install systems and materials in accordance with manufacturer's instructions
and roughing-in drawings, and details on drawings. Install electrical components and use electrical products complying with requirements of applicable Division-26 sections of these specifications. Mount controllers at convenient locations and heights.

B. Control Wiring: The term "control wiring" is defined to include providing of wire, conduit and miscellaneous materials as required for mounting and connecting electric control devices.

C. Wiring System: Install complete control wiring system for control systems. Conceal wiring, except in mechanical rooms and areas where other conduit and piping are exposed. Provide multi-conductor instrument harness (bundle) in place of single conductors where number of conductors can be run along common path. Fasten flexible conductors bridging cabinets and doors, neatly along hinge side, and protect against abrasion. Tie and support conductors neatly.

D. Number-code or color-code conductors, excluding those used for local individual room controls, appropriately for future identification and servicing of control system.

3.3 SEQUENCE OF OPERATION (ADMINISTRATION AIR HANDLING UNIT):

A. HVAC System Supply Fan Operating:
   1. Interlocked exhaust fans shall be stopped in the unoccupied mode and their dampers shall be closed. Interlocked exhaust fans shall run in the occupied mode, and their dampers shall open. Heating and cooling controls shall function as described hereinafter for the specific modes of operation. Outside air dampers shall be open to minimum position unless in economizer mode.

B. HVAC System Supply Fan Not Operating:
   1. When an HVAC system is stopped, all interlocked fans shall stop. Outside air and relief air dampers shall close. Return air damper shall open.

C. VAV Unit:
   1. Occupied and Unoccupied Modes of Operation:
      a. At the time programmed, the controller shall place the system in the occupied mode. At the programmed time the controller shall place the control system in the unoccupied mode of operation.

   2. Supply Fan Control:
      a. Occupied Mode - supply fan shall start, and shall operate continuously.
      b. Unoccupied Mode - The supply fan shall cycle based on the night setpoints and the temperature at the night sensor. The fan shall start at and stop at the setpoints programmed.
      c. Current sensor shall monitor fan operation.
      d. Volume Control – modulate fan speed to maintain duct pressure setpoint.

   3. Filter:
      a. A differential pressure switch across the filter banks shall turn on the filter alarm when the pressure drop across the filter banks reaches the setpoint.

   4. Cooling Control:
      a. VAV unit:
         1) Occupied Mode - The cooling coil valve shall be controlled by the
DDC controller to maintain 57 degree supply air.

2) Unoccupied Mode – Same as occupied mode.

D. Interlocked Exhaust Fans:
   1. Occupied Mode – fans run continuously.
   2. Ventilation Delay and Unoccupied Modes – fans off.

E. Variable Air Volume (VAV) Terminals:
   1. On space temperature rise above cooling setpoint modulate air damper open to meet load.
   2. On space temperature drop below heating setpoint modulate reheat valve open to meet load.
   3. Minimum Airflow:
      a. Minimum airflow in occupied mode shall be as scheduled.
      b. Minimum airflow in unoccupied mode shall be 0 CFM.

3.4 EQUIPMENT LABELING

A. Labels shall be installed wherever necessary to clarify functions of components and facilitate adjustment and servicing. Labels shall be required on, but not limited to the following:
   1. Control panels.
   2. Automatic damper motors.
   3. Temperature sensors.

3.5 FINAL ADJUSTMENT OF CONTROLS

A. After completion of the installation, adjust all thermostats, control valves, motors and other equipment provided under this contract and place them in complete operating condition.

END OF SECTION 23 09 50
SECTION 23 21 13

HYDRONIC PIPING

PART 1 – GENERAL

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

1.2 WORK INCLUDES
A. Hot and chilled water piping for new air handling unit and VAV boxes, including accessories.

1.3 PERFORMANCE REQUIREMENTS
A. Hydronic Piping components and installation shall be capable of withstanding the following minimum working pressure and temperatures:

1. Chilled Water Piping: 150 psig at 150 deg F.
2. Heating Hot Water Piping: 150 psig at 200 deg F.

1.4 SUBMITTALS
A. Product Data for hydronic specialties.

PART 2 - PRODUCTS

2.1 COPPER TUBE AND FITTINGS
A. Drawn-Temper Copper Tubing: ASTM B88, Type L.
B. Wrought-Copper Fittings and Unions: ASME B16.22.
C. Copper Press Fittings: Copper press fittings by Viega, Nibco, or Elkhart.

2.2 JOINING MATERIALS
A. Solder Filler Metals: ASTM B32, lead-free alloys. Include water-flushable flux according to ASTM B813.
B. Brazing Filler Metals: AWS A5.8, BCuP Series, copper-phosphorus alloys for joining copper with copper; or BAg-1, silver-alloy for joining copper with bronze or steel.

2.3 DI-ELECTRIC FITTINGS
A. Dielectric Unions shall be factory fabricated for 250 psig working pressure at 180 deg F.
2.4 HYDRONIC SPECIALTIES

A. Bronze, Calibrated-Orifice Balancing Valves:
   1. Manufacturers: Subject to compliance with requirements, provide products by Armstrong, Bell & Gossett, or Taco.
   2. Body: Bronze, ball or plug type with calibrated orifice.
   3. Ball: Brass or stainless steel.
   4. Plug: Resin.
   5. Seat: PTFE.
   8. Handle Style: Lever, with memory stop to retain position.
   10. Maximum Operating Temperature: 250 deg F.

B. Manual Air Vents:
   1. Body: Bronze.
   2. Internal Parts: Nonferrous.
   4. Inlet Connection: NPS ½.
   7. Maximum Operating Temperature: 225 deg F.

C. Y-Pattern Strainers:
   1. Body: ASTM A126, Class B, cast iron with bolted cover and drain connection.
   2. End Connections: To coordinate with adjacent piping.
   3. Strainer Screen: Perforated stainless steel with 50% free area.

PART 3 - EXECUTION

3.1 INSPECTION

A. General: Examine areas and conditions under which hydronic piping is to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

3.2 VALVE APPLICATIONS

A. Install shut-off duty valves at each branch connection to supply mains and at supply connection to each piece of equipment.

B. Install balancing valves at each branch connection to return main.

C. Install balancing valve in the return piping from each heating or cooling coil.

3.3 PIPING INSTALLATIONS
A. Drawings, plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated piping locations and arrangements if such were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved by A/E.

B. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms.

C. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

D. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

E. Install piping to allow valve servicing.

F. Install piping at indicated slopes.

G. Install piping free of sags and bends.

H. Install fittings for changes of direction and branch connections.

I. Install piping to allow application of insulation.

J. Select system components with pressure rating equal to or greater than system operating pressure.

K. Install groups of pipes parallel to each other, spaced to permit application of insulation and servicing of valves.

L. Install drains at low points in piping system mains, and elsewhere as required for system drainage.

M. Install piping at a uniform grade of 0.2 percent upward in direction of flow.

N. Reduce piping sizes using eccentric reducer fittings installed with level side up.

O. Install branch connections to mains using tee fittings in main pipe, with the branch connected to the top of the main pipe.

P. Install valves according to Division 23 Section “General Duty Valves for HVAC Piping.”

Q. Install unions at final connections to equipment and elsewhere as indicated.

R. Install strainers at inlet connection to each control valve.

S. Identify piping as specified in Division 23 Section “Identification for HVAC Piping and Equipment.”

3.4 HANGERS AND SUPPORTS

A. Hangers, support and anchor devices are specified in Section 23 05 29.

3.5 PIPE JOINT CONSTRUCTION
A. Ream ends of pipes and tubes and remove burrs.
B. Remove slag, scale, dirt, and debris from inside and outside of pipe and fittings before assembly.
C. Soldered Joints: Apply flux to tube end. Construct joints according to ASTM B828 or CDA’s Copper Tube Handbook,” using lead-free solder.
D. Press Joints: Assemble according to instructions provided by manufacturer of press fittings.

3.6 HYDRONIC SPECIALTIES INSTALLATION
A. Install manual air vents at high points in piping, at coils, and elsewhere as indicated.
B. Install balancing valves at locations indicated.

3.7 TERMINAL EQUIPMENT CONNECTIONS
A. Sizes for supply and return piping connections shall be the same as or larger than equipment connections.
B. Install control valves in accessible locations close to equipment.
C. Install P&T test ports at coil inlet and outlet connections.

3.8 FIELD QUALITY CONTROL
A. Prepare hydronic piping according to ASME B31.9 and as follows:
   1. Leave joints uninsulated and exposed for examination during test.
   2. Flush hydronic piping systems with clean water, then remove and clean or replace strainer screens.
   3. Isolate equipment from piping. If a valve is used to isolate equipment, it shall be capable of sealing against the test pressure without damage to the valve.
   4. Install safety valve, set at pressure nor more than one-third higher than test pressure, to protect against damage by expanding liquid.
B. Perform the following tests on hydronic piping;
   1. Use ambient temperature water as testing medium.
   2. While filling system, use vents installed at high points to release air.
   3. Isolate expansion tanks and determine that system is full of water.
   4. Subject piping system to hydrostatic test pressure that is not less than 1.5 times the system’s working pressure. Test pressure shall not exceed maximum pressure for any vessel, pump, valve, or other component of the system under test.
   5. After hydrostatic test pressure has been applied for for at least 10 minutes, examine piping, joints, and connections for leakage. Eliminate leaks by tightening, repairing or replacing components, and repeat test until there are no leaks.
   6. Prepare written report.
C. Perform the following before restarting the systems:
   1. Open manual valves fully.
   2. Inspect air vents and determine if all bleed air completely.

END OF SECTION 23 21 13
SECTION 23 23 00

REFRIGERANT PIPING AND SPECIALTIES

PART 1 - GENERAL

1.1 WORK INCLUDES

A. Piping.
B. Refrigerant.
C. Moisture and liquid indicators.
D. Valves.
E. Filter-driers.
F. Solenoid valves.
G. Expansion valves.

1.2 RELATED SECTIONS

A. Section 09 9100 - Painting.

1.3 REFERENCES

A. ARI 710 - Liquid Line Dryers.
B. ARI 730 - Flow-Capacity Rating and Application of Suction-Line Filters and Filter-Driers
C. ARI 750 - Thermostatic Refrigerant Expansion Valves.
D. ARI 760 - Solenoid Valves for Use With Volatile Refrigerants.
F. ASHRAE 34 - Number Designation of Refrigerants.
H. ASME B16.22 - Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.
I. ASME B16.26 - Cast Copper Alloy Fittings For Flared Copper Tubes.
J. ASME B31.5 - Refrigeration Piping.
K. ASME B31.9 - Building Services Piping.
M. ASTM B280 - Seamless Copper Tube for Air Conditioning and Refrigeration Field Service.
N. ASTM F708 - Design and Installation of Rigid Pipe Hangers.
O. AWS A5.8 - Brazing Filler Metal.
P. MSS SP58 - Pipe Hangers and Supports - Materials, Design and Manufacturer.
Q. MSS SP69 - Pipe Hangers and Supports - Selection and Application.
R. MSS SP89 - Pipe Hangers and Supports - Fabrication and Installation Practices.

1.4 SYSTEM DESCRIPTION

A. Where more than one piping system material is specified ensure system components are compatible and joined to ensure the integrity of the system is not jeopardized. Provide necessary joining fittings. Ensure flanges, union, and couplings for servicing are consistently provided.

B. Provide pipe hangers and supports in accordance with MSS SP69 unless indicated otherwise.

C. Liquid Indicators:
   1. Use line size liquid indicators in main liquid line leaving condensing unit.

D. Valves:
   1. Use service valves on suction and discharge of compressors.
   2. Use gage taps at compressor inlet and outlet.

E. Filter-Driers:
   1. Use in systems utilizing hermetic and semi-hermetic compressors.

F. Solenoid Valves:
   1. Use in liquid line of systems operating with single pump-out or pump-down compressor control.

1.5 SUBMITTALS

A. Submit under provisions of Division 01.

B. Product Data: Provide general assembly of specialties, including manufacturers catalogue information. Provide manufacturers catalog data including load capacity.

C. Test Reports: Indicate results of leak test, acid test.

1.6 PROJECT RECORD DOCUMENTS

A. Submit under provisions of Division 01.

B. Record exact locations of equipment and refrigeration accessories on record drawings.
1.7 OPERATION AND MAINTENANCE DATA
   A. Submit under provisions of Division 01.
   B. Maintenance Data: Include instructions for changing cartridges, assembly views, spare parts lists.

1.8 QUALIFICATIONS
   A. Installer: Company specializing in performing the work of this section with minimum 3 years experience.

1.9 REGULATORY REQUIREMENTS
   A. Conform to ASME B31.9 for installation of piping system.
   B. Welding Materials and Procedures: Conform to ASME SEC 9 and applicable state labor regulations.
   C. Welders Certification: In accordance with ASME SEC 9.
   D. Products Requiring Electrical Connection: Listed and classified by UL, as suitable for the purpose indicated.
   E. All refrigeration work shall be done by certified Technicians in accordance with Federal Register 40CFR, Part 82, subpart F.

1.10 DELIVERY, STORAGE, AND HANDLING
   A. Deliver, store, protect and handle products to site.
   B. Deliver and store piping and specialties in shipping containers with labeling in place.
   C. Protect piping and specialties from entry of contaminating material by leaving end caps and plugs in place until installation.
   D. Dehydrate and charge components such as piping and receivers, seal prior to shipment, until connected into system.

PART 2 - PRODUCTS

2.1 PIPING
   A. Copper Tubing: ASTM B280, Type ACR hard drawn or annealed.
      2. Joints: Braze, AWS A5.8 BCuP silver/phosphorus/copper alloy with melting range 1190 to 1480 degrees F.
   B. Pipe Supports and Anchors:
      1. Conform to MSS SP58, MSS SP69, and MSS SP89.
      2. Hangers for Pipe Sizes 1/2 to 1-1/2 Inch: Adjustable swivel, split ring.
      3. Hangers for Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis.
      4. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
5. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
7. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.
8. Hanger Rods: Mild steel threaded both ends, threaded one end, or continuous threaded.

2.2 REFRIGERANT

A. Refrigerant: ASHRAE 34:
   1. R-410A.
   2. Refrigerant used by ice machine(s) furnished by Exchange.

B. Ozone-Depleting Substances:
   1. Class I Substance, as used in this clause, means any substance designated as class 1 by the Environmental Protection Agency (EPA) 40 CFR Part 82), including but not limited to chlorofluorocarbons, halons, carbon tetrachloride, and methyl chloroform.
   2. Class II Substance, as used in this clause, means any substance designated as class II by EPA (40 CFR Part 82), including but not limited to, hydrochlorofluorocarbons.
   3. As required by 42 USC 767j (b), (c), and (d) and 40 CFR Part 82, Subpart E, the Contractor shall label products which contain class I or class II ozone depleting substances or are manufactured with a process that uses class I or class II ozone depleting substances, or containers of class I or class II ozone depleting substances, as follows:

   WARNING: Contains (or manufactured with, if applicable) _______________, (a) substance(s) which harm(s) public health and the environment by destroying ozone in the upper atmosphere. The Contractors shall insert the name of the substance(s).

C. Refrigeration Equipment and Air Conditioners: for Contracts for services for maintenance, repair, or disposal of any equipment using class I or class II ozone depleting substances as a refrigerant, such as refrigerators, chillers, freezers, or air conditioners, including motor vehicle air conditioners: The contractor shall comply with the applicable requirements of Sections 608 and 609 of the Clean Air Act (42 USC 7671g, National Recycling and Emission Reduction Program and 7671h, Servicing of Motor Vehicle Air Conditioners) as each or both apply to the contract.

D. Use of Recycled Materials: To the greatest extent practicable, contractor shall use recycled materials and materials and equipment that are recyclable.

2.3 MOISTURE AND LIQUID INDICATORS

A. Indicators: Single port type, UL listed, with copper or brass body, solder ends, sight glass, color coded paper moisture indicator and plastic cap; for maximum working pressure of 500 psig, and maximum temperature of 200 degrees F.

2.4 VALVES

A. Service Valves:
   1. Forged brass body with copper stubs, brass caps, removable valve core, flared or solder ends, for maximum pressure of 500 psig.

2.5 FILTER-DRIERS

A. Permanent filter driers:
   1. Comply with ARI 730.
2.6 SOLENOID VALVES

A. Valve: ARI 760, pilot operated, copper or brass body and internal parts, synthetic seat, stainless steel stem and plunger assembly, integral strainer, with flared, solder, or threaded ends; for maximum working pressure of 500 psig. Stem shall permit manual operation in case of coil failure.

B. Coil Assembly: UL listed, replaceable with molded electromagnetic coil, moisture and fungus proof, with surge protector and color coded lead wires, integral junction box.

2.7 EXPANSION VALVES

A. Angle or Straight Through Type: ARI 750; design suitable for refrigerant, brass body, internal or external equalizer, adjustable superheat setting, replaceable inlet strainer, with capillary tube and remote sensing bulb.

B. Selection: Evaluate refrigerant pressure drop through system to determine available pressure drop across valve. Select valve for maximum load at design operating pressure and minimum 10 degrees F superheat. Select to avoid being undersized at full load and excessively oversized at part load.

PART 3 - EXECUTION

3.1 PREPARATION

A. Ream pipe and tube ends. Remove burrs.

B. Remove scale and dirt on inside and outside before assembly.

C. Prepare piping connections to equipment with flanges or unions.

3.2 INSTALLATION

A. Install refrigeration specialties in accordance with manufacturer's instructions.

B. Route piping in orderly manner parallel to building structure, and maintain gradient.

C. Install piping to conserve building space and not interfere with use of space.

D. Group piping whenever practical at common elevations and locations. Slope piping one percent in direction of oil return.

E. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.

F. Pipe Hangers and Supports:
   1. Install in accordance with ASTM B31.5, ASTM F708 and MSS SP89.
   2. Support horizontal piping as scheduled.
   3. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
   4. Place hangers within 12 inches of each horizontal elbow.
6. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.

7. Provide copper plated hangers and supports for copper piping.

G. Arrange piping to return oil to compressor. Provide traps and loops in piping, and provide double risers as required. Slope horizontal piping 0.40 percent in direction of flow.

H. Provide clearance for installation of insulation and access to valves and fittings.

I. Provide access to concealed valves and fittings. Coordinate size and location of access doors with other trades.

J. Flood piping system with nitrogen when brazing.

K. Where pipe support members are welded to structural building frame, brush clean, and apply one coat of zinc rich primer to welding.

L. Prepare unfinished pipe, fittings, supports, and accessories ready for finish painting. Refer to Division 09.

M. Follow ASHRAE 15 procedures for charging and purging of systems and for disposal of refrigerant.

N. Install piping in compliance with equipment manufacturer’s instructions.

O. Fully charge completed system with refrigerant after testing.

P. Provide electrical connection to solenoid valves. Refer to Division 26.

Q. Install ice machine condenser, and associated piping in compliance with manufacturers requirements.

3.3 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed under provisions of Division 01.

B. Test refrigeration system in accordance with ASME B31.5.

C. Pressure test system with dry nitrogen to 200 psig. Perform final tests at 27 inches vacuum and 200 psig using electronic leak detector. Test to no leakage.

3.4 SCHEDULES

A. Pipe Hanger Spacing:

<table>
<thead>
<tr>
<th>PIPE SIZE</th>
<th>MAX. HANGER SPACING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inches</td>
<td>Feet</td>
</tr>
<tr>
<td>1/2 to 1-1/4</td>
<td>6.5</td>
</tr>
<tr>
<td>1-1/2 to 2</td>
<td>10</td>
</tr>
<tr>
<td>2-1/2 to 3</td>
<td>10</td>
</tr>
</tbody>
</table>

END OF SECTION 23 23 00
SECTION 23 31 13

METAL DUCTWORK

PART 1 – GENERAL

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

1.2 WORK INCLUDES
A. Sheet metal ductwork for air distribution systems including accessories.

1.3 QUALITY ASSURANCE
A. Codes and Standards:
   1. SMACNA Standards: Comply with SMACNA's "HVAC Duct Construction Standards, Metal and Flexible" for fabrication and installation of metal ductwork.

B. Field Reference Manual: Have available for reference at project field office, copy of SMACNA "HVAC Duct Construction Standards, Metal and Flexible".

1.4 SUBMITTALS
A. Product Data: Submit manufacturer's technical product data and installation instructions for metal ductwork materials and products in accord with Division 01.

1.5 DELIVERY, STORAGE, AND HANDLING
A. Protection: Protect shop-fabricated and factory-fabricated ductwork, accessories and purchased products from damage during shipping, storage and handling. Prevent end damage and prevent dirt and moisture from entering ducts and fittings.

B. Storage: Where possible, store ductwork inside and protect from weather. Where necessary to store outside, store above grade and enclose with waterproof wrapping.

PART 2 - PRODUCTS

2.1 DUCTWORK MATERIALS
A. Sheet Metal: Except as otherwise indicated, fabricate ductwork from galvanized sheet steel complying with ASTM A 527, lockforming quality; with G 90 zinc coating in accordance with ASTM A 525; and mill phosphatized for exposed locations.

B. Black Steel: Exhaust hood ductwork shall be constructed of 16 gage black steel with all joints welded liquid-tight.

### 2.2 MISCELLANEOUS DUCTWORK MATERIALS

A. General: Provide miscellaneous materials and products of 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.

B. Fittings: Provide radius type fittings fabricated of multiple sections with maximum 15 degree change of direction per section. Unless specifically detailed otherwise, use 45 degree laterals and 45 degree elbows for branch takeoff connections. Where 90 degree branches are indicated, provide conical type tees.

C. Duct Sealant: Non-hardening, non-migrating mastic or liquid elastic sealant, type applicable for fabrication/installation detail, as compounded and recommended by manufacturer specifically for sealing joints and seams in ductwork.

D. Duct Cement: Non-hardening migrating mastic or liquid neoprene based cement, type applicable for fabrication/installation detail, as compounded and recommended by manufacturer specifically for cementing fitting components, or longitudinal seams in ductwork.

E. Ductwork Support Materials: Except as otherwise indicated, provide hot-dipped galvanized steel fasteners, anchors, rods, straps, trim and angles for support of ductwork.

### 2.3 FABRICATION

A. Shop fabricate ductwork in 4, 8, 10 or 12-ft. lengths, unless otherwise indicated or required to complete runs. Preassemble work in shop to greatest extent possible, so as to minimize field assembly of systems. Disassemble systems only to extent necessary for shipping and handling. Match-mark sections for reassembly and coordinated installation.

B. Shop fabricate ductwork of gages and reinforcement complying with SMACNA "HVAC Duct Construction Standards".

C. Fabricate duct fittings to match adjoining ducts, and to comply with duct requirements as applicable to fittings. Except as otherwise indicated, fabricate elbows with center-line radius equal to associated duct width; and fabricate to include turning vanes in elbows where shorter radius is necessary. Limit angular tapers to 30 deg. for contracting tapers and 20 deg. for expanding tapers.

D. Fabricate ductwork with accessories installed during fabrication to the greatest extent possible. Refer to Division 23 section "Ductwork Accessories" for accessory requirements.

### PART 3 - EXECUTION
3.1 INSPECTION

A. General: Examine areas and conditions under which metal ductwork is to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

3.2 INSTALLATION OF METAL DUCTWORK

A. General: Assemble and install ductwork in accordance with recognized industry practices which will achieve air-tight (5% leakage for systems rated 3" and under; 1% for systems rated over 3") and noiseless (no objectionable noise) systems, capable of performing each indicated service. Install each run with minimum number of joints. Align ductwork accurately at connections, within 1/8” misalignment tolerance and with internal surfaces smooth. Support ducts rigidly with suitable ties, braces, hangers and anchors of type which will hold ducts true-to-shape and to prevent buckling. Support vertical ducts at every floor.

B. Field Fabrication: Complete fabrication of work at project as necessary to match shop-fabricated work and accommodate installation requirements.

C. Routing: Locate ductwork runs, except as otherwise indicated, vertically and horizontally and avoid diagonal runs wherever possible. Locate runs as indicated by diagrams, details and notations or, if not otherwise indicated, run ductwork in shortest route which does not obstruct useable space or block access for servicing building and its equipment. Hold ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building. Limit clearance to 1/2" where furring is shown for enclosure or concealment of ducts, but allow for insulation thickness, if any. Where possible, locate insulated ductwork for 1" clearance outside of insulation. Wherever possible in finished and occupied spaces, conceal ductwork from view, by locating in mechanical shafts, hollow wall construction or above suspended ceilings. Do not encase horizontal runs in solid partitions, except as specifically shown. Coordinate layout with suspended ceiling and lighting layouts and similar finished work.

D. Penetrations: Where ducts pass through interior partitions and exterior walls, conceal space between construction opening and duct or duct insulation with sheet metal flanges of same gage as duct. Overlap opening on 4 sides by at least 1-1/2”. Fasten to duct and substrate.

E. Coordination: Coordinate duct installations with installation of accessories, dampers, coil frames, equipment, controls and other associated work of ductwork system.

F. Installation: Install metal ductwork in accordance with SMACNA HVAC Duct Construction Standards.

3.3 EQUIPMENT CONNECTIONS

A. General: Connect metal ductwork to equipment as indicated, provide flexible connection for each ductwork connection to equipment mounted on vibration isolators, and/or equipment containing rotating machinery. Provide access doors as indicated.

3.4 ADJUSTING AND CLEANING

A. Clean ductwork internally, unit by unit as it is installed, of dust and debris. Clean external surfaces of foreign substances which might cause corrosive deterioration of metal or, where
ductwork is to be painted, might interfere with painting or cause paint deterioration.

B. Temporary Closure: At ends of ducts which are not connected to equipment or air distribution devices at time of ductwork installation, provide temporary closure of polyethylene film or other covering which will prevent entrance of dust and debris until time connections are to be completed.

END OF SECTION 23 21 13
SECTION 23 33 00

DUCTWORK ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 WORK INCLUDES

A. Ductwork accessories.

1.3 QUALITY ASSURANCE

A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of ductwork accessories, of types and sizes required, whose products have been in satisfactory use in similar service for not less than 3 years.

B. Codes and Standards:

1. SMACNA Compliance: Comply with applicable portions of SMACNA "HVAC Duct Construction Standards, Metal and Flexible".
2. Industry Standards: Comply with ASHRAE recommendations pertaining to construction of ductwork accessories, except as otherwise indicated.
3. UL Compliance: Construct, test, and label fire dampers in accordance with UL Standards 555 "Fire Dampers and Ceiling Dampers" and 555S "Standard For Safety-Leakage Rated Dampers For Use In Smoke Control Systems."

1.4 SUBMITTALS

A. General: Submit the following in accord with Division 01.

B. Product Data: Submit manufacturer's technical product data for each type of ductwork accessory, including dimensions, capacities, and materials of construction; and installation instructions.

C. Maintenance Data: Submit manufacturer's maintenance data including parts lists for each type of duct accessory. Include this data, product data, and shop drawings in maintenance manual; in accordance with Division 01.

PART 2 - PRODUCTS

2.1 DAMPERS
A. Low Pressure Manual Dampers: Provide dampers of single blade type or multiblade type, constructed in accordance with SMACNA "HVAC Duct Construction Standards".

B. Manufacturer: Subject to compliance with requirements, provide dampers of one of the following:
   1. Air Balance, Inc.
   2. Nailor.
   3. American Warming & Ventilating, Inc.
   4. Arrow Louver and Damper.
   5. Greenheck.
   6. National Controlled Air.
   8. Leader.

2.2 DUCT HARDWARE

A. General: Provide duct hardware, manufactured by one manufacturer for all items on project, for the following:
   1. Test Holes: Provide in ductwork at fan inlet and outlet, and elsewhere as indicated, duct test holes, consisting of slot and cover, for instrument tests.
   2. Quadrant Locks: Provide for each damper, quadrant lock device on one end of shaft; and end bearing plate on other end for damper lengths over 12". Provide extended quadrant locks and end extended bearing plates for externally insulated ductwork.

B. Manufacturer: Subject to compliance with requirements, provide duct hardware of one of the following:
   1. Ventfabrics, Inc.
   2. Young Regulator Co.
   3. Duro Dyne Corp.

2.3 FLEXIBLE CONNECTIONS

A. General: Provide flexible duct connections wherever ductwork connects to vibration isolated equipment. Construct flexible connections of neoprene-coated flameproof fabric crimped into duct flanges for attachment to duct and equipment. Make airtight joint. Provide adequate joint flexibility to allow for thermal, axial, transverse, and torsional movement, and also capable of absorbing vibrations of connected equipment.

B. Manufacturer: Subject to compliance with requirements, provide flexible connections of one of the following:
   2. Duro Dyne Corp.
   3. Flexaust (The) Co.
   4. Ventfabrics, Inc.

PART 3 - EXECUTION
3.1 INSPECTION

A. Examine areas and conditions under which ductwork accessories will be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

3.2 INSTALLATION OF DUCTWORK ACCESSORIES

A. Install ductwork accessories in accordance with manufacturer's installation instructions, with applicable portions of details of construction as shown in SMACNA standards, and in accordance with recognized industry practices to ensure that products serve intended function.

B. Coordinate with other work, including ductwork, as necessary to interface installation of ductwork accessories properly with other work.

C. Install manual damper at each branch duct take-off.

3.3 FIELD QUALITY CONTROL

A. Operate installed ductwork accessories to demonstrate compliance with requirements. Test for air leakage while system is operating. Repair or replace faulty accessories, as required to obtain proper operation and leakproof performance.

3.4 ADJUSTING AND CLEANING

A. Adjusting: Adjust ductwork accessories for proper settings, install fusible links in fire dampers and adjust for proper action.

1. Label access doors in accordance with Division-23 section "Mechanical Identification".

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

B. Cleaning: Clean factory-finished surfaces. Repair any marred or scratched surfaces with manufacturer's touch-up paint.

END OF SECTION 23 33 00
SECTION 23 34 23

FANS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 WORK INCLUDES

A. All materials, equipment, tools, labor, etc. required to complete the installation of the fans as shown on the drawings and as specified.

1.3 SUBMITTALS

A. General: Submit the following in accord with Division 01.

B. Product data for selected models, including specialties, accessories; and the following:
   1. Certified fan performance curves with system operating conditions indicated.
   2. Certified fan sound power ratings.
   3. Motor ratings and electrical characteristics plus motor and fan accessories.
   4. Materials gages and finishes, including color charts.
   5. Dampers, including housings, linkages, and operators.

C. Maintenance data for fans, for inclusion in Operation and Maintenance Manual specified in Division 01.

1.4 QUALITY ASSURANCE

A. UL Compliance: Fans and components shall be UL listed and labeled.

B. Nationally Recognized Testing Laboratory and NEMA Compliance (NRTL): Fans and components shall be NRTL listed and labeled. The term "NRTL" shall be as defined in OSHA Regulation 1910.7.

C. NEMA Compliance: Motors and electrical accessories shall comply with NEMA standards.

D. Electrical Component Standard: Components and installation shall comply with NFPA 70 "National Electrical Code."

1.5 DELIVERY, STORAGE AND HANDLING

A. Lift and support units with the manufacturer's designated lifting or supporting points.

B. Disassemble and reassemble units as required for movement into the final location following manufacturer's written instructions.
C. Deliver fan units as a factory-assembled unit to the extent allowable by shipping limitations, with protective crating and covering.

1.6 SEQUENCING AND SCHEDULING

A. Coordinate the installation of roof curbs, equipment supports, and roof penetrations specified in Division 07.

B. Coordinate the size and location of structural steel support members.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Cook (Loren) Co.
2. Greenheck Fan Corp.

2.2 FANS, GENERAL

A. General: Provide fans that are factory fabricated and assembled, factory tested, and factory finished, with indicated capacities and characteristics.

B. Fans and Shafts: Statically and dynamically balanced and designed for continuous operation at the maximum rated fan speed and motor horsepower.

1. Fan Shafts: Turned, ground, and polished steel designed to operate at no more than 70 percent of the first critical speed at the top of the speed range of the fan's class.

C. Belt Drives: Factory mounted, with final alignment and belt adjustment made after installation.


D. Belts: Oil-resistant, nonsparking, and nonstatic.

E. Motors and Fan Wheel Pulleys: Adjustable pitch for use with motors through 15 HP; fixed pitch for use with motors larger than 15 HP. Select pulley so that pitch adjustment is at the middle of the adjustment range at fan design conditions.

1. Belt Guards: Provide steel belt guards for motors mounted on the outside of the fan cabinet.

F. Shaft Bearings: Provide type indicated, having a median like "Rating Life" (AFBMA L) of 200,000 calculated in accordance with AFBMA Standard 9 for ball bearings and AFBMA Standard 11 for roller bearings.

2.3 CENTRIFUGAL ROOF VENTILATORS

A. Description: Belt-driven centrifugal fans consisting of housing, wheel, fan shaft, bearings, motor and disconnect switch, drive assembly, and accessories.
B. Housing: Heavy-gage, removable, spun-aluminum, dome top and outlet baffle; venture inlet cone.

C. Fan Wheel: Aluminum hub and wheel with backward-inclined blades.

D. Belt-Driven Drive Assembly: Resiliently mounted to housing, with the following features:
   1. Fan Shaft: Turned, ground, and polished steel; keyed to wheel hub.
   4. Fan and motor isolated from exhaust airstream.

E. Accessories:
   1. Disconnect Switch: Nonfusible type, with thermal overload protection mounted inside fan housing, factory wired through internal aluminum conduit.
   2. Bird Screens: Removable, ½ inch mesh, aluminum or brass wire.
   3. Dampers: Counterbalanced, parallel blade, backdraft dampers mounted in wall sleeve; factory set to close when fan stops.
   4. Roof Curbs: Prefabricated galvanized steel curbs with internal insulation.
   5. Exhaust Hood Fans: Provide UL-762 listed fans with accessories scheduled and as required for compliance with NFPA-96.

PART 3 - EXECUTION

3.1 EXAMINATION

   A. Examine areas and conditions, with Installer present, for compliance with requirements for installation tolerances, housekeeping pads, and other conditions affecting performance of fans.

   B. Do not proceed until unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

   A. Install fans level and plumb, in accordance with manufacturer's written instructions. Support units as described below, using the vibration control devices indicated. Vibration control devices are specified in Division 23.
      1. Secure roof-mounted fans to roof curbs with stainless steel hardware.

   B. Arrange installation of units to provide access space around air handling units for service and maintenance.

3.3 CONNECTIONS

   A. Duct installations and connections are specified in other Division 23 sections. Make final duct connections with flexible connections.

   B. Electrical Connections: The following requirements apply:
1. Electrical power wiring is specified in Division 26.
2. Temperature control wiring and interlock wiring are specified in Section 23 0900.
3. Grounding: Connect unit components to ground in accordance with the National Electrical Code.

3.4 ADJUSTING, CLEANING, AND PROTECTING

A. Adjust damper linkages for proper damper operation.

B. Clean unit cabinet interiors to remove foreign material and construction dirt and dust. Vacuum clean fan wheel and cabinet.

END OF SECTION 23 34 23
SECTION 23 34 33
AIR CURTAINS

PART 1 - GENERAL
1.1 WORK INCLUDES
A. Air curtains.

1.2 SUBMITTALS
A. Product Data: Include rated capacities, operating characteristics, furnished specialties, and accessories for each unit.
B. Operation and Maintenance Data: For air curtains to include in maintenance manuals.

1.3 QUALITY ASSURANCE
A. Product Options: Drawings indicate size, profiles, and dimensional requirements of air curtains and are based on the specific product indicated. Refer to Division 01 Section "Product Requirements."
B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
C. Comply with AMCA 220, "Test Methods for Air Curtain Units," for airflow, outlet velocity, and power consumption.
D. Comply with NSF 37, "Air Curtains for Entranceways in Food and Food Service Establishments."

1.4 COORDINATION
A. Coordinate layout and installation of air curtains and suspension system components with other construction, including light fixtures, fire-suppression-system components, and partition assemblies.

PART 2 - PRODUCTS
2.1 MANUFACTURERS
A. Subject to compliance with requirements, provide products by one of the following:
   1. Berner International Corp.
   2. Mars Air Products; Mars Air Door Division.
2.2 MATERIALS
A. Housing Materials: Galvanized steel with electrostatically applied epoxy enamel finish over powdered mirror.
B. Intake Louvers: Integral part of the housing.
C. Discharge Nozzle: Integral part of the housing, containing adjustable air-directional vanes.

2.3 FANS
A. Fans: Centrifugal, forward curved, double width, double inlet statically and dynamically balanced.
B. Fan Drives: Direct.

2.4 MOTORS
A. Motor Type: Resiliently mounted, continuous duty, with integral thermal-overload protection.
B. Bearings: Permanently sealed, lifetime, prelubricated, ball bearings.

2.5 ACCESSORIES
A. Automatic Door Switch: Plunger type installed in door area to activate air curtain when door opens and to deactivate air curtain when door closes.
B. Mounting Brackets: Adjustable mounting brackets for drum-type roll-up doors.

PART 3 - EXECUTION
3.1 EXAMINATION
A. Examine areas and conditions where air curtains will be installed for compliance with requirements for installation tolerances and other conditions affecting performance.
B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION
A. Install air curtains with clearance for equipment service and maintenance.

3.3 CONNECTIONS
A. Ground equipment according to Division 26 Section "Grounding and Bonding for Electrical Systems."
B. Connect wiring according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

END OF SECTION 23 34 33
SECTION 23 36 00
AIR TERMINAL UNITS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 WORK INCLUDES

A. Shutoff, single-duct air terminal units with hydronic reheat coils.

1.3 PERFORMANCE REQUIREMENTS

A. Structural Performance: Hangers and supports shall withstand the effects of gravity loads and stresses within limits and under conditions described in SMACNA’s "HVAC Duct Construction Standards - Metal and Flexible."

1.4 SUBmittALS

A. Product Data: For each type of the following products, including rated capacities, furnished specialties, sound-power ratings, and accessories.

1. Air terminal units.
2. Liners and adhesives.
3. Sealants and gaskets.

B. Shop Drawings: For air terminal units. Include plans, elevations, sections, details, and attachments to other work.

1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
2. Wiring Diagrams: For power, signal, and control wiring.
3. Hangers and supports, including methods for duct and building attachment and vibration isolation.

C. Operation and Maintenance Data: For air terminal units to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01 Section "Operation and Maintenance Data," include the following:

1. Instructions for resetting minimum and maximum air volumes.
2. Instructions for adjusting software set points.
1.5 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1-2004, Section 5 - "Systems and Equipment" and Section 7 - "Construction and System Start-Up."

PART 2 - PRODUCTS

2.1 SHUTOFF, SINGLE-DUCT AIR TERMINAL UNITS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Krueger.
   2. Nailor.
   4. Titus.
   5. Trane.
   6. Carrier.
   7. Tuttle & Bailey.

B. Configuration: Volume-damper assembly inside unit casing with control components inside a protective metal shroud.

C. Casing: 0.034-inch steel, single wall.
   1. Casing Lining: Adhesive attached coated, fibrous-glass duct liner complying with ASTM C 1071, and having a maximum flame-spread index of 25 and a maximum smoke-developed index of 50, for both insulation and adhesive, when tested according to ASTM E 84.
      a. Cover liner with nonporous foil.
   2. Air Inlet: Round stub connection or S-slip and drive connections for duct attachment.
   3. Air Outlet: S-slip and drive connections.
   4. Access: Removable panels for access to parts requiring service, adjustment, or maintenance; with airtight gasket.
   5. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1-2004.

D. Volume Damper: Galvanized steel with peripheral gasket and self-lubricating bearings.
   1. Maximum Damper Leakage: ARI 880 rated, 2 percent of nominal airflow at 3-inch wg inlet static pressure.

E. Hydronic Coils: Copper tube, with mechanically bonded aluminum fins spaced no closer than 0.1 inch, and rated for a minimum working pressure of 200 psig and a maximum entering-water temperature of 220 deg F. Include manual air vent and drain valve.
F. Direct Digital Factory Controls: Install single-package unitary controller and actuator specified in Section 23 09 50.

2.2 HANGERS AND SUPPORTS

A. Hanger Rods for Noncorrosive Environments: Cadmium-plated steel rods and nuts.

B. Air Terminal Unit Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.

C. Trapeze and Riser Supports: Steel shapes and plates for units with steel casings; aluminum for units with aluminum casings.

D. Channel Support System: Shop- or field-fabricated support assembly made of slotted steel channels rated in tension, compression, and torsion forces and with accessories for attachment to braced component at one end and to building structure at the other end. Include matching components and corrosion-resistant coating.

E. Mechanical Anchor Bolts: Drilled-in and stud-wedge or female-wedge type. Select anchor bolts with strength required for anchor and as tested according to ASTM E 488.

2.3 SOURCE QUALITY CONTROL

A. Factory Tests: Test assembled air terminal units according to ARI 880.

1. Label each air terminal unit with plan number, nominal airflow, maximum and minimum factory-set airflows, coil type, and ARI certification seal.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install air terminal units according to NFPA 90A, "Standard for the Installation of Air Conditioning and Ventilating Systems."

B. Install air terminal units level and plumb. Maintain sufficient clearance for normal service and maintenance.

3.2 HANGER AND SUPPORT INSTALLATION

A. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 4, "Hangers and Supports."

B. Hangers Exposed to View: Threaded rod and angle or channel supports.

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

A. Install piping adjacent to air terminal unit to allow service and maintenance.

B. Hot-Water Piping: In addition to requirements in Division 23 Section "Hydronic Piping," connect heating coils to supply with shutoff valve, strainer, control valve, and union or flange; and to return with balancing valve and union or flange.

C. Connect ducts to air terminal units according to Division 23 Section "Metal Ducts."

D. Make connections to air terminal units with flexible connectors complying with requirements in Division 23 Section "Air Duct Accessories."

3.4 IDENTIFICATION

A. Label each air terminal unit with plan number, nominal airflow, and maximum and minimum factory-set airflows. Comply with requirements in Division 23 Section "Identification for HVAC Piping and Equipment" for equipment labels and warning signs and labels.

END OF SECTION 23 36 00
SECTION 23 37 13

AIR OUTLET AND INLET

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 WORK INCLUDES

A. All grilles, registers, and diffusers.

1.3 QUALITY ASSURANCE

A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of air outlets and inlets of types and capacities required, whose products have been in satisfactory use in similar service for not less than 5 years.

B. Codes and Standards:

1. ARI Compliance: Test and rate air outlets and inlets in accordance with ARI 650 "Standard for Air Outlets and Inlets".

2. ASHRAE Compliance: Test and rate air outlets and inlets in accordance with ASHRAE 70 "Method of Testing for Rating the Air Flow Performance of Outlets and Inlets".

3. ADC Compliance: Test and rate air outlets and inlets in certified laboratories under requirements of ADC 1062 "Certification, Rating and Test Manual".

4. ADC Seal: Provide air outlets and inlets bearing ADC Certified Rating Seal.

5. AMCA Compliance: Test and rate louvers in accordance with AMCA 500 "Test Method for Louvers, Dampers and Shutters".

6. AMCA Seal: Provide louvers bearing AMCA Certified Rating Seal.

7. NFPA Compliance: Install air outlets and inlets in accordance with NFPA 90A "Standard for the Installation of Air Conditioning and Ventilating Systems".

1.4 SUBMITTALS

A. General: Submit the following in accord with Division 01.

B. Product Data: Submit manufacturer's technical product data for air outlets and inlets including the following:

1. Schedule of air outlets and inlets indicating drawing designation, room location, number furnished, model number, size, and accessories furnished.

2. Data sheet for each type of air outlet and inlet, and accessory furnished; indicating construction, finish, and mounting details.

3. Performance data for each type of air outlet and inlet furnished, including aspiration ability, temperature and velocity traverses, throw and drop, and noise criteria ratings. Indicate selections on data.
1.5 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver air outlets and inlets wrapped in factory-fabricated fiber-board type containers. Identify on outside of container type of outlet or inlet and location to be installed. Avoid crushing or bending and prevent dirt and debris from entering and settling in devices.

B. Store air outlets and inlets in original cartons and protect from weather and construction work traffic. Where possible, store indoors; when necessary to store outdoors, store above grade and enclose with waterproof wrapping.

PART 2 - PRODUCTS

2.1 GRILLES, REGISTERS, AND DIFFUSERS

A. General: Units are scheduled on the drawings.

B. Finish Compatibility: Provide with border styles that are compatible with adjacent finish systems. Refer to general construction drawings and specifications for types of finish systems which will contain each type of air device.

C. Manufacturer: Subject to compliance with requirements, provide air devices of one of the following:
   1. Krueger.
   2. Price.
   3. Titus.

PART 3 - EXECUTION

3.1 INSPECTION

A. Examine areas and conditions under which air outlets and inlets are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Install air outlets and inlets in accordance with manufacturer's written instructions and in accordance with recognized industry practices to insure that products serve intended functions.

B. Coordinate with other work, including ductwork and duct accessories, as necessary to interface installation of air outlets and inlets with other work.

C. Locate ceiling air diffusers, registers, and grilles, as indicated on general construction "Reflected Ceiling Plans". Unless otherwise indicated, locate units in center of acoustical ceiling modules.

END OF SECTION 23 37 13
SECTION 23 73 13

MODULAR INDOOR CENTRAL STATION AIR-HANDLING UNITS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 WORK INCLUDES

A. All materials, equipment, tools, labor, etc. required to complete the installation of the air handling units as shown on the drawings and as specified.

1.3 SUBMITTALS

A. General: Submit the following in accord with Division 01.

B. Product data for selected models, including specialties, accessories; and the following:

   1. Certified fan performance curves with system operating conditions indicated.
   2. Certified fan sound power ratings.
   3. Motor ratings and electrical characteristics plus motor and fan accessories.
   4. Materials gages and finishes, including color charts.
   5. Dampers, including housings, linkages, and operators.
   6. Coil data.

C. Maintenance data for air handling units, for inclusion in Operation and Maintenance Manual specified in Division 01.

1.4 QUALITY ASSURANCE

A. UL Compliance: Air-handling units and components shall be UL listed and labeled.

B. Nationally Recognized Testing Laboratory and NEMA Compliance (NRTL): Fans and components shall be NRTL listed and labeled. The term "NRTL" shall be as defined in OSHA Regulation 1910.7.

C. NEMA Compliance: Motors and electrical accessories shall comply with NEMA standards.

D. Electrical Component Standard: Components and installation shall comply with NFPA 70 "National Electrical Code."

E. ARI Certification: Air-handling units and their components shall be factory tested according to ARI 430, "Central Station Air-Handling Units" and shall be listed and labeled by ARI.

1.5 DELIVERY, STORAGE AND HANDLING
A. Lift and support units with the manufacturer's designated lifting or supporting points.

B. Disassemble and reassemble units as required for movement into the final location following manufacturer's written instructions.

C. Deliver fan units as a factory-assembled unit to the extent allowable by shipping limitations, with protective crating and covering.

1.6 SEQUENCING AND SCHEDULING

A. Coordinate the size and location of structural steel support members.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Trane.
2. Daikin.
3. Carrier.

2.2 FANS

A. General: Provide fans that are factory fabricated and assembled, factory tested, and factory finished, with indicated capacities and characteristics.

B. Fans and Shafts: Statically and dynamically balanced and designed for continuous operation at the maximum rated fan speed and motor horsepower.

1. Fan Shafts: Turned, ground, and polished steel designed to operate at no more than 70 percent of the first critical speed at the top of the speed range of the fan's class.

C. Belt Drives: Factory mounted, with final alignment and belt adjustment made after installation.


D. Belts: Oil-resistant, nonsparking, and nonstatic.

E. Motors and Fan Wheel Pulleys: Adjustable pitch for use with motors through 15 HP; fixed pitch for use with motors larger than 15 HP. Select pulley so that pitch adjustment is at the middle of the adjustment range at fan design conditions.

F. Shaft Bearings: Provide type indicated, having a median like "Rating Life" (AFBMA L) of 200,000 calculated in accordance with AFBMA Standard 9 for ball bearings and AFBMA Standard 11 for roller bearings.

2.3 UNIT CASINGS

A. General: Form walls, roofs, and floors with at least two breaks at each joint. Seal all joints
with water-resistant sealant. Provide galvanized steel finish. All surfaces in contact with airstream shall comply with ASHRAE 62.1. Casing shall be double wall construction with 18 gage outer wall and 20 gage inner wall.

B. Casing Insulation: 1” thick encased between outside and inside casing. Comply with ASTM C1071, Type I or Type II.

C. Access Panels and Access Doors: Provide same construction as casing. Provide doors with piano hinges and latches with tool free handles. Provide neoprene gaskets. Provide in following locations:
1. Fan Section: Access doors.
2. Coil Section: Access panels.
3. Filter Section: Access door.

D. Condensate Drain Pan: Stainless Steel pan fabricated with two percent slope in at least two directions to direct water toward drain connection. Insulate exterior. Comply with ASHRAE 62.1.

E. Mounting Frame: Formed galvanized steel channels designed for low deflection with integral lifting lugs.

2.4 COIL SECTION
A. General Requirements: Comply with ARI 410. Fabricate to allow removal of coils.

2.5 AIR FILTER SECTION
A. General Requirements: Comply with NFPA 90A. Provide filter holding frames arranged for angular orientation, with access doors on both sides of unit.

B. Filters: Provide MERV 8 disposable fiberglass pleated filters with beverage board frames.

2.6 DAMPERS
A. General Requirements: Provide low leakage parallel blade aluminum dampers rated according to AMCA 500 and complying with UFC 3-420-01. Provide linkages and damper actuators to coordinate with existing Johnson Controls system.

PART 3 - EXECUTION

3.1 EXAMINATION
A. Examine areas and conditions, with Installer present, for compliance with requirements for installation tolerances, housekeeping pads, and other conditions affecting performance of fans.

B. Do not proceed until unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL
A. Install unit level and plumb, in accordance with manufacturer's written instructions.
B. Arrange installation of units to provide access space around air handling units for service and maintenance.

3.3 CONNECTIONS

A. Duct installations and connections are specified in other Division 23 sections. Make final duct connections with flexible connections.

B. Pipe Connections: See section 23 13 13.

C. Electrical Connections: The following requirements apply:
   1. Electrical power wiring is specified in Division 26.
   2. Temperature control wiring and interlock wiring are specified in Section 23 0900.
   3. Grounding: Connect unit components to ground in accordance with the National Electrical Code.

3.4 ADJUSTING, CLEANING, AND PROTECTING

A. Adjust damper linkages for proper damper operation.

B. Clean unit cabinet interiors to remove foreign material and construction dirt and dust. Vacuum clean fan wheel and cabinet.

END OF SECTION 23 73 13
SECTION 23 81 26
SPLIT- SYSTEM AIR-CONDITIONERS

PART 1 - GENERAL

1.1 WORK INCLUDES

A. Split-system air-conditioning and heat pump units consisting of separate evaporator-fan and compressor-condenser components, designed for exposed or concealed mounting.

B. Thermostats and associated control wiring.

1.2 SUBMITTALS

A. Product Data: Include rated capacities, furnished specialties, and accessories for each type of product indicated. Include performance data in terms of capacities, outlet velocities, static pressures, sound power characteristics, motor requirements, and electrical characteristics.

B. Operation and Maintenance Data: For split-system air-conditioning units to include in emergency, operation, and maintenance manuals.

C. Warranty: Special warranty specified in this Section.

1.3 QUALITY ASSURANCE

A. Product Options: Drawings indicate size, profiles, and dimensional requirements of split-system units and are based on the specific system indicated. Refer to Division 01 Section "Product Requirements."

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

C. ASHRAE/IESNA 90.1 Compliance: Applicable requirements in ASHRAE/IESNA 90.1, Section 6 - "Heating, Ventilating, and Air-Conditioning."

1.4 COORDINATION

A. Coordinate size and location of concrete bases for units. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork are specified in Division 03 Section "Cast-in-Place Concrete."

B. Coordinate size, location, and connection details with roof curbs, equipment supports, and roof penetrations specified in Division 07 Section "Roof Accessories."

1.5 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of split-system air-conditioning units that fail in materials or workmanship within specified warranty period.
1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with requirements, provide products by one of the following:
   1. E.M.I.
   2. Friedrich Air Conditioning Company.
   3. Mitsubishi.

2.2 HORIZONTAL MOUNTING, EVAPORATOR-FAN COMPONENTS

A. Cabinet: Enameled steel with removable panels on front and ends in color selected by Architect, and discharge drain pans with drain connection.
   1. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.
   2. Drain Pan and Drain Connection: Comply with ASHRAE 62.1.

B. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins, complying with ARI 210/240, and with thermal-expansion valve.

C. Electric Coil: Helical, nickel-chrome, resistance-wire heating elements with refractory ceramic support bushings; automatic-reset thermal cutout; built-in magnetic contactors; manual-reset thermal cutout; airflow proving device; and one-time fuses in terminal box for overcurrent protection.

D. Fan: Direct drive, centrifugal fan, with outside air, and integral condensate pump.

E. Fan Motors: Comply with requirements in Division 23 Section "Common Motor Requirements for HVAC Equipment."
   1. Special Motor Features: Multitapped, multispeed with internal thermal protection and permanent lubrication.

F. Filters: Permanent, cleanable.

2.3 AIR-COOLED, COMPRESSOR-CONDENSER COMPONENTS

A. Casing: Steel, finished with baked enamel in color selected by Architect, with removable panels for access to controls, weep holes for water drainage, and mounting holes in base. Provide brass service valves, fittings, and gage ports on exterior of casing.

B. Compressor: Hermetically sealed with crankcase heater and mounted on vibration isolation. Compressor motor shall have thermal- and current-sensitive overload devices, start capacitor, relay, and contactor.
   1. Refrigerant: R-410A.

C. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins, complying with ARI 210/240, and with liquid subcooler.
D. Fan: Aluminum-propeller type, directly connected to motor.
E. Motor: Permanently lubricated, with integral thermal-overload protection.
F. Unit shall operate in heat pump mode down to 0 deg F.

2.4 ACCESSORIES
A. Thermostat: Low voltage to control compressor and evaporator fan.

PART 3 - EXECUTION
3.1 INSTALLATION
A. Install units level and plumb.
B. Install evaporator-fan components using manufacturer's standard mounting devices securely fastened to building structure.
C. Install ground-mounting, compressor-condenser components on polyethylene or fiberglass mounting base.
D. Install and connect precharged refrigerant tubing to component's quick-connect fittings. Install tubing to allow access to unit.
E. Install thermostat and control wiring in compliance with Division 27 requirements.

3.2 CONNECTIONS
A. Piping installation requirements are specified in other Division 23 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
B. Install piping adjacent to unit to allow service and maintenance.
C. Ground equipment according to Division 26.
D. Electrical Connections: Comply with requirements in Division 26.

END OF SECTION 23 81 26
SECTION 26 05 01
ELECTRICAL DEMOLITION FOR REMODELING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Interior demolition, removal and abandonment of interior electrical systems, including communications and special systems including fire alarm, intrusion detection and telephone.

B. Cleaning and repair of existing equipment to remain.

1.2 RELATED SECTIONS

A. Section 01 - Selective Demolition.

B. WPAFB Base Facilities Standards

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT

A. Materials and equipment for patching work: As specified in individual Sections.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify field measurements and circuiting arrangements are as shown on Drawings.

B. Verify that abandoned wiring and equipment serve only abandoned facilities.

C. Demolition Drawings are based on casual field observation and existing record documents. Report discrepancies to Contracting Officer before disturbing existing installation.

D. Beginning of demolition means installer accepts existing conditions.

E. Contractor shall verify and or test ballasts, transformers, and other devices or equipment to be removed to ensure they do not contain and PCB or other hazardous materials requiring special disposal. Contractor is responsible for all testing and disposal costs.

3.2 PREPARATION
A. Disconnect electrical systems in walls, floors, and ceilings scheduled for removal.

B. Coordinate utility service outages with store manager, AAFES PM, Base Engineering and Dayton Power and Lighting. Outage shall only occur during non-customer hours and be scheduled a minimum of 10 days in advance with all parties. Outage shall be minimized to the fullest extent possible with power being restored a minimum of two hours before the start of the next business day.

C. Provide temporary wiring and connections to maintain existing systems in service during all phases of construction. See architectural phasing plan.

D. Existing Electrical Service: Existing system to remain and be extended as shown.

E. Existing Fire Alarm System: Existing system to remain and be extended as shown. Notify Contracting Officer and local fire department at least 7 days before partially or completely disabling system. Minimize outage duration. Make temporary connections to maintain service in areas adjacent to work area. See 28 31 11.

F. Existing Telephone System: Existing system to remain in service. Contractor shall coordinate with AAFES IT personnel and AAFES communications contractor as needed to ensure AAFES telephone and data system installation is fully coordinated with project work schedule.

G. Existing Intrusion Detection System: Existing system to remain in service and be extended as shown. Disable system only to make switchovers and connections. Obtain permission from the Contracting Officer and Provost Marshall at least 7 days before partially or completely disabling system. Minimize outage duration. Make temporary connections to maintain service in areas adjacent to work area.

3.3 DEMOLITION EXISTING ELECTRICAL WORK

A. Demolish existing electrical work under provisions of Section 01, and this Section.

B. Remove existing installations to accommodate requirements for new construction.

C. Remove abandoned wiring to source of supply or next active device to remain.

D. Remove exposed abandoned conduit, including abandoned conduit above accessible ceiling finishes. Cut conduit flush with walls and floors, and patch surfaces.

E. Disconnect abandoned outlets and remove devices, boxes and wiring back to next active device to remain. Remove abandoned outlets if conduit servicing them is abandoned and or removed. Provide blank cover for abandoned outlets which are not removed from wall to remain.

F. Disconnect and remove abandoned panelboards and distribution equipment.

G. Disconnect and remove electrical devices and equipment serving utilization equipment that has been removed.

H. Disconnect and remove abandoned luminaires. Remove brackets, stems, hangers, and other accessories.

I. Repair adjacent construction and finishes damaged during demolition work.
J. Maintain access to existing electrical installations which remain active. Modify installation or provide access panel as appropriate.

K. Contractor may elect to reuse existing wiring and conduit if it complies with design requirements and will coordinate with new work. Contractor to show reuse of existing raceways and wiring on as-builts as required.

3.4 RECYCLING

A. Recycle all electrical debris as required by WPAFB Recycling Center. Contact CE environmental office (937-257-7152) for current material acceptance policies.

B. Contractor shall recycle conduit, fittings, boxes, wiring, fluorescent lamps, metal, paper and cardboard as required by WPAFB Recycling Center.

C. Contractor shall break down and separate recyclable materials for delivery to WPAFB Recycling Center per WPAFB Recycling Center Requirements.

D. Items not acceptable for recycling shall be legally disposed of per Base, State and Federal regulations.

3.5 CLEANING AND REPAIR

A. Clean and repair existing materials and equipment which remain or are to be reused.

B. Panelboards: Clean exposed surfaces and check tightness of electrical connections. Replace damaged circuit breakers and provide closure plates for vacant positions. Provide typed circuit directory showing revised circuiting (as-built) arrangement.

END OF SECTION 26 05 01
SECTION 26 05 19
BUILDING WIRE AND CABLE

PART 1 - GENERAL

1.1 SECTION INCLUDES
   A. Building wire and cable.
   B. Wiring connectors and connections.

1.2 REFERENCES
   A. NECA Standard of Installation (National Electrical Contractors Association).
   C. NFPA 70 - National Electrical Code.

1.3 SUBMITTALS FOR REVIEW
   A. Division 01 - Submittals: Procedures for submittals.
   B. Product Data: Provide for each cable type.

1.4 SUBMITTALS FOR INFORMATION
   A. Division 01 – Submittals: Procedures for submittals.
   B. Test Reports: Indicate procedures and values obtained.
   C. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency specified under Regulatory Requirements.

1.5 SUBMITTALS AT PROJECT CLOSEOUT
   A. Division 01 – Project Record Documents.
   B. Project Record Documents: Record actual locations of components and circuits.

1.6 QUALIFICATIONS
   A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years documented experience.

1.7 REGULATORY REQUIREMENTS
   A. Conform to NFPA 70.
   B. Furnish building wire and wiring connectors listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.
1.8 PROJECT CONDITIONS
   A. Verify that field measurements are as indicated.
   B. Conductor sizes are based on copper.
   C. Wire and cable routing indicated is schematic unless dimensioned.

1.9 COORDINATION
   A. Where wire and cable destination is indicated and routing is not shown, determine exact routing and lengths required.

PART 2 - PRODUCTS

2.1 BUILDING WIRE
   A. Description: Single conductor insulated wire.
   B. Conductor: Copper.
   C. Insulation Voltage Rating: 600 volts.
   D. Insulation: NFPA 70, Type THHN-2/THWN-2.
   E. Use standard color coding for phase A, phase B, phase C, neutral and ground: Insulation:
      1. 208/120 volt circuits: black, red, blue, white, green.
      2. 480/277 volt circuits: brown, orange, yellow, gray, green with white stripe.

PART 3 - EXECUTION

3.1 EXAMINATION
   A. Verify that interior of building has been protected from weather.
   B. Verify that mechanical work likely to damage wire and cable has been completed.
   C. Verify that raceway installation is complete and supported.

3.2 PREPARATION
   A. Completely and thoroughly swab raceway before installing wire.

3.3 WIRING METHODS
   A. Use wiring methods indicated.
   B. All branch circuit and feeder wiring shall be installed in raceways.

3.4 INSTALLATION
   A. Route wire and cable as required to meet Project Conditions.
   B. Install cable in accordance with the NECA “Standard of Installation” and NFPA 70.
   C. Use solid conductors for #12 and smaller, stranded #10 and larger.
D. Use stranded conductors for power circuits.

E. Use stranded conductors for control circuits.

F. Use conductor not smaller than 12 AWG for power and lighting circuits.

G. Use conductor not smaller than 14 AWG for fused control circuits.

H. Unless a larger size is indicated on plans, use 10 AWG conductors for 20 ampere, 120 volt branch circuits with homeruns longer than 75 feet.

I. Unless a larger size is indicated on plans, use 10 AWG conductors for 20 ampere, 277 volt branch circuits with homeruns longer than 200 feet.

J. Pull all conductors into raceway at same time.

K. Use suitable wire pulling lubricant for building wire 4 AWG and larger.

L. Neatly train and lace wiring inside boxes, equipment, and panelboards.

M. Clean conductor surfaces before installing lugs and connectors.

N. Make splices, taps, and terminations to carry full ampacity of conductors with no perceptible temperature rise.

O. Use split bolt connectors for copper conductor splices and taps, 6 AWG and larger. Tape uninsulated conductors and connector with electrical tape to 150 percent of insulation rating of conductor.

P. Use solderless pressure connectors with insulating covers for copper conductor splices and taps, 8 AWG and smaller.

Q. Use insulated spring wire connectors with plastic caps for copper conductor splices and taps, 10 AWG and smaller.

R. Identify and color code wire and cable under provisions of Section 16195. Identify each conductor with its circuit number or other designation indicated.

3.5 FIELD QUALITY CONTROL

A. Inspect and test in accordance with NETA ATS, except Section 4.

B. Perform inspections and tests listed in NETA ATS, Section 7.3.1.

3.6 INSULATION RESISTANCE TESTS

A. Perform tests after cables have been installed in raceways, but before connection to lugs. Notify Contracting Officer at least 14 days prior to cable tests.

B. Measure resistance line-to-ground using a commercial megger tester. Apply 1000 volts DC to cables 2 AWG and larger and record DC insulation resistance for each circuit conductor. Minimum acceptable level is 50 megohms.

C. Record test results and include in O and M manual.

END OF SECTION 26 05 19
PART 1 - GENERAL

1.1 SECTION INCLUDES
   A. Prefabricated flexible cable assemblies.
   B. Distribution units.
   C. Cable accessories.

1.2 REFERENCES

1.3 SUBMITTALS
   A. Submit under provisions of Division 01 – Submittals.
   B. Shop Drawings: Indicate distribution box, switch box, outlet, and cable layout and branch circuit configuration.
   C. Product Data: Provide for each cable type and for each fitting and accessory.
   D. Manufacturer’s Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, and installation of Product.
   E. Provide voltage drop calculation showing wire size will support use per NEC guidelines.
   F. Provide scaled drawings showing connection and cable requirements. Electronic drawing files may be obtained by General Contractor from engineer’s office (618-242-0473). Request drawings minimum two weeks prior to need.

1.4 PROJECT RECORD DOCUMENTS
   A. Submit under provisions of Division 01 – Project Record and Closeout Documents.
   B. Record actual locations of cable assemblies and branch circuit arrangements.

1.5 OPERATION AND MAINTENANCE DATA
   A. Submit under provisions of Division 01 – Project Record and Closeout Documents.
   B. Maintenance Data: Include replacement parts list.

1.6 QUALIFICATIONS
   A. Manufacturer: Company specializing in manufacturing Products specified in this Section with minimum three years experience.

1.7 REGULATORY REQUIREMENTS
A. Conform to requirements of ANSI/NFPA 70.

B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown.

1.8 FIELD MEASUREMENTS

A. Verify that field measurements are as indicated on shop drawings.

1.9 COORDINATION

A. Furnish luminaire connectors to luminaire manufacturer for factory installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. AMP Inc.

B. Hubbell Wiring Devices

C. Siemens Co.

D. Light Fixture Manufacturer.

2.2 MANUFACTURED WIRING SYSTEMS

A. Cable Assemblies: Factory assembled units with appropriate connector on each end, with lengths and circuit configurations as required.

B. Voltage: 120 or 277 volts.

C. Switching Unit Assemblies: Cable assembly with 6 inch pigtail on one end. Provide cables configured for 3-way and 4-way switches where required.

D. Luminaire Connector Assemblies: Connector suitable for mounting in luminaire body knockout. At Contractor's option, provide connector factory mounted in luminaire.

E. Accessories: Provide manufacturer's standard accessories, including cable extenders, distribution tees, and switching assemblies.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install Products in accordance with manufacturer's instructions.

B. Support cable by means of straps and clamps independently of ceiling suspension system.

C. Support cable minimum 24" above suspended ceiling to avoid contact with and interference with removal of ceiling panels.

D. Arrange cable to avoid interference with access to other work.

END OF SECTION 26 05 20
SECTION 26 05 26
GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SECTION INCLUDES
A. Equipment grounding conductors.
B. Bonding.

1.2 REFERENCES
B. NFPA 70 - National Electrical Code.
C. AFI 32-1065 (2017)

1.3 GROUNDING SYSTEM DESCRIPTION
A. Existing system to remain.

1.4 SUBMITTALS FOR REVIEW
A. Division 01 – Submittals: Procedures for submittals.
B. Product Data: Provide for grounding electrodes and connections.

1.5 SUBMITTALS FOR INFORMATION
A. Division 01 - Submittals: Submittals for information.
B. Test Reports: Indicate overall resistance to ground.
C. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, and installation of Product.

1.6 QUALIFICATIONS
A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

1.7 REGULATORY REQUIREMENTS
A. Conform to requirements of NFPA 70.
B. Products: Listed and classified by Underwriters Laboratories, Inc.

PART 2 - PRODUCTS
2.1 MECHANICAL CONNECTORS
   A. Manufacturers: Burndy or approved equal.
   B. Material: Bronze.

2.2 WIRE
   A. Material: Stranded copper. Unless noted otherwise, provide with green insulation.
   B. Size: As required by NEC.

2.3 GROUND BUSHING/LUG
   A. Insulated metallic grounding bushings, tin-plated open-type lug dual rated for CU-AL conductors, thermoplastic liners rated 105 degree C, die cast zinc, to provide a smooth, well-rounded bearing surface for wires or cable at the end of threaded conduit or a conduit connector as required by the NEC.

PART 3 - EXECUTION

3.1 INSTALLATION
   A. Provide bonding to meet Regulatory Requirements.
   B. Equipment Grounding Conductor: Provide separate, insulated conductor within each feeder and branch circuit raceway. Terminate each end on suitable lug, bus, or bushing.
   C. Where multiple ground terminal strips are provided with new panels, run solid bare #8AWG between all ground terminal strips.

3.3 FIELD QUALITY CONTROL
   A. Inspect and test in accordance with NETA ATS, except Section 4.
   B. Perform inspections and tests listed in NETA ATS, Section 7.13.
   C. Perform test on existing electrical service grounding in compliance with AFI 32-1065. Notify A/E in writing of test results and any irregularities found. Corrective work shall not be in the project scope of work but will be discussed with the base and AAFES to see who and how it will be addressed.

END OF SECTION 26 05 26
SECTION 26 05 29
SUPPORTING DEVICES

PART 1 - GENERAL

1.1 SECTION INCLUDES
   A. Conduit and equipment supports.
   B. Anchors and fasteners.

1.2 REFERENCES
   A. NECA - National Electrical Contractors Association.

1.3 SUBMITTALS
   A. Submit under provisions of Division 01 – Submittals.
   B. Product Data: Provide manufacturer’s catalog data for fastening systems.
   C. Manufacturer’s Instructions: Indicate application conditions and limitations of use stipulated by
      Product testing agency specified under Regulatory Requirements. Include instructions for
      storage, handling, protection, examination, preparation, installation, and starting of Product.

1.4 REGULATORY REQUIREMENTS
   A. Conform to requirements of ANSI/NFPA 70.
   B. Furnish products listed and classified by Underwriters Laboratories, Inc.

PART 2 - PRODUCTS

2.1 PRODUCT REQUIREMENTS
   A. Materials and Finishes: Provide adequate corrosion resistance.
   B. Provide materials, sizes, and types of anchors, fasteners and supports to carry the loads of
      equipment and conduit. Consider weight of wire in conduit when selecting products.
   C. Anchors and Fasteners:
      1. Concrete Structural Elements: Use precast insert system or expansion anchors and
         preset inserts.
      2. Steel Structural Elements: Use beam clamps or welded fasteners.
      4. Hollow Masonry, Plaster, and Gypsum Board Partitions: Use toggle bolts and hollow wall
         fasteners.
      5. Solid Masonry Walls: Use expansion anchors and preset inserts.
2.2 STEEL CHANNEL

A. Manufacturer: Unistrut (P1000 unless otherwise noted) or approved equal.

B. Description: Galvanized or painted steel. (1-5/8”square.)

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install products in accordance with manufacturer’s instructions.

B. Provide anchors, fasteners, and supports in accordance with NECA “Standard of Installation”, NFPA 70 and maximum distance between conduit support tables.

C. Do not fasten supports to pipes, ducts, mechanical equipment, ceiling support wires, and conduit.

D. Do not use spring steel clips and clamps.

E. Do not use powder-actuated anchors.

F. Do not drill or cut structural members.

G. Fabricate supports from structural steel or steel channel. Rigidly weld members or use hexagon head bolts to present neat appearance with adequate strength and rigidity. Use spring lock washers under all nuts.

H. Install surface-mounted cabinets and panelboards with minimum of four anchors.

I. In wet and damp locations use steel channel supports to stand cabinets and panelboards one inch off wall.

J. Use sheet metal channel to bridge studs above and below cabinets and panelboards recessed in hollow partitions.

END OF SECTION 26 05 29
SECTION 26 05 33

CONDUIT

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Metal conduit.
B. Flexible metal conduit.
C. Liquidtight flexible metal conduit.
D. Electrical metallic tubing.
E. Flexible nonmetallic conduit.
F. Fittings and conduit bodies.

1.2 RELATED SECTIONS

A. Division 07 – Roofing Penetrations.
B. Division 07 – Fire stopping.
C. Division 26 – Boxes.
D. Division 26 – Grounding and Bonding.
E. Division 26 – Supporting Devices.
F. Division 26 – Electrical Identification.

1.3 REFERENCES

A. Conduit and tubing shall meet the requirements of the latest editions of following standards:
   1. ANSI C80.1 - Rigid Steel Conduit, Zinc Coated.
   2. ANSI C80.3 - Electrical Metallic Tubing, Zinc Coated.
   3. ANSI/NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies.
   5. NECA "Standard of Installation."
   6. NEMA RN 1 - Polyvinyl Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit.

1.4 DESIGN REQUIREMENTS

A. Conduit Size: ANSI/NFPA 70. Limit conductor cross sectional area to no more than 40% of conduit cross sectional area.

1.5 SUBMITTALS

A. Submit under provisions of Division 01 – Submittals.
B. Product Data: Provide for metallic conduit, flexible metal conduit, liquid tight flexible metal conduit, metallic tubing, nonmetallic conduit, fittings, conduit bodies.

1.6 PROJECT RECORD DOCUMENTS
A. Submit under provisions of Division 01 – Project Record Documents.
B. Accurately record actual routing of interior conduits larger than 2 inches on project record documents and of all underground conduits regardless of size. For locations of underground conduits provide dimensions indicating locations and depth.

1.7 REGULATORY REQUIREMENTS
A. Conform to requirements of ANSI/NFPA 70.
B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown.

1.8 DELIVERY, STORAGE, AND HANDLING
A. Accept conduit on site. Inspect for damage.
B. Protect conduit from corrosion and entrance of debris by storing above grade. Provide appropriate covering.

1.9 PROJECT CONDITIONS
A. Verify that field measurements are as shown on Drawings.
B. Verify routing and termination locations of conduit prior to rough-in.
C. Conduit routing is shown schematically on Drawings unless dimensioned. Route as required to complete wiring system.

PART 2 - PRODUCTS

2.1 CONDUIT REQUIREMENTS
A. Minimum Size: ¾” inch unless otherwise specified.
B. Wet and Damp Interior Locations Above Floor Slab: Use rigid steel conduit, intermediate metal conduit or electrical metallic tubing. Use wet and/or damp location fittings.
C. Dry Interior Locations Above Floor Slab (Including Hollow Stud Partitions):
   1. Concealed: Use rigid steel, intermediate metal conduit or electrical metallic tubing.
   2. Exposed: Use rigid steel, intermediate metal conduit or electrical metallic tubing.

2.2 METAL CONDUIT
A. Rigid Steel Conduit: ANSI C80.1.
B. Intermediate Metal Conduit (IMC): Rigid steel.
C. Fittings and Conduit Bodies: ANSI/NEMA FB 1; material to match conduit, threaded connections.

2.3 PVC COATED METAL CONDUIT
A. Description: NEMA RN 1; rigid steel conduit with external PVC coating, 40 mil thick.

B. Fittings and Conduit Bodies: ANSI/NEMA FB 1; steel fittings with external PVC coating to match conduit.

2.4 FLEXIBLE METAL CONDUIT

A. Description: Interlocked steel construction.


2.5 LIQUIDTIGHT FLEXIBLE METAL CONDUIT

A. Description: Interlocked steel construction with PVC jacket.


2.6 ELECTRICAL METALLIC TUBING (EMT)

A. Description: ANSI C80.3; galvanized tubing.

B. Fittings and Conduit Bodies: ANSI/NEMA FB 1; steel compression type or set screw type.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install conduit in accordance with NECA “Standard of Installation” and NFPA 70.

B. Provide supports as required by NEC maximum distance between conduit support tables. Arrange supports to prevent misalignment during wiring installation.

C. Support conduit using coated steel or malleable iron straps, lay-in adjustable hangers, clevis hangers, and split hangers. Where possible, support conduits in ceiling cavity space at the level of structural roof joists.

D. Group related conduits; support using conduit rack. Construct rack using steel channel; provide space on each rack for 25 percent additional conduits.

E. Fasten conduit supports to building structure and surfaces under provisions of Division 26. DO NOT SUPPORT CONDUITS DIRECTLY FROM ROOF DECK.

F. Do not support conduit with wire or perforated pipe straps. Remove wire used for temporary supports.

G. Do not attach conduit to ceiling support wires. Fasten individual conduits to roof joists.

H. Arrange conduit to maintain headroom and present neat appearance.

I. Route exposed conduit parallel and perpendicular to walls.

J. Route conduit installed above accessible ceilings parallel and perpendicular to walls.

K. Maintain minimum 6-inch clearance between conduit and piping.
L. Maintain 12 inch clearance between conduit and surfaces with temperatures exceeding 104 degrees F.

M. Cut conduit square using saw or pipe cutter; de-burr cut ends before joining.

N. Bring conduit to shoulder of fittings; fasten securely.

O. Use conduit hubs or sealing locknuts to fasten conduit to sheet metal boxes in damp and wet locations and to cast boxes.

P. Install no more than equivalent of three 90-degree bends between boxes (no more than two 90-degree bends for conduits containing telephone cables, fire alarm cables, intrusions system cables, local area network (LAN) cables, etc.). Use conduit bodies to make sharp changes in direction, as around beams. Use hydraulic one-shot bender to fabricate factory elbows for bends in metal conduit larger than 2 inch size.

Q. Avoid moisture traps; provide junction box with drain fitting at low points in conduit system.

R. Provide expansion/deflection couplings to accommodate expansion and deflection where conduit crosses seismic joints or expansion joints. Such couplings shall have braided copper bonding jumpers.

S. Provide suitable pull string in each empty conduit except sleeves less than 20 feet long and nipples.

T. Use suitable caps to protect installed conduit against entrance of dirt and moisture.


V. Identify conduit under provisions of Division 26.

W. Where conduits for telephone cables, cash register cables, etc. are stubbed from wall boxes or cabinets to above accessible ceilings, turn conduits out of wall approximately 12 inches above accessible ceiling. Coordinate location with other trades. Provide bushing on end of conduit to prevent signal cable contact with sharp metal. Provide tag on end of conduit indicating type and location of utilization outlet (example: TELEPHONE - BREAK ROOM).

X. Paint exposed conduits to match adjacent surface.

Y. Where conduits enter boxes and cabinets, provide bushings with plastic insulated throat for conduits 1 inch and larger.

Z. Seismic Bracing: provide seismic bracing for suspended conduits 2" or larger and trapeze hangers at interval of 20 feet or less. Bracing shall consist of 1-5/8" square channel both parallel and perpendicular to conduit, and fastened to roof joist at 45-degree angle relative to vertical.

AA. AC and MC cable shall not be acceptable for use on this project. Except as specified in Division 26.

3.2 INTERFACE WITH OTHER PRODUCTS

A. Install conduit to preserve fire resistance rating of partitions and other elements, using materials and methods under the provisions of Division 07.

B. Route conduit through roof openings for piping and ductwork or through suitable roof jack with pitch pocket. Coordinate location with roofing installation.

END OF SECTION 26 05 33
SECTION 26 05 34
BOXES

PART 1 - GENERAL

1.1 SECTION INCLUDES
A. Wall and ceiling outlet boxes.
B. Pull and junction boxes.

1.2 REFERENCES
A. NECA - Standard of Installation.
B. NEMA FB 1 - Fittings and Supports for Conduit and Cable Assemblies.
C. NEMA OS 1 - Sheet-steel Outlet Boxes, Device Boxes, Covers, and Box Supports.
D. NEMA OS 2 - Nonmetallic Outlet Boxes, Device Boxes, Covers and Box Supports.
B. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).
C. NFPA 70 - National Electrical Code.

1.3 SUBMITTALS
A. Submittals under provisions of Division 01 – Submittals.
B. Product Data: Provide dimensions, materials, and accessories.

1.4 SUBMITTALS FOR CLOSEOUT
A. Division 01 – Project Record and Closeout Documents.
B. Record actual locations and mounting heights of outlet, pull, and junction boxes on project record documents.

1.5 REGULATORY REQUIREMENTS
A. Conform to requirements of NFPA 70.
B. Provide Products listed and classified by Underwriters Laboratories, Inc., as suitable for the purpose specified and indicated.

PART 2 - PRODUCTS

2.1 OUTLET BOXES
A. Sheet Metal Outlet Boxes: NEMA OS 1, galvanized steel.
   1. Luminaire and Equipment Supporting Boxes: Rated for weight of equipment supported; include male fixture studs where required.
   2. Concrete Ceiling Boxes: Concrete type.
B. Cast Boxes: NEMA FB 1, Type FD, cast ferroalloy. Provide gasketed cover by box manufacturer. Provide threaded hubs.

C. Wall Plates for Finished Areas: As specified in Section 16141.

D. Weatherproof exterior boxes to house receptacles: Receptacle shall be installed in surface box on the wall or equipment. The cast aluminum receptacle cover shall have ports to allow two 3/8” diameter cords to pass through and must not protrude over 4-1/2” from wall surface. Enclosure must have gasket between enclosure and mounting surface to assure that the enclosure is weathertight in use per NEC 410-57b. Hubbell WP-700, or equal.

2.2 PULL AND JUNCTION BOXES

A. Sheet Metal Boxes: NEMA OS 1, galvanized steel.

B. Hinged Enclosures: As specified in 26 05 35.

C. Surface Mounted Cast Metal Box: NEMA 250, Type 6; flat-flanged, surface mounted junction box:
   1. Material: Galvanized cast iron.
   2. Cover: Furnish with ground flange, neoprene gasket, and stainless steel cover screws.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install boxes in accordance with NECA "Standard of Installation."

D. Install in locations as shown on Drawings, and as required for splices, taps, wire pulling, equipment connections and compliance with regulatory requirements.

E. Set wall mounted boxes at elevations to accommodate mounting heights indicated.

F. Electrical boxes are shown on Drawings in approximate locations unless dimensioned. Adjust box location up to 10 feet if required to accommodate intended purpose.

G. Orient boxes to accommodate wiring devices as specified in 26 27 26.

H. Maintain headroom and present neat mechanical appearance.

I. Install pull boxes and junction boxes above accessible ceilings and in unfinished areas only.

J. Inaccessible Ceiling Areas: Install outlet and junction boxes no more than 6 inches from ceiling access panel or from removable recessed luminaire.

K. Install boxes to preserve fire resistance rating of partitions and other elements.

L. Coordinate mounting heights and locations of outlets mounted above counters, benches, and backsplashes.

M. Locate outlet boxes to allow luminaires positioned as shown on reflected ceiling plan.

N. Unless otherwise indicated on plans, align adjacent wall mounted outlet boxes for switches, manual starters, interval timers, thermostats, and similar devices. Align wall mounted boxes for receptacles, telephone jacks, local area network outlets, and the like. Where such devices are
shown in close proximity on plans, locate adjacent outlets with no more than 4 inch space between adjacent boxes.

O. Use flush mounting outlet boxes in all areas except mechanical rooms, mezzanines, and electrical closets.

P. Unless otherwise indicated on plans, locate flush mounting boxes in masonry wall to require cutting of masonry unit corner only. Coordinate masonry cutting to achieve neat opening.

Q. Do not install flush mounting boxes back-to-back in walls; provide minimum 6 inches separation.

R. Secure flush mounting box to interior wall and partition studs. Accurately position to allow for surface finish thickness. After finished wall material is applied, provide box extensions for all boxes with setback more than 1/8 inch.

S. Use stamped steel bridges to fasten flush mounting outlet box between studs.

T. Install flush mounting box without damaging wall insulation or reducing its effectiveness.

U. Use adjustable steel channel fasteners for hung ceiling outlet box.

V. **DO NOT FASTEN BOXES TO CEILING SUPPORT WIRES OR DIRECTLY TO ROOF DECK.**

W. Support boxes independently of conduit.

X. Use gang box where more than one device is mounted together. Do not use sectional box. Provide metal barrier plates between gangs to separate line voltage from low voltage systems and where voltage between adjacent light switches exceeds 300 volts.

Y. Use 4” square box with plaster ring for single device outlets.

Z. Use cast outlet box in exterior locations exposed to the weather, interiors of walk-in refrigeration equipment, and wet locations. Provide vapor seals at conduit entrances to these boxes. Use U.L. listed sealing compound.

AA. Large Pull Boxes: Use hinged enclosure in interior dry locations, surface-mounted cast metal box in other locations.

Z. Provide pull boxes in feeder circuits as required but at least every 150 feet in straight runs.

AA. Identify all junction boxes by panel and circuit number on outside cover with legible permanent ink marker on outside face of cover.

### 3.3 INTERFACE WITH OTHER PRODUCTS

A. Coordinate installation of outlet box for equipment connected to allow accessibility of box and proper operation of equipment.

### 3.4 ADJUSTING

A. Adjust flush-mounting outlets to make front flush with finished wall material.

C. Install knockout closures in unused box openings.

### 3.5 CLEANING

A. Division 01 – Cleaning: Clean installed work.
B. Clean interior of boxes to remove dust, debris, and other material.

C. Clean exposed surfaces and restore finish.

D. Check boxes for the presence of drywall screws, concrete residue, and other sharp objects. Remove all sharp objects.

END OF SECTION 26 05 34
SECTION 26 05 35
CABINETS AND ENCLOSURES

PART 1 - GENERAL

1.1 SECTION INCLUDES
A. Hinged cover enclosures.
B. Cabinets.
C. Terminal blocks.
D. Accessories.

1.2 REFERENCES
A. NECA Standard of Installation (National Electrical Contractors Association).
B. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).
C. NEMA ICS 4 - Terminal Blocks for Industrial Control Equipment and Systems.
D. NFPA 70 - National Electrical Code.

1.3 SUBMITTALS FOR REVIEW
A. Division 01 – Submittals: Procedures for submittals.
B. Product Data: Provide manufacturer’s standard data for enclosures and cabinets.

1.4 SUBMITTALS FOR INFORMATION
A. Division 01 – Submittals: Submittals for information.
B. Manufacturer’s Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, and installation of Product.

1.5 REGULATORY REQUIREMENTS
A. Conform to requirements of NFPA 70.
B. Products: Listed and classified by Underwriters Laboratories, Inc.

1.6 MAINTENANCE MATERIALS
A. Division 01 – Project Record and Closeout Documents.
B. Furnish two of each key. Cabinets and enclosures shall be keyed to same key as panel boards.

PART 2 - PRODUCTS

2.1 MANUFACTURERS
A. Hoffman
B. Square D
C. General Electric

2.2 HINGED COVER ENCLOSURES

A. Construction: NEMA 250, Type 1 inside, or 3R where exposed to weather or moisture, steel enclosure.

B. Covers: Continuous hinge, held closed by flush latch operable by key. Covers in damp and wet locations shall have continuous gasket.

C. Provide removable interior metal panel for mounting terminal blocks and electrical components; finish with white enamel. Provide standoff devices for separation of equipment mounting panel from enclosure.

D. Enclosure Finish: Manufacturer's standard enamel.

2.3 CABINETS

A. Boxes: Galvanized steel.

B. Backboard: Provide white enamel finished metal backboard for mounting terminal blocks or other devices.

C. Fronts: Steel, Flush type with door with concealed hinge, and flush lock keyed to match branch circuit panelboard. Finish with gray baked enamel.

D. Provide metal barriers to form separate compartments wiring of different systems and voltages.

E. Provide accessory feet for free-standing equipment.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install in accordance with NECA "Standard of Installation" and NFPA 70.

B. Install enclosures and boxes plumb. Anchor securely to wall and structural supports at each corner under the provisions Division 26.

C. Install cabinet fronts plumb.

3.2 CLEANING

A. Division 01 – Cleaning: Clean installed work.

B. Clean electrical parts to remove conductive and harmful materials.

C. Remove dirt and debris from enclosure.

D. Clean finishes and touch up damage.

END OF SECTION 26 05 35
SECTION 26 05 53
IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SECTION INCLUDES
   A. Nameplates.
   B. Wire and cable markers.
   C. Conduit markers.

1.2 REFERENCES

1.3 SUBMITTALS
   A. Submit under provisions of Division 01 – Submittals.
   B. Product Data: Provide catalog data for nameplates, labels, and markers.
   C. Manufacturer’s Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency specified under regulatory requirements. Include instructions for storage, handling, protection, examination, preparation and installation of Product.

1.4 REGULATORY REQUIREMENTS
   A. Conform to requirements of ANSI/NFPA 70.
   B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown.

PART 2 – PRODUCTS

2.1 NAMEPLATES
   A. Nameplates: Engraved three-layer laminated plastic, white letters on black background. Screw on type with two self tapping screws. Mastic type nameplates not allowed.
   B. Locations:
      1. Each new lighting and appliance panelboard.
      2. Each new breaker in distribution panel.
      4. Each automatic motor starter.
      5. Relays and contactors. Indicate loads controlled.
      7. Fire alarm and mass notification equipment cabinets. Label to match fire protection plans.
      8. Transformers.
9. Where more than two switches are located adjacent to each other or where switches control loads not in same space.
10. Air handling units and other HVAC equipment connections shall be labeled to match HVAC equipment schedule.
11. Where noted on plans.

C. Letter Size:

1. Use 1/8 inch letters for identifying individual equipment and loads such as safety switches, motor starters, and relays.
2. Use 1/4 inch letters for identifying grouped equipment and loads such as panelboards, switchboards, and motor control centers.

2.2 WIRE MARKERS
A. Description: Cloth, tape, split sleeve, or tubing type wire markers.
B. Locations: Each conductor at distribution equipment panelboard gutters, pull boxes, outlet and junction boxes, and each load connection.
C. Legend:

1. Power and Lighting Circuits: Branch circuit or feeder circuit number.
2. Control Circuits: Control wire number corresponding to applicable control schematics.

2.3 CONDUIT MARKERS
A. Location: Conduit couplings and junction box covers shall be painted to indicate system that conduit serves.
B. Color:

1. 480 Volt System: Orange
2. 208 Volt System: Natural conduit.
5. Comm/Data: Blue

PART 3 - EXECUTION
3.1 PREPARATION
A. Degrease and clean surfaces to receive nameplates.

3.2 APPLICATION
A. Install nameplate parallel to equipment lines.
B. Secure nameplate to equipment front using screws.
C. Identify conduit using field painting under provisions of Section 09910.
D. Field paint colored couplings on each conduit longer than 6 feet and conduit stubs.
E. Color:
1. 480 Volt System: Orange
2. 208 Volt System: Natural conduit.
5. Comm/Data: Blue

END OF SECTION 26 05 53
PART 1 - GENERAL

1.1 SECTION INCLUDES
A. Time switches.

1.2 RELATED SECTIONS
A. Section 26 05 35 - Enclosures: Cabinets and terminal blocks.
B. Section 26 09 24 - Enclosed Contactors.

1.3 REFERENCES
A. NEMA ICS 1 - General Standards for Industrial Control Systems.
B. NEMA ICS 2 - Standards for Industrial Control Devices, Controllers and Assemblies.
C. NEMA ICS 6 - Enclosures for Industrial Controls and Systems.
D. NFPA 70 - National Electrical Code.

1.4 SUBMITTALS
A. Submit under provisions of Division 01 – Submittals.
B. Product Data: Provide for each component showing electrical characteristics and connection requirements.
C. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of Product.

1.5 QUALIFICATIONS
A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

1.6 REGULATORY REQUIREMENTS
A. Conform to requirements of NFPA 70.
B. Furnish Products listed and classified by Underwriters Laboratories, Inc.

PART 2 - PRODUCTS

2.1 TIME SWITCHES
A. Time switches shall be programmable astronomic, seven day plus 365 day solid state electronic type, capable of independent programming of two (2) independent channels, with programmable automatic daylight savings time adjustment, and shall be housed in a lockable, non-metallic, surface mount case.
B. Switches shall be capable of fully independent 7 day scheduling, with up to 3 ON and 3 Off times per channel per day, plus a special 365 holiday schedule, assigned by month and day.

C. They shall be capable of independent duty cycling during the scheduled ON time, with up to 3 patterns per channel per day and built-in 5 minute short cycle protection.

D. They shall have independent timed override for each channel for manual control and be programmable independently per channel per day, from 1 minute to 23 hours and 59 minutes.

E. Switches shall have brown-out protection and automatic 4 second load staggering when channels are programmed to be ON at the same time or after power outages and shall be equipped with a rechargeable carry-over system for up to 14 hours of carry-over. Switches shall perform a self-test every 60 seconds to assure a fail-safe operation.

F. Time switches shall be powered by a 120VAC, 60HZ source. Contact configuration to be N.O. (N.C.) For each channel, with a rating of 15 amperes ballast, 120/240/277VAC. Contact closure on time switch shall be momentary for pilot control of mechanically held contactors and relays.

G. Manufacturers for time switches:

1. Time Switch: Tork #DZM200BP-0 with USB-MMP (remote programming by USB flash drive) option and software package.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install equipment according to manufacturer’s written instructions.

B. Train and lace wiring in cabinets.

C. Program time switches according to instructions from Contracting Officer.

D. Label each time switch with engraved nameplate.

E. Label each time switch load contact indicating contactors controlled by each load contact.

F. Provide two hours training of AAFES personnel in programming operations.

G. Provide programming module (flash drive) and PC based software for programming of time switch. Turn module program and software instructions over to AAFES at completion of project with current system programming. Obtain hand receipt and include with O & M manuals.

END OF SECTION 26 09 23
SECTION 26 09 24
ENCLOSED CONTACTORS

PART 1 - GENERAL

1.1 SECTION INCLUDES
A. General purpose contactors.
B. Lighting contactors.

1.2 REFERENCES
A. NEMA ICS 6 - Enclosures for Industrial Controls and Systems.
B. NEMA ICS 2 - Industrial Control Devices, Controllers, and Assemblies.
C. NFPA 70 - National Electrical Code.

1.3 SUBMITTALS FOR REVIEW
A. Division 01 – Submittals: Procedures for submittals.
B. Product Data: Provide dimensions, size, voltage ratings and current ratings.

1.4 SUBMITTALS FOR INFORMATION
A. Division 01 - Submittals: Submittals for information.
B. Submit manufacturer's installation instructions.

1.5 PROJECT CLOSEOUT SUBMITTALS
A. Division 01 – Phase Turnover and Contract Closeout.
B. Record actual locations of each contactor and indicate circuits controlled on project record documents.
C. Maintenance Data: Include instructions for replacing and maintaining coil and contacts.

1.6 QUALIFICATIONS
A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

1.7 REGULATORY REQUIREMENTS
A. Conform to requirements of NFPA 70.
B. Provide Products listed and classified by Underwriters Laboratories, Inc., as suitable for the purpose specified and indicated.

PART 2 - PRODUCTS
2.1 GENERAL PURPOSE CONTACTORS

A. Manufacturers:
   1. General Electric.
   2. Siemens.
   3. Square D.
   4. ASCO.
   5. Allen-Bradley.
   6. Cutler Hammer.

B. Description: NEMA ICS 2, AC general purpose magnetic contactor.

C. Coil Voltage: 120 or 277 volts, 60 Hertz or as indicated. Separate latching and unlatching coils with coil clearing contacts in series with each coil to ensure only momentary contact.

D. Poles: As scheduled or indicated.

E. Size: As scheduled or indicated.

F. Enclosure: ANSI/NEMA ICS 6, Type as required to meet conditions of installation.

G. Surface mount in janitor, mechanical and electrical spaces. Surface mount above panels where panel is surface mounted. Flush mount above flush mounted panel or surface mount above accessible ceiling.

H. Label per Section 26 05 53.

2.2 LIGHTING CONTACTORS

A. Manufacturers:
   1. General Electric.
   2. Siemens.
   3. Square D.
   4. Asco.
   5. Allen-Bradley.
   6. Cutler Hammer.

B. Description: NEMA ICS 2, magnetic lighting contactor.

C. Configuration: Mechanically held, 3 wire control.

D. Coils: 120 or 277 volts, 60 Hertz. Separate latching and unlatching coils with clearing contacts in series with each coil to ensure only momentary energization of coils.

E. Poles: As scheduled or indicated.

F. Contact Rating: As scheduled or indicated. Match branch circuit overcurrent protection, considering derating for continuous loads.

G. Enclosure: ANSI/NEMA ICS 6, Type as required to meet conditions of installation.

H. Accessories:
   1. Auxiliary Contacts: Two field convertible.
I. Label per Section 26 05 53.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Mount contactors true and plumb according to manufacturer’s written instructions.

B. Ensure proper operation by several open/close operations of the load contacts.

3.2 CLEANING

A. Division 01 – Cleaning: Cleaning installed work.

B. Touch up scratched or marred surfaces to match original finish.

C. Clean dust and debris from interior and exterior of contactors.

3.3 LABELLING

A. Provide engraved nameplate per 26 05 53. Nameplate shall indicate contactor designation and branch circuits controlled. Example: “CONTACTOR LC-1” on first line; “CKTS HAA 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, 41” on second line.

END OF SECTION 26 09 24
SECTION 26 09 25

OCCUPANCY SENSORS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Occupancy sensors for lighting control.

1.2 RELATED SECTIONS

A. Section 26 05 33 - Conduit.
B. Section 26 05 39 - Building Wire and Cable.
C. Section 26 05 34 - Boxes.

1.3 REFERENCES

A. NFPA 70 - National Electrical Code.

1.4 SUBMITTALS

A. In accordance with Division 01 – Submittals, provide:
   1. Product Data: Provide electrical ratings, adjustment ranges, enclosure type, outline dimensions, mounting dimensions, and terminal connection information.
   2. Manufacturer’s Installation Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of Product.
   3. CAD generated lighting plans for each building marked by occupancy sensor manufacturer showing proper product, location, and orientation of each sensor.

1.5 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

1.6 REGULATORY REQUIREMENTS

A. Conform to requirements of NFPA 70.
B. Provide Products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and indicated.

PART 2 - PRODUCTS

2.1 SENSORS

A. Ceiling mounted dual technology sensors shall employ both passive infrared and ultrasonic detection methods. Sensors shall have a multiple segmented lens and provide coverage for up to a 40’ x 40’ room.

B. Wall Mounted combination dual technology sensors with integral light switch shall employ both passive
infrared and ultrasonic detection methods. Sensors shall have a multiple segmented lens and provide coverage for the room being served. Unit shall have integral on / off switch.

C. All sensors shall be capable of operating normally with any electronic ballasts and compact fluorescent lamp systems.

D. Coverage of sensors shall remain constant after sensitivity control has been set. No automatic reduction shall occur in coverage due to the cycling of air conditioner or heating fans.

E. All sensors shall have readily accessible, user adjustable controls for time delay (0 - 15 minutes) and sensitivity.

F. In the event of failure, a bypass manual “override on” shall be provided on each sensor. When bypass is utilized, control shall divert to a wall switch until sensor is replaced.

G. All sensors shall provide a method of indication to verify that motion is being detected during testing and that the unit is working.

H. All sensors shall have no leakage current to load, in manual or in Auto/Off mode, for safety purposes and shall have voltage drop protection.

2.2 CIRCUIT CONTROL HARDWARE - CU

A. Control unit(s) shall mount through a 2” knock-out on a standard electrical enclosure and be an integrated, self-contained unit consisting internally of an isolated load switching control relay and a transformer to provide low-voltage power. Transformer shall provide power to a maximum of four (4) sensors and shall power to a larger number of sensors where indicated on plans.

B. Relay contacts shall have ratings of:
   1. 20A - 277 VAC Ballast.
   2. Where noted on plans, provide relays with two (2) load contacts.

C. Control wiring between sensors and controls units shall be Class II, 18-24 AWG, stranded UL Classified, jacketed cable. Cable shall be plenum rated.

2.3 MANUFACTURERS

A. Leviton.

B. Wattstopper.

C. Hubble.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Locate and aim sensors in the correct location required for complete coverage. Rooms shall have ninety (90) to one hundred (100) percent coverage. The locations and quantities of sensors shown on the drawings are diagrammatic and indicate only the rooms which are to be provided with sensors. Provide additional sensors if required to properly and completely cover the respective room.

B. Meet with the manufacturer’s factory authorized representative, at the jobsite, to verify placement of sensors and installation criteria prior to beginning work.
C. Locate sensors to ensure the best possible coverage in the available space and to overcome local difficulties due to space limitations or interference of structural components. Provide training necessary to familiarize Owner’s key personnel with the operation, use, adjustment, and problem solving diagnosis of the occupancy sensing devices and systems.

END OF SECTION 26 09 25
SECTION 26 22 00
DRY TYPE TRANSFORMERS

PART 1 - GENERAL

1.1 SECTION INCLUDES
A. Two-winding transformers.

1.2 RELATED SECTIONS
A. Division 03 – Cast-In-Place Concrete: Concrete for supporting foundations and pads.
B. Section 26 05 33 – Conduit.
C. Section 26 05 26 – Grounding and Bonding.

1.3 REFERENCES
A. NEMA ST 1 - Specialty Transformers (Except General-Purpose Type).
B. NEMA ST 20 - Dry-Type Transformers for General Applications.
D. NFPA 70 - National Electrical Code.

1.4 SUBMITTALS FOR REVIEW
A. Division 01 – Submittals: Procedures for submittals.
B. Product Data: Provide outline and support point dimensions of enclosures and accessories, unit weight, voltage, kVA, and impedance ratings and characteristics, tap configurations, insulation system type, and rated temperature rise.

1.5 SUBMITTALS FOR INFORMATION
A. Division 01 – Submittals: Submittals for information.
B. Test Reports: Indicate loss data, efficiency at 25, 50, 75 and 100 percent rated load, and sound level.
C. Submit manufacturer's installation instructions. Indicate application conditions and limitations of use stipulated by Product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, and installation of Product.

1.6 SUBMITTALS FOR CLOSEOUT
A. Division 01 – Project Record and Closeout Documents: Submittals for project closeout.
B. Record actual locations of transformers in project record documents.
1.7 QUALIFICATIONS
   A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

1.8 REGULATORY REQUIREMENTS
   A. Conform to requirements of NFPA 70.
   B. Products: Listed and classified by Underwriters Laboratories, Inc. as suitable for the purpose specified and indicated.

1.9 DELIVERY, STORAGE, AND HANDLING
   A. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.
   B. Handle in accordance with manufacturer's written instructions. Lift only with lugs provided for the purpose. Handle carefully to avoid damage to transformer internal components, enclosure, and finish.

PART 2 - PRODUCTS
2.1 TWO-WINDING TRANSFORMERS
   A. Manufacturers:
      1. General Electric.
      2. Siemens.
      3. Square D.
      5. Cooper.
   B. Description: NEMA ST 20, factory-assembled, air cooled, copper winding dry type transformers, ratings as indicated.
   C. Primary Voltage: 480 volts, 3 phase.
   D. Secondary Voltage: 208Y/120 volts, 3 phase.
   E. Insulation system and average winding temperature rise for rated kVA as follows:
      1. 1-15 kVA: Class 185 with 80 degrees C rise.
      2. 16-500 kVA: Class 220 with 80 degrees C rise.
   F. Case temperature: Do not exceed 35 degrees C rise above ambient at warmest point at full load.
   G. Winding Taps:
1. Transformers Less than 15 kVA: Two 5 percent below rated voltage, full capacity taps on primary winding.

H. Sound Levels: NEMA ST 20.

I. Basic Impulse Level: 10 kV for transformers less than 300 kVA, 30 kV for transformers 300 kVA and larger.

J. Ground core and coil assembly to enclosure by means of a visible flexible copper grounding strap.

K. Mounting:
   1. 1-15 kVA: Suitable for wall or trapeze mounting.
   2. 16-75 kVA: Suitable for wall or trapeze mounting.
   3. Larger than 75 kVA: Suitable for floor or trapeze mounting.

L. Coil Conductors: Continuous windings with terminations brazed or welded.

M. Enclosure: NEMA ST 20, Type 1 ventilated. Provide lifting eyes or brackets.

N. Isolate core and coil from enclosure using vibration-absorbing mounts.

O. Nameplate: Include transformer connection data and overload capacity based on rated allowable temperature rise.

2.2 SOURCE QUALITY CONTROL

A. Production test each unit according to NEMA ST20.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Set transformers plumb and level. Hold transformers minimum of 6 inches from walls.

B. Use flexible conduit, under the provisions of Section 26 05 33, 2 feet minimum length, for connections to transformer case. Make conduit connections to side panel of enclosure.

C. Bolt transformer legs to concrete slab

D. Provide grounding and bonding in accordance with Section 26 05 26.

3.2 FIELD QUALITY CONTROL

A. Inspect and test in accordance with NETA ATS, except Section 4.

B. Perform inspections and tests listed in NETA ATS, Section 7.2.

3.3 ADJUSTING

A. Measure primary and secondary voltages and make appropriate tap adjustments.
3.4 CLEANING

A. Division 01 – Cleaning: Clean installed work.

B. Touch up scratched or marred surfaces to match original finishes.

C. Clean dust and debris from interior and exterior of transformer according to manufacturer’s instructions.

END OF SECTION 26 22 00
SECTION 26 24 16

PANELBOARDS

PART 1 - GENERAL

1.1 SECTION INCLUDES
A. Branch circuit panelboards.

1.2 RELATED SECTIONS
A. Section 26 05 26 – Grounding and Bonding.
B. Section 26 05 53 – Electrical Identification.
C. Section 26 43 13 – Transient Voltage Surge Suppressor (TVSS).

1.3 REFERENCES
A. NECA Standard of Installation (published by the National Electrical Contractors Association).
B. NEMA AB1 - Molded Case Circuit Breakers.
C. NEMA ICS 2 - Industrial Control Devices, Controllers and Assemblies.
D. NEMA KS1 - Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum).
E. NEMA PB 1 - Panelboards.
F. NEMA PB 1.1 - Instructions for Safe Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less.
H. NFPA 70 - National Electrical Code.
I. AFI 32-1065 (2017)

1.4 SUBMITTALS FOR REVIEW
A. Division 01 – Submittals: Procedures for submittals.
B. Shop Drawings: Indicate outline and support point dimensions, voltage, main bus ampacity, integrated short circuit ampere rating, circuit breaker and fusible switch arrangement and sizes.
C. Arrange circuit breakers in panels same as shown on plans.

1.5 SUBMITTALS FOR INFORMATION
A. Division 01 – Submittals: Submittals for information.
B. Submit manufacturer’s installation instructions. Indicate application conditions and limitations of use stipulated by Product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, and installation of Product.

1.6 SUBMITTALS FOR CLOSEOUT

A. Division 01 – Project Record and Closeout Documents: Submittals for project closeout.
B. Record actual locations of panelboards and record actual circuiting arrangements in project record documents.
C. Maintenance Data: Include spare parts listing; source and current prices of replacement parts and supplies; and recommended maintenance procedures and intervals.

1.7 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

1.8 REGULATORY REQUIREMENTS

A. Conform to requirements of NFPA 70.
B. Products: Listed and classified by Underwriters Laboratories, Inc. as suitable for the purpose specified and indicated.

1.9 MAINTENANCE MATERIALS

A. Division 01 – Project Record and Closeout Documents.

PART 2 -PRODUCTS

2.1 LIGHTING AND APPLIANCE PANELBOARDS

A. Manufacturers:
   1. General Electric.
   2. Siemens.
   3. Square D.

B. Description: NEMA PB1, circuit breaker type, lighting and appliance branch circuit panelboard.

C. Panelboard Bus: Copper, ratings as indicated. Provide copper ground bus in each panelboard. Provide 200% rated Neutral bus.

D. Minimum Integrated Short Circuit Rating: 10,000 amperes rms symmetrical for 208 volt panelboards. Provide higher ratings where indicated. **Series rating not allowed.**

E. Molded Case Circuit Breakers: NEMA AB 1, bolt-on type thermal magnetic trip circuit breakers, with common trip handle for all poles, listed as Type SWD for lighting circuits, Type HACR for heating, air conditioning, or refrigeration equipment circuits, Class A ground fault interrupter circuit breakers where scheduled. Do not use tandem circuit breakers.

F. Enclosure: NEMA PB 1, Type 1 for dry locations, type 3R for exterior locations.
G. Cabinet Box: 6 inches deep, 20 inches wide. Where multiple section panel cabinets are specified, all cabinets shall be of same dimensions.

H. Cabinet Front: With concealed trim clamps, door in door type hinge, metal directory frame, and flush lock all keyed alike. Finish in manufacturer's standard gray enamel.

I. Where multiple section panel cabinets are specified, all cabinets shall be of same dimensions.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install panelboards in accordance with NEMA PB 1.1 and the NECA "Standard of Installation."

B. Install panelboards plumb. Install recessed panelboards flush with wall finishes.

C. Height: 6 feet to top of panelboard; install panelboards taller than 6 feet with bottom no more than 4 inches above floor and with handle of top circuit breaker no more than 6'6" above floor.

D. Provide filler plates for unused spaces in panelboards.

E. Provide typed circuit directory for each branch circuit panelboard. Revise directory to reflect circuiting changes required to balance phase loads.

F. Provide screw-on type engraved plastic nameplates under the provisions of Section 26 05 53.

G. Ground and bond panelboard enclosure according to Section 26 05 26.

H. Do not splice conductors in panelboard cabinets.

I. Land only one conductor to each circuit breaker. Where multiple conductors are used, splice in junction box before entering panelboard.

J. Where multiple ground terminal strips are provided with new panels, run solid, bare, #8AWG between all ground terminal strips.

K. Provide and install arc flash warning signs per NEC 110.16.

L. Rigidly mount surface mounted panels to unistrut supports spanning a minimum of two studs. Panel shall be supported at a minimum of two locations vertically. Provide similar installation at masonry construction. Toggle bolts shall not be used.

3.2 FIELD QUALITY CONTROL

A. Inspect and test in accordance with NETA ATS, except Section 4.

B. Perform inspections and tests listed in NETA ATS, Section 7.4 for switches, Section 7.5 for circuit breakers.

3.3 CLEANING

A. Division 01 – Cleaning: Clean installed work.

B. Touch up scratched or marred surfaces to match original finish.
C. Clean dust and debris from interior and exterior of panelboards.

END OF SECTION 26 24 16
SECTION 26 27 26
WIRING DEVICES

PART 1 - GENERAL

1.1 SECTION INCLUDES
A. Wall switches.
B. Receptacles.
C. Device plates and decorative box covers.

1.2 REFERENCES
A. NECA - Standard of Installation.
B. NEMA WD 1 - General Requirements for Wiring Devices.
C. NEMA WD 6 - Wiring Device -- Dimensional Requirements.
D. NFPA 70 - National Electrical Code.

1.3 SUBMITTALS FOR REVIEW
A. Division 01 - Submittals: Procedures for submittals.
B. Product Data: Provide manufacturer's catalog information showing dimensions, colors, and configurations.

1.4 SUBMITTALS FOR INFORMATION
A. Division 01 - Submittals: Submittals for information.
B. Submit manufacturer's installation instructions.

1.5 QUALIFICATIONS
A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

1.6 REGULATORY REQUIREMENTS
A. Conform to requirements of NFPA 70.
B. Provide Products listed and classified by Underwriters Laboratories, Inc., as suitable for the purpose specified and indicated.

PART 2 - PRODUCTS

2.1 WALL SWITCHES
A. Manufacturers:
   1. Hubbell
   2. Pass & Seymour
3. Leviton
4. G.E.

B. Description: NEMA WD 1, Heavy-Duty, AC only general-use snap switch. Provide single pole, double pole, three-way, four way, pilot light, or momentary contact type as indicated.

C. Body and Handle: Plastic with toggle handle.

D. Indicator Light: Separate pilot strap; red lens.

E. Ratings:
1. Voltage: 120-277 volts, AC.

F. For control of mechanically held contactors or relays; provide three position, momentary contact switches with spring return to center off position. Momentary contact switches shall be rated 120/277 volt, 20 amperes.

G. Color: Architect shall select from manufacturers standard colors. Note: Architect may chose multiple colors throughout project.

2.2 RECEPTACLES

A. Manufacturers:
1. Hubbell
2. Pass & Seymour
3. Leviton
4. G.E.

B. Description: NEMA WD 1, heavy duty, specification grade receptacle. In barber shop and beauty shop waiting area, provide safety type receptacles which shall discourage insertion of foreign object into receptacle by small children.

C. Device Body: Nylon.

D. Configuration: NEMA WD 6, type as specified and indicated.

E. Convenience Receptacle: Type 5-20.

F. GFCI Receptacle: Convenience receptacle with integral ground fault circuit interrupter to meet regulatory requirements. Devices shall utilize “Lock Out” technology to ensure outlet can not be used if ground fault protection fails. Device shall have status LED.

G. Color: Architect shall select from manufacturers standard colors. Note: Architect may chose multiple colors throughout project.

2.3 WALL PLATES

A. Decorative Cover Plate: Smooth nylon in all areas except food prep. Devices in food prep shall be stainless steel. Manufacturer same as device manufacturer. Color to match device.

B. Exterior Wall Weatherproof exterior boxes to house receptacles: Receptacle shall be installed surface mounted to wall or equipment. The cast aluminum receptacle cover shall have ports to allow two 3/8" diameter cords to pass through and must not protrude over 4-1/2" from wall surface. Enclosure must have gasket between enclosure and mounting surface to assure that the
enclosure is “Weatherproof in use”. The enclosure shall be UL Listed. Provide Hubbell WP-700, or equal.

PART 3 - EXECUTION

3.1 EXAMINATION
A. Verify that outlet boxes are installed at proper height.
B. Verify that wall openings are neatly cut and will be completely covered by wall plates.
C. Verify that branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.

3.2 PREPARATION
A. Provide extension rings to bring outlet boxes flush with finished surface.
B. Clean debris from outlet boxes.

3.3 INSTALLATION
A. Install in accordance with NECA "Standard of Installation."
B. Install devices plumb and level.
C. Install switches with OFF position down.
D. Install receptacles with grounding pole on top.
D. After connecting wires to GFCI receptacles, wrap terminals with four layers of electrician’s tape.
F. Connect wiring device grounding terminal to branch circuit equipment grounding conductor.
G. Install decorative plates on switch, receptacle, and blank outlets in finished areas.
H. Connect wiring devices by wrapping conductor around screw terminal when using solid conductors. Provide crimp on lugs for terminations when using stranded conductors.
I. Install galvanized steel plates on outlet boxes and junction boxes in unfinished areas and above accessible ceilings.
J. Provide ½” black on clear adhesive label tape on each device coverplate centered between the top of the cover and the device indicating panel and branch circuit. This label will be controlled when multiple light switches are located next to each other (i.e. A-21).

3.4 INTERFACE WITH OTHER PRODUCTS
A. Coordinate locations of outlet boxes provided under Section 26 05 34 to obtain mounting heights indicated on drawings.

3.5 FIELD QUALITY CONTROL
A. Inspect each wiring device for defects.
B. Operate each wall switch with circuit energized and verify proper operation.
C. Verify that each receptacle device is energized.
D. Test each receptacle device for proper polarity.
E. Test each GFCI receptacle device for proper operation.

3.6 CLEANING
A. Division 01 – Project Record and Closeout Documents: Clean installed work.
B. Clean exposed surfaces to remove splatters and restore finish.

END OF SECTION 26 27 26
SECTION 26 28 17
ENCLOSED SWITCHES

PART 1 - GENERAL

1.1 SECTION INCLUDES
A. Fusible switches.
B. Nonfusible switches.

1.2 REFERENCES
A. NECA - Standard of Installation (published by the National Electrical Contractors Association).
B. NEMA FU1 - Low Voltage Cartridge Fuses.
C. NEMA KS1 - Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum).
E. NFPA 70 - National Electrical Code.

1.3 SUBMITTALS FOR REVIEW
A. Division 01 – Submittals: Procedures for submittals.
B. Product Data: Provide switch ratings and enclosure dimensions.

1.4 SUBMITTALS FOR CLOSEOUT
A. Division 01 – Project Record and Closeout Documents: Submittals for project closeout.
B. Record actual locations of enclosed switches in project record documents.

1.5 QUALIFICATIONS
A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

1.6 REGULATORY REQUIREMENTS
A. Conform to requirements of NFPA 70.
B. Products: Listed and classified by Underwriters Laboratories, Inc. as suitable for the purpose specified and indicated.

PART 2 - PRODUCTS

2.1 MANUFACTURERS
A. General Electric.
B. Siemens.
C. Square D.
D. Cutler Hammer.

2.2 FUSIBLE SWITCH ASSEMBLIES
A. Description: NEMA KS 1, Type HD, enclosed load interrupter knife switch. Handle lockable in OFF position.
B. Fuse clips: Designed to accommodate NEMA FU1, Class R fuses. Provide rejection clips to prevent the use of other than Class R fuses.

2.3 NONFUSIBLE SWITCH ASSEMBLIES
A. Description: NEMA KS 1, Type HD enclosed load interrupter knife switch. Handle lockable in OFF position.

2.4 ENCLOSURES
A. Fabrication: NEMA KS 1.
   1. Interior Dry Locations: Type 1.
   2. Exterior Locations: Type 3R.

PART 3 - EXECUTION

3.1 INSTALLATION
A. Install in accordance with NECA "Standard of Installation."
B. Install fuses in fusible disconnect switches with fuse labels visible from fronts of enclosures.
C. Apply adhesive tag on inside door of each fused switch indicating NEMA fuse class and size installed.
D. Provide engraved nameplates for switches not in sight of controlled loads. Indicate load type and location and correct fuse size for fusible switches.

3.2 FIELD QUALITY CONTROL
A. Inspect and test in accordance with NETA ATS, except Section 4.
B. Perform inspections and tests listed in NETA ATS, Section 7.5.

3.3 CLEANING
A. Division 01 – Cleaning: Clean installed work.
B. Touch up scratched or marred surfaces to match original finishes.
C. Clean dust and debris from interior and exterior of cabinet.

END OF SECTION 26 28 17
SECTION 26 43 13
SURGE PROTECTIVE DEVICES (SPDs)

PART 1 - GENERAL

1.1 WORK INCLUDES
A. Contractor provide:
   1. SPD units mounted integral panelboards as indicated on riser diagram.

1.2 RELATED SECTIONS
A. Section 26 24 16 – Panelboards.

1.3 REQUIREMENTS OF REGULATORY AGENCIES
A. Underwriters Laboratory (UL)
B. American National Standards Institute (ANSI)
C. Institute of Electrical and Electronics Engineers (IEEE)
D. National Electrical Manufacturers Association (NEMA)
E. National Fire Protection Association (NFPA)
F. Occupational Safety and Health Act (OSHA)
G. Federal Information Processing Standards, Pub 94 (FIPS)
H. ANSI/IEEE C62.41, Recommended Practice for Surge Voltages in Low-Voltage AC Power Circuits, Category C
J. UL 1449, Current Edition – Surge Protective Devices
K. UL 1283
L. NEMA LS-1, Low Voltage Surge Protective Devices
M. NEC Article 285

1.4 SUBMITTALS
A. In accordance with Division 01, provide:
   1. Shop drawings and product data sheets indication physical and electrical characteristics in accordance with Division 1.
2. UL1449 file card copies.
3. Third party test results verifying label ratings.

1.5 WARRANTY

A. Warrant all equipment for ten (10) years from date of substantial completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Liebert.
B. Current Technology.
C. EFI Electronics.
D. United Power.
E. Leviton.
F. Square D.
G. Seimens ITE.
H. G.E.

2.2 ELECTRICAL REQUIREMENTS

A. SPD Types

1. Branch Panels: The panelboard shall be UL 67 listed and the SPD shall be UL 1449 labeled as Type 1 or as Type 4 intended for Type 1 or Type 2 applications.

B. Nominal System Operating Voltages

1. 480Y/277V VAC, 3-phase, 4 wire, plus ground for panelboard units.

C. Maximum Continuous Operating Voltages (MCOV)

1. 125% of nominal system operating voltage.

D. Operating Frequency

1. 60 Hertz.

E. Seven (7) Protection Modes on Grounded Wye System

1. L-G, L-N and N-G (L = Line, N = Neutral, and G = Ground).

F. The SPD shall be UL Tested and labeled as a complete assembly to a symmetrical fault current rating greater than or equal to the rating of the connected panel, in accordance with NEC Article 285, without the requirement of a dedicated breaker feeder to obtain the
fault current withstand rating.

G. The Voltage Protection Rating (VPR) shall be tested with the integral disconnect in accordance with UL-1449, Third Edition. The UL VPR values shall not exceed the following (including disconnect). If the device is remote mounted it shall be fed by a circuit breaker and the UL VPR rating shall include the breaker in series with the SPD.

H. Maximum UL 1449 Voltage Surge (Category C1)

<table>
<thead>
<tr>
<th>System Voltage</th>
<th>L-N, L-G, N-G Modes</th>
</tr>
</thead>
<tbody>
<tr>
<td>208Y/120 VAC</td>
<td>800V</td>
</tr>
<tr>
<td>480Y/277 VAC</td>
<td>1200V</td>
</tr>
</tbody>
</table>

I. Protection and Filtering Elements:

1. The SPD shall have a maximum surge current rating of:
   - Service Entrance: 300 kA per mode.
   - Distribution Panel: 100 kA per mode.
   - Branch Panel: 100 kA per mode.

   Devices that derive a maximum surge current rating by adding test results of individual components are not acceptable. Test documentation of kA rating shall be required. Devices must be rated per mode, not per PHASE per NEMA.

2. The SPD device repetitive surge current capacity shall be tested utilizing a 1.2x50ms, 20kV open circuit voltage, 8x20ms, 10kA short circuit Category C3 test waveform (as defined by ANSI/IEEE C62.41-1991 and ANSI/IEEE C62.45-1992) at one minute intervals. A failure is defined as either performance degradation or more than 10% deviation of clamping voltage at the specified surge current. The service entrance device shall be capable of surviving a minimum of 20,000 C3 impulses without failure or performance degradation of more than 10%. Downstream devices shall be capable of surviving a minimum of 5,000 C3 impulses without failure or performance degradation of more than 10%.

3. The SPD device shall be capable of surviving a minimum of 5,000 surges using a 10x1000ms impulse (1kV, 4kA for 277/480V devices, .5kV, 2kA for 120/208V devices), confirmed by an independent nationally recognized test lab (R&B Labs).

4. Systems using selenium, gas tubes or silicon avalanche diodes in surge current path are not acceptable.

5. The Maximum Continuous Operating Voltage (MCOV) for all voltage configurations shall be 125% of nominal or greater.

6. The fusing system shall be capable of allowing the rated maximum surge current to pass through without fuse operation. Systems utilizing a fusing system that opens below the maximum surge current level are unacceptable. The fusing system shall be included in the surge current testing.

J. The SPD shall incorporate a UL 1283 listed EMI/RFI filter with minimum attenuation of –50dB at 100kHz.

K. The SPD shall be UL labeled with 20kA I-nominal (I-n).

L. Overcurrent Protection:

1. Fuses rated for 200 KAIC (integral fused disconnect).
M. Diagnostic Monitoring:

1. Fuse monitoring.
2. MOV monitoring.
4. Form C contacts for remote annunciation of unit status.
5. Press-to-test diagnostics to verify operational integrity of monitoring system.
6. Surge event counter and audible alarm.
7. Remote status monitor.

N. Serviceability:

1. SPD system module(s) must be field replaceable by qualified individuals or licensed Electricians.

O. Equipment Mounting:

1. Switchboard & Distribution Panel SPD – The SPD shall include an integral disconnect switch which has been tested to the surge current rating of the SPD and match or exceed the fault current rating of the board per NEC 285. The Disconnect must switch the phases and neutral. Use of circuit breakers for disconnect mean is not acceptable due to impedance and the requirement for neutral disconnect. The SPD shall be mounted integral to the equipment.
2. Branch panel SPD – the SPD shall be mounted adjacent to existing panels and integral to new panels as indicated on riser diagram. Use of a breaker to feed an integral device shall not be acceptable.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install SPD units per manufacturer's written recommendations.

B. Verify SPD unit ratings with service rating and voltage characteristics, and with Electrical Requirements section of this specification. Ensure proper system configuration and coordination prior to ordering any equipment.

C. Do not drill or tap equipment bus bars. Use suitable bolted bus connectors.

D. Connect separately mounted SPD units to equipment with input conductors that are as short and straight as practically possible. Twist input conductors to reduce inductance.

E. Provide source breaker or fused disconnect switch for SPD units sized in accordance with SPD manufacturer's recommendations.

F. Ground equipment and SPD units per manufacturer's recommendations, NEC, and Section 16170.

G. Provide mounting brackets, bus bar, breaker stabs, and filler pieces for unused spaces.

3.2 FIELD QUALITY CONTROL
A. Perform SPD unit tests according to manufacturer’s instructions. Provide verification of test results to Architect/Engineer.

B. Provide services of manufacturer’s factory trained Engineer for length of time required to:
   1. Coordinate installation.
   2. Conduct functional tests on all equipment and field test listed herein.
   3. Provide training during normal working hours to AAFES’s personnel in operation, testing, adjusting, and maintenance.
   4. Submit written report to Architect/Engineer and AAFES stating results of tests conducted and listing personnel trained.

3.3 ADJUSTMENT AND CLEANING

A. Adjust operating mechanisms for free mechanical movement.

B. Tighten bus connections and mechanical fasteners, in accordance with manufacturer's published torque value recommendations and UL 486A and B.

C. Touch-up scratched or marred surfaces to match original finish.

D. Clean interior and exterior of enclosure.

END OF SECTION 26 43 13
SECTION 26 51 00
INTERIOR LUMINAIRES

PART 1 - GENERAL

1.1 SECTION INCLUDES
A. Interior luminaires and accessories.
B. Drivers.
C. Luminaire accessories.

1.2 REFERENCES
B. IES LM-79 – LED lamp and luminaire performance
C. IES LM-85 - LED Package Characteristics.
D. NEMA WD 6 - Wiring Devices-Dimensional Requirements.
E. NFPA 70 - National Electrical Code.
G. UFC 3-350-01 Change 3, 01 June 2016
H. UFC 3-520-01 14 October 2015
I. WPAFB Base Facility Standards

1.3 SUBMITTALS FOR REVIEW
A. Division 01 – Submittals: Procedures for submittals.
B. Shop Drawings: Indicate dimensions and components for each luminaire that is not a standard product of the manufacturer. Provide ballast information for each fixture.
C. Product Data: Provide dimensions, ratings, and performance data.

1.4 SUBMITTALS FOR INFORMATION
A. Division 01 – Submittal: Submittals for information.
B. Submit manufacturer’s installation instructions. Indicate application conditions and limitations of use stipulated by Product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, and installation of Product.

1.5 SUBMITTALS FOR CLOSEOUT
A. Division 01 – Project Record and Closeout Documents: Submittals for project closeout.
B. Submit manufacturer’s operation and maintenance instructions for each product.
C. Warranty for LEDs, drivers and emergency standby drivers shall be Ten (10) years from date of substantial completion.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

1.7 REGULATORY REQUIREMENTS

A. Conform to requirements of NFPA 70.
B. Conform to requirements of NFPA 101.
C. Products: Listed and classified by Underwriters Laboratories, Inc. as suitable for the purpose specified and indicated.

PART 2 - PRODUCTS

2.1 LUMINAIRES

A. Furnish products as scheduled. Contractors wishing to submit voluntary substitutions shall submit complete cut sheet information showing fixture dimensions, options and photometrics. Alternate fixtures must be received at engineers’ office minimum two weeks prior to bidding. Engineers’ evaluation shall be final. Fixtures submitted without prior approval or outside this time window will be returned to contractor without comment.

B. Luminaires shall meet the following minimum requirements:

1. Only brand name fixtures (Columbia/Hubbell, Eaton/Cooper, GE, Lithonia/Acuity, etc.) or equal (approved by AAFES Contracting officer) shall be used.
2. Correlated Color Temperature (CCT):
   a. Interior luminaires shall be nominal 3500K (per LM-79 Test).
3. Color Rendering Index (CRI):
   a. Interior luminaires: >80, R9>0 (per LM-79 Test).
4. Luminaire efficacy: >100 Lumens per Watt (LPW).
5. Reported L90* > 60,000 hours.
6. Dual rated 120-277V 60 Hz.
7. Transient Protection: 100kHz ring wave, 2kV level.
8. Total current harmonic distortion: ≤ 20%.
9. Power Factor (PF): ≥ 0.9.
10. Class 2, replaceable, high efficiency LED driver rated for 60,000 hours.
12. Underwriter Laboratory (UL) listed.
13. Electrical components shall be assessable from below the ceiling.
14. Modularly replaceable drivers.

*Lumen Maintenance at 25 deg C ambient temperature shall be based on calculations per The Illuminating Engineering Society of North America (IESNA) standard, TM-21 and performed by an accredited National Voluntary Laboratory Accreditation Program (NVLAP) laboratory.

C. Warranty:
1. 10 YEARS
2.2 LED Drivers

A. Manufacturers:
   1. Manufacturers Standard complying with ANSI ANSLG requirements.

B. Warranty:
   1. Drivers shall be rated for a minimum operation of 60,000 hours

2.3 LED Standby Drivers

A. Manufacturers: Bodine, ITOA or approved equal.

B. Description: Emergency battery power supply suitable for installation in ballast compartment of fluorescent luminaire or for remote mounting.

C. Ratings: As shown on fixture schedule.

D. Battery: Sealed pure lead type, rated for 10 year life. Provide 3 year full warranty.

E. Include TEST switch and AC ON indicator light, installed to be operable and visible from the outside of an assembled luminaire.

PART 3 - EXECUTION

3.1 INSTALLATION

A. **Support recessed luminaires independent of ceiling framing.** For recessed luminaires, provide two hanger wires fastened at opposite corners of luminaires and at structural joists. Supports wires shall be same type and gauge as ceiling support wires or 1/8” aircraft cables.

B. Locate recessed ceiling luminaires as indicated on reflected ceiling plan.

C. Support surface mounted luminaires on grid ceiling directly from building structure.

D. Install surface mounted luminaires plumb and adjust to align with building lines and with each other. Secure to prevent movement.

E. Install recessed luminaires to permit removal from below.

F. Install accessories furnished with each luminaire.

G. Connect luminaires to branch circuits provided under Section 26 05 33 using flexible conduit. In exposed grid ceiling areas, use premanufactured wiring systems at contractor’s option.

H. Make wiring connections to branch circuit using building wire with insulation suitable for temperature conditions within luminaire.

I. Bond products and metal accessories to branch circuit equipment grounding conductor.

J. Install specified lamps in each luminaire.

3.2 FIELD QUALITY CONTROL

A. Operate each luminaire after installation and connection. Inspect for proper connection and operation.

3.3 CLEANING
A. Division 01 – Cleaning: Cleaning installed work.
B. Clean electrical parts to remove conductive and deleterious materials.
C. Remove dirt and debris from enclosures.
D. Clean photometric control surfaces as recommended by manufacturer.
E. Clean finishes and touch up damage.

3.4 PROTECTION OF FINISHED WORK
A. Prior to final acceptance, replace luminaires that have failed LEDs.

END OF SECTION 26 51 00
SECTION 26 60 00

TESTING

PART 1 - GENERAL

1.1 WORK INCLUDES

A. Provide:

1. Testing of electrical components and systems:
   a. Insulation resistance test.
   b. Grounding electrode test.
   c. Continuity test.
   d. Voltage test.
   e. Phase relationship verification.
   f. Power transmission equipment test.

2. Test reports.
3. Correction of defective components or systems.
4. Retest of corrected components, systems.

1.2 SUBMITTALS

A. Test Reports: Submit seven (7) copies of all test reports to Contracting Officer.

   1. Type each test report on 8-1/2 inch x 11 inch paper. Include:
      a. Project Number.
      b. Project title and location.
      c. Test performed.
      d. Date performed.
      e. Test equipment used.
      f. Contractor's name, address and telephone number.
      g. Testing firm's name, address and telephone number if other than Contractor.
      h. Name(s) and title(s) of person(s):
         1. Performing test.
         2. Observing test.

      i. Statement verifying each test.
      j. Nameplate data from each motor and equipment item tested.
      k. Test results.
      l. Retest results after correction of defective components, systems.

   2. For each copy, assemble all test reports and bind them in a folder. Label each folder, "Electrical Test Reports".

PART 2 - PRODUCTS

2.1 MATERIALS: Furnish all equipment, manpower and casual labor to perform specified testing.

PART 3 - EXECUTION

3.1 PREPARATION
A. When temporary electrical service is used for testing, do not energize any equipment or portion of permanent system that exceeds capacity of temporary service.

B. Ensure that all electrical work is complete and ready for testing.

C. Disconnect all devices or equipment that might be damaged by application of test voltages, voltage of reversed phase sequence or other test procedures.

3.2 TESTING: Conduct tests and adjust equipment to verify compliance with specified performance.

3.3 INSULATION RESISTANCE TESTS

A. Resistance measured; line-to-ground.

B. Perform testing on the following items:

<table>
<thead>
<tr>
<th>Item Tested</th>
<th>Voltage of Test</th>
<th>Min. Acceptance Resistance in Megohms</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. No. 2 and larger cables (600V)</td>
<td>1000V</td>
<td>50</td>
</tr>
<tr>
<td>2. Motors</td>
<td>500V</td>
<td>5</td>
</tr>
<tr>
<td>3. Switchboard and Panelboard Buses</td>
<td>1000V</td>
<td>25</td>
</tr>
</tbody>
</table>

3.4 CONTINUITY TESTS: Test branch circuits and control circuits to determine continuity of wiring and connections.

3.5 VOLTAGE TESTS

A. Make and record voltage tests and recorded at the following listed points. Conduct tests under normal load conditions.

1. Service entrance at main panel.
2. Terminals of all motors.

3.6 PHASE RELATIONSHIP

A. Examine connections to equipment for proper phase relationships. Verify proper motor rotation.

3.7 CORRECTION OF DEFECTS

A. When tests disclose any unsatisfactory workmanship or equipment furnished under this Contract, correct defects and retest. Repeat tests until satisfactory results are obtained.

B. When any wiring or equipment is damaged by tests, repair or replace such wiring or equipment. Test repaired items to ensure satisfactory operation.

END OF SECTION 26 60 00
SECTION 28 16 00

INTRUSION DETECTION

PART 1. GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Intrusion detection with multiplexed, modular, microprocessor-based controls, intrusion sensors and detection devices, and communication links to perform monitoring, alarm, and control functions.

1.3 DEFINITIONS

A. LCD: Liquid-crystal display.

B. LED: Light-emitting diode.

C. PIR: Passive infrared.

D. RFI: Radio-frequency interference.

E. UPS: Uninterruptible power supply.

F. Protected or Protection Zone: A space or area for which an intrusion must be detected and uniquely identified, the sensor or group of sensors assigned to perform the detection, and any interface equipment between sensors and communication link to central-station control unit.

G. Standard Intruder: A person who weighs 100 lb or less and whose height is 60 inches or less; dressed in a long-sleeved shirt, slacks, and shoes.

H. Standard-Intruder Movement: Any movement, such as walking, running, crawling, rolling, or jumping, of a “standard intruder” in a protected zone.

1.4 SUBMITTALS

A. Product Data in accordance with Division 01 – Quality Control: Components for sensing, detecting, and control, including dimensions and data on features, performance, electrical characteristics, ratings, and finishes.

1. Site and Floor Plans: Indicate final outlet and device locations, routing of raceways, and cables inside and outside the building.

2. Device Address List: Coordinate with final system programming.

3. System Wiring Diagrams: Include system diagrams unique to Project. Show connections for all devices, components, and auxiliary equipment. Include diagrams for equipment and for system with all terminals and interconnections identified.

4. Details of surge-protection devices and their installation.

5. Sensor detection patterns and adjustment ranges.
B. Equipment and System Operation Description: Include method of operation and supervision of each component and each type of circuit. Show sequence of operations for manually and automatically initiated system or equipment inputs. Description must cover this specific Project; manufacturer’s standard descriptions for generic systems are not acceptable.

C. Qualification Data: For Installer, testing agency.

D. Field quality-control test reports.

E. Operation and Maintenance Data: For intrusion detection system to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 1 Section “Operation and Maintenance Data,” include the following:
   1. Data for each type of product, including features and operating sequences, both automatic and manual.
   2. Central-station control-unit hardware and software data.

F. Warranty: Special warranty specified in this Section.

G. Other Information Submittals:
   1. Test Plan and Schedule: Test plan defining all tests required to ensure that system meets technical, operational, and performance specifications within 60 days of date of Contract award.
   2. Examination reports documenting inspections of substrates, areas, and conditions.
   3. Anchor inspection reports documenting inspections of built-in and cast-in anchors.

1.5 QUALITY ASSURANCE

A. Installer Qualifications:
   1. An employer of workers, at least one of whom is a technician certified by the National Burglar & Fire Alarm Association.
   2. Manufacturer’s authorized representative who is trained and approved for installation of units required for this Project.

B. Intrusion Detection Systems Integrator Qualifications: An experienced intrusion detection equipment supplier and Installer who has completed systems integration work for installations similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.

C. Testing Agency Qualifications: An independent testing agency, with the experience and capability to conduct the testing indicated, that is a member company of the National Burglar & Fire Alarm Association or is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7.
   1. Testing Agency’s Field Supervisor: Person currently certified as an advanced alarm technician by the National Burglar & Fire Alarm Association to supervise on-site testing specified in Part 3.

D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70-05, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

E. FMG Compliance: FMG-approved and -labeled intrusion detection devices and equipment.

F. Comply with NFPA 70.
1.6 PROJECT CONDITIONS

A. Environmental Conditions: Capable of withstanding the following environmental conditions without mechanical or electrical damage or degradation of operating capability:

1. Altitude: Sea level to 1000 feet.
2. Central-Station Control Unit: Rated for continuous operation in an ambient of 60 to 85 deg F and a relative humidity of 20 to 80 percent, noncondensing.
3. Interior, Controlled Environment: System components, except central-station control unit, installed in temperature-controlled interior environments shall be rated for continuous operation in ambients of 0 to 122 deg F dry bulb and 20 to 90 percent relative humidity, noncondensing.
4. Interior, Uncontrolled Environment: System components installed in non-temperature-controlled interior environments shall be rated for continuous operation in ambients of 0 to 122 deg F dry bulb and 20 to 90 percent relative humidity, noncondensing.

1.7 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer and Installer agree to repair or replace components of intrusion detection devices and equipment that fail in materials or workmanship within specified warranty period.

1. Warranty Period: One year from date of beneficial occupancy.

PART 2. PRODUCTS

2.1 FUNCTIONAL DESCRIPTION OF SYSTEM

A. Supervision: System components shall be continuously monitored for normal, alarm, supervisory, and trouble conditions. Indicate deviations from normal conditions at any location in system. Indication includes identification of device or circuit in which deviation has occurred and whether deviation is an alarm or malfunction.

1. Alarm Signal: Display at central-station control.
2. Trouble Condition Signal: Distinct from other signals, indicating that system is not fully functional. Trouble signal shall indicate system problems such as battery failure, open or shorted transmission line conductors, or controller failure.
3. Supervisory Condition Signal: Distinct from other signals, indicating an abnormal condition as specified for the particular device or controller.

B. System Control: Central-station control unit shall directly monitor intrusion detection devices and connecting wiring in a multiplexed distributed control system or as part of a network.

C. System shall automatically reboot program without error or loss of status or alarm data after any system disturbance.

D. Operator Commands:

1. Help with System Operation: Display all commands available to operator. Help command, followed by a specific command, shall produce a short explanation of the purpose, use, and system reaction to that command.
2. Acknowledge Alarm: To indicate that alarm message has been observed by operator.
3. Place Protected Zone in Access: Disable all intrusion-alarm circuits of a specific protected zone. Tamper circuits may not be disabled by operator.
4. Place Protected Zone in Secure: Activate all intrusion-alarm circuits of a protected zone.
5. Protected Zone Test: Initiate operational test of a specific protected zone.
7. Print Reports.

E. Printed Record of Events: Print a record of alarm, supervisory, and trouble events on system printer. Sort and report by protected zone, device, and function. When central-station control unit receives a signal, print a report of alarm, supervisory, or trouble condition. Report type of signal (alarm, supervisory, or trouble), protected zone description, date, and time of occurrence. Differentiate alarm signals from other indications. When system is reset, report reset event with the same information concerning device, location, date, and time. Commands shall initiate the reporting of a list of current alarm, supervisory, and trouble conditions in system or a log of past events.

F. Response Time: Thirty seconds maximum between actuation of any alarm and its indication at central-station control unit.

G. Circuit Supervision: Supervise all signal and data transmission lines, links with other systems, and sensors from central-station control unit. Indicate circuit and detection device faults with both protected zone and trouble signals, sound a distinctive audible tone, and illuminate an LED. Maximum permissible elapsed time between occurrence of a trouble condition and indication at central-station control unit is 20 seconds. Initiate an alarm in response to opening, closing, shorting, or grounding of a signal or data transmission line.

H. Manual Secure-Access Control: Coded entries at manual stations shall change status of associated protected zone between secure and access conditions.

I. Alarm Transmission to Remote Monitoring Station: Transmit all alarm and supervisory indications to a designated remote monitoring station via telephone lines, dedicated alarm network. Transmissions must be compatible with monitoring station equipment. Coordinate with local authority having jurisdiction.

2.2 SYSTEM COMPONENT REQUIREMENTS

A. Surge Protection: Protect components from voltage surges originating external to equipment housing and entering through power, communication, signal, control, or sensing leads. Include surge protection for external wiring of each conductor entry connection to components.

1. Minimum Protection for Power Lines 120 V and More: Auxiliary panel suppressors complying with requirements in Division 26 Section “Transient Voltage Suppression.”
2. Minimum Protection for Communication, Signal, Control, and Low-Voltage Power Lines: Comply with requirements in Division 26 Section “Transient Voltage Suppression” as recommended by manufacturer for type of line being protected.

B. Interference Protection: Components shall be unaffected by radiated RFI and electrical induction of 15 V/m over a frequency range of 10 to 10,000 MHz and conducted interference signals up to 0.25-V RMS injected into power supply lines at 10 to 10,000 MHz.

C. Tamper Protection: Tamper switches on detection devices, controllers, annunciators, pull boxes, junction boxes, cabinets, and other system components shall initiate a tamper-alarm signal when unit is opened or partially disassembled and when entering conductors are cut or disconnected. Central-station control-unit alarm display shall identify tamper alarms and indicate locations.

D. Addressable Devices: Transmitter and receivers shall communicate unique device identification and status reports to central-station control unit.
2.3 ENCLOSURES

A. Interior Sensors: Enclosures that protect against dust, falling dirt, and dripping noncorrosive liquids.

B. Interior Electronics: NEMA 250, Type 12.

C. Screw Covers: Where enclosures are accessible to unauthorized persons, secure with security fasteners of type appropriate for enclosure.

2.4 SECURE AND ACCESS DEVICES

A. Manufacturers:
   1. ICIDS. IV

B. Keypad and Display Module: Existing to remain.

2.5 PIR SENSORS

A. Manufacturers:
   1. ADEMCO Group; Pittway Corporation.
   4. Digital Security Controls, Ltd.
   5. FBI; Pittway Corporation.
   6. Honeywell International Inc.
   7. NAPCO Security Systems, Inc.
   8. Optex.
   9. Richardson Electronics, Ltd.
   10. Visonic Inc.

B. Description: Sensors detect intrusion by monitoring infrared wavelengths emitted from a human body within their protected zone and by being insensitive to general thermal variations.
   2. Ceiling-Mounting Unit Pattern Size: 84-inch diameter at floor level for units mounted 96 inches above floor; 18-foot diameter at floor level for units mounted 25 feet above floor.

C. Device Performance:
   1. Sensitivity: Adjustable pattern coverage to detect a change in temperature of 2 deg F or less, and standard-intruder movement within sensor’s detection patterns at any speed between 0.3 to 7.5 fps across 2 adjacent segments of detector’s field of view.
   2. Test Indicator: LED test indicator that is not visible during normal operation. When visible, indicator shall light when sensor detects an intruder. Locate test enabling switch under sensor housing cover.

2.6 DURESS-ALARM SWITCHES

A. Manufacturers:
   1. ADEMCO Group; Pittway Corporation.
   2. GE Interlogix; General Electric Company.
   3. NAPCO Security Systems, Inc.
   4. Visonic Inc.
B. Description: A switch with a shroud over the activating lever that allows an individual to covertly send a duress signal to central-station control unit, with no visible or audible indication when activated. Switch shall lock in activated position until reset with a key.

1. Minimum Switch Rating: 50,000 operations.
2. Push Button: Finger activated, suitable for mounting on horizontal or vertical surface.

2.7 SECURITY SYSTEM CONTROL PANEL (SSCP)

A. Manufacturer: ICIDS. IV

B. Existing control panel to remain. Expand existing system as required to serve new devices. All work associated with Intrusion Detection System shall be performed by ESI Electrical. Contractor shall contact ESI for pricing information to coordinate and include with their bids.

C. Expansion Module:

1. Expansion module shall mount locally inside the SSCP enclosure and provide the option of remote mounting within an enclosure up to 2,000 feet from SSCP.
2. Expansion module shall provide 16 programmable, supervised, hard wired alarm loops.
3. Alarm loops shall be programmable alarm into any of 8 separate arming zones (protected areas).
4. Alarm loops shall be N/C, N/O, or both (dry contacts) and shall operate normally under ground fault conditions.
5. Four 100mA programmable hardwired auxiliary outputs shall be incorporated into the Expansion Module design.
6. Module shall operate in an environment of 0 to 122 degrees Farenheit.
7. Expansion module power shall be provided by the SSCP 12 VDC transformer and shall operate at 130mA maximum in normal standby and alarm modes.
8. Expansion module shall be compatible with the SSCP RS-485.
9. Expansion module shall be UL listed for the specific application.

2.8 SECURITY FASTENERS

A. Operable only by tools produced for use on specific type of fastener by fastener manufacturer or other licensed fabricator. Drive system type, head style, material, and protective coating as required for assembly, installation, and strength.

B. Manufacturers:

1. Camcar Textron Inc.
2. Holo-Krome; a Danaher Corporation.
4. Tamper-Pruf Screws, Inc.

C. Drive System Types: Pinned Torx-Plus, Pinned Torx, or pinned hex (Allen).

D. Socket Flat Countersunk Head Fasteners:

2. Stainless steel, ASTM F 879, Group 1 CW.

E. Socket Button Head Fasteners:

2. Stainless steel, ASTM F 879), Group 1 CW.
F. Socket Head Cap Fasteners:
   2. Stainless steel, ASTM F 837, Group 1 CW.

G. Protective Coatings for Heat-Treated Alloy Steel:
   1. Zinc chromate, ASTM F 1135, Grade 3 or 4; for exterior applications and interior applications where indicated.
   2. Zinc phosphate with oil, ASTM F 1137, Grade I, or black oxide, unless otherwise indicated.

PART 3. EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of intrusion detection.

   1. Examine roughing-in for embedded and built-in anchors to verify actual locations of intrusion detection connections before intrusion detection installation.
   2. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of intrusion detection.

B. Inspect built-in and cast-in anchor installations, before installing intrusion detection, to verify that anchor installations comply with requirements. Prepare inspection reports.

   1. Remove and replace anchors where inspections indicate that they do not comply with requirements. Reinspect after repairs or replacements are made.
   2. Perform additional inspections to determine compliance of replaced or additional anchor installations. Prepare inspection reports.

C. For material whose orientation is critical for its performance as a ballistic barrier, verify installation orientation.

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

3.2 SYSTEM INSTALLATION

A. Comply with UL 681.

B. Security Fasteners: Where accessible to unauthorized persons, install intrusion detection components using security fasteners with head style appropriate for fabrication requirements, strength, and finish of adjacent materials except that a maximum of two different sets of tools shall be required to operate security fasteners for Project. Provide stainless-steel security fasteners in stainless-steel materials.

3.3 WIRING INSTALLATION

A. Wiring Method: Install wiring in metal raceways according to Division 26 Conduit and boxes. Conceal raceway except in unfinished spaces and as indicated. Minimum conduit size shall be ¾ inch. Control and data transmission wiring shall not share conduit with other building wiring systems.

B. Wiring Method: Cable in metal raceways, concealed in accessible ceilings, walls, and floors when possible.
C. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points. Use lacing bars and distribution spools. Separate power-limited and non-power-limited conductors as recommended in writing by manufacturer. Install conductors parallel with or at right angles to sides and back of enclosure. Connect conductors that are terminated, spliced, or interrupted in any enclosure associated with intrusion system to terminal blocks. Mark each terminal according to system’s wiring diagrams. Make all connections with approved crimp-on terminal spade lugs, pressure-type terminal blocks, or plug connectors.

D. Wires and Cables:

1. Conductors: Size as recommended in writing by system manufacturer, unless otherwise indicated.
2. 120-V Power Wiring: Install according to Division 26.
3. Control and Signal Transmission Conductors: Size and type cable as recommended by manufacturer.

E. Splices, Taps, and Terminations: Make connections only on numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures.

F. Install power supplies and other auxiliary components for detection devices at controllers, unless otherwise indicated or required by manufacturer. Do not install such items near devices they serve.

G. Identify components with engraved, laminated-plastic or metal nameplate for central-station control unit and each terminal cabinet, mounted with corrosion-resistant screws. Nameplates and label products are specified in Division 26.

3.4 GROUNDING

A. Ground system components and conductor and cable shields to eliminate shock hazard and to minimize ground loops, common-mode returns, noise pickup, cross talk, and other impairments.

B. Signal Ground Terminal: Locate at main equipment rack or cabinet. Isolate from power system and equipment grounding. Provide 5-ohm ground. Measure, record, and report ground resistance.

C. Install grounding electrodes of type, size, location, and quantity indicated. Comply with installation requirements in Division 26.

3.5 FIELD QUALITY CONTROL

A. Pre-Construction Testing: Existing system shall be 100% tested and certified prior to beginning of construction project to document existing system status and any existing deficiencies. Contractor shall provide written report noting any issues found during testing. Items found during testing shall be discussed with AAFES and the base to decide on who should accomplish the work. Any work related to the correcting of existing conditions shall be addressed outside of this contract or by change order.

B. Pretesting: After installation, align, adjust, and balance system and perform complete pretesting to determine compliance of system with requirements in the Contract Documents. Correct deficiencies observed in pretesting. Replace malfunctioning or damaged items with new ones and retest until satisfactory performance and conditions are achieved. Prepare forms for systematic recording of acceptance test results.

1. Report of Pretesting: After pretesting is complete, provide a letter certifying that installation is complete and fully operable; include names and titles of witnesses to preliminary tests.
C. Manufacturer’s Field Service: Engage a factory-authorized service representative to inspect, test, and adjust field-assembled components and equipment installation, including connections, and to assist in field testing. Report results in writing and include in O & M data. Testing shall be done in presence of Base Security and AAFES Store Manager. Schedule testing with all parties minimum 14 days in advance.

D. Perform the following field tests and inspections and prepare reports:

1. Inspection: Verify that units and controls are properly labeled and interconnecting wires and terminals are identified.

2. Operational Tests: Schedule tests after pretesting has been successfully completed. Test all modes of system operation and intrusion detection at each detection device. Test for detection of intrusion and for false alarms in each protected zone. Test for false alarms by simulating activities outside indicated detection patterns.

3. Electrical Tests: Comply with NFPA 72, Section A-7. Minimum required tests are as follows:
   a. Verify the absence of unwanted voltages between circuit conductors and ground.
   b. Test all conductors for short circuits using an insulation-testing device.
   c. With each circuit pair, short circuit at the far end of circuit and measure circuit resistance with an ohmmeter. Record circuit resistance of each circuit on Record Drawings.
   d. Verify that each controller is in normal condition as detailed in manufacturer’s operation and maintenance manual.
   e. Verify that transient surge-protection devices are installed according to manufacturer’s written instructions.
   f. Test each initiating and indicating device for alarm operation and proper response at central-station control unit.
   g. Test both primary and secondary power.

E. Report of Tests and Inspections: Prepare a written record of tests, inspections, and detailed test results in the form of a test log.

F. Tag all equipment, stations, and other components for which tests have been satisfactorily completed.
1. GENERAL

1.1. REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

FM GLOBAL (FM)

FM APP GUIDE (updated on-line) Approval Guide

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 1221 (2016) Standard for the Installation, Maintenance and Use of Emergency Services Communications Systems

NFPA 70 (2017) National Electrical Code


UNDERWRITERS LABORATORIES (UL)

UL 1242 (2006; Reprint Mar 2014) Standard for Electrical Intermediate Metal Conduit -- Steel

UL 1971 (2002; Reprint Oct 2008) Signaling Devices for the Hearing Impaired


UL 268A (2008; Reprint Oct 2014) Smoke Detectors for Duct Application


UL 464 (2016) Standard for Audible Signal Appliances

UL 6 (2007; Reprint Nov 2014) Electrical Rigid Metal Conduit-Steel
1.2. SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00:

SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Detail Drawings/Fire Alarm System; G

SD-03 Product Data

Storage Batteries; G
Low Battery Voltage; G
Special Tools and Spare Parts
Technical Product Data; G
Testing

SD-06 Test Reports

Testing; G

SD-07 Certificates

Equipment Qualifications

SD-10 Operation and Maintenance Data

Operating and Maintenance Instructions; G

1.3. QUALITY ASSURANCE

1.3.1. Qualifications

Submit proof of qualifications for required personnel. The installer shall submit proof of experience for the Professional Engineer, fire alarm technician, and the installing company.

1.3.1.1. Engineer and Technician

a. Registered Professional Engineer with verification of experience and at least 4 years of current experience in the design of the fire protection and detection systems.

b. National Institute for Certification in Engineering Technologies (NICET) qualifications as an engineering technician in fire alarm systems program with verification of experience and current NICET certificate.

c. The Registered Professional Engineer may perform all required items under this specification. The NICET Fire Alarm Technician shall perform only the items allowed by the specific category of certification held.
1.3.1.2. Installer

The installing Contractor shall provide the following: Fire Alarm Technicians to perform the installation of the system. A Fire Alarm Technician with a minimum of 4 years of experience shall perform/supervise the installation of the fire alarm system. Fire Alarm Technicians with a minimum of 2 years of experience shall be utilized to assist in the installation and terminate fire alarm devices, cabinets and panels. An electrician shall be allowed to install wire or cable and to install conduit for the fire alarm system. The Fire Alarm technicians installing the equipment shall be factory trained in the installation, adjustment, testing, and operation of the equipment specified herein and on the drawings.

1.3.1.3. Fire Protection Engineer

Installations needing designs or modifications of fire detection, fire alarm, or fire suppression systems require the services and review of a qualified fire protection engineer. For the purposes of meeting this requirement, a qualified fire protection engineer is defined as an individual meeting one of the following conditions:

a. An engineer having a Bachelor of Science or Masters of Science Degree in Fire Protection Engineering from an accredited university engineering program, plus a minimum of 2 years' work experience in fire protection engineering.

b. A registered professional engineer (P.E.) in fire protection engineering.

c. A registered PE in a related engineering discipline and member grade status in the National Society of Fire Protection Engineers.

d. An engineer with a minimum of 10 years' experience in fire protection engineering and member grade status in the National Society of Fire Protection Engineers.

1.3.2. Detail Drawings

Submit detail drawings consisting of a complete list of equipment and material, including manufacturer's descriptive and technical literature, catalog cuts, and installation instructions. Note that the contract drawings show layouts based on typical audible appliances. Check the layout based on the actual audible devices to be installed and make any necessary revisions in the detail drawings. The detail drawings shall also contain complete wiring and schematic diagrams for the equipment furnished, equipment layout, and any other details required to demonstrate that the system has been coordinated and will properly function as a unit. Detail drawings and detailed point-to-point wiring diagram shall be prepared and signed by a Registered Professional Engineer or a NICET Level 4 Fire Alarm Technician showing points of connection. Diagram shall include connections between system devices, appliances, control panels, supervised devices, and equipment that is activated or controlled by the panel.

1.4. DELIVERY, STORAGE, AND HANDLING

Protect equipment delivered and placed in storage from the weather, humidity and temperature variation, dirt, dust, and any other contaminants.

1.5. SPECIAL TOOLS AND SPARE PARTS

Submit spare parts data for each different item of material and equipment specified, not later than 3 months prior to the date of beneficial occupancy. Data shall include a complete list of parts and supplies with the current unit prices and source of supply and a list of the parts recommended by the manufacturer to be replaced after 1 year of service. Furnish software, connecting cables, proprietary equipment and two spare fuses of each type and size required, necessary for the maintenance, testing, and reprogramming of the equipment. Two percent of the total number of each different type of detector, but no less than two each, shall be furnished. Mount spare fuses in the fire alarm panel.
2. PRODUCTS

2.1. SYSTEM DESCRIPTION

The fire detection and alarm system and the central reporting system shall be a complete, supervised fire alarm reporting system configured in accordance with NFPA 72 and UFC 3-600-01 exceptions are acceptable as directed by the Contracting Officer. Furnish equipment compatible and UL listed, FM approved, or approved or listed by a nationally recognized testing laboratory in accordance with the applicable NFPA standards. Locks shall be keyed alike. Provide four keys for the system. Furnish tags with stamped identification number for keys and locks.

2.1.1. Operation

Activate the system into the alarm mode by actuation of any alarm initiating device. The system will remain in the alarm mode until the initiating device is reset and the fire alarm control panel is reset and restored to normal. Alarm and supervisory initiating devices shall be individually addressable. Alarm initiating devices shall be connected to signal line circuits (SLC), Class B, in accordance with NFPA 72. Connect alarm notification appliances to notification appliance circuits (NAC), Class B in accordance with NFPA 72. The conduit loop requirement is not applicable to the signal transmission link from the local panels (at the protected premises) to the Supervising Station (fire station, fire alarm central communication center). Textual, audible, and visual appliances and systems shall comply with NFPA 72. Fire alarm system components requiring power, except for the control panel power supply, shall operate on 24 Volts dc.

2.1.2. Operational Features

The system shall have the following operating features:

a. Monitor electrical supervision of IDC, SLC, and NAC.

b. Monitor electrical supervision of the primary power (ac) supply, battery voltage, placement of alarm zone module (card, PC board) within the control panel, and transmitter tripping circuit integrity.

c. Electrical supervision for circuits used for supervisory signal services (i.e., sprinkler systems, valves, etc.). Supervision shall detect any open, short, or ground.

d. Confirmation or verification of all smoke detectors. The control panel shall interrupt the transmission of an alarm signal to the system control panel for a factory preset period. This interruption period shall be adjustable from 1 to 60 seconds and be factory set at 20 seconds. Immediately following the interruption period, a confirmation period shall be in effect during which time an alarm signal, if present, will be sent immediately to the control panel. Fire alarm devices other than smoke detectors shall be programmed without confirmation or verification.

2.1.3. Alarm Functions

Sequence of operations shall match that of the existing system, or an alarm condition on a circuit shall automatically initiate the following functions:

a. Transmission of a signal over the station fire reporting system.

b. Visual indications of the alarmed devices on the fire alarm control panel display.

c. Continuous sounding or operation of alarm notification appliances throughout the building as required by ASA S3.41.
d. Closure of doors held open by electromagnetic devices.

e. Deactivation of the air handling units throughout the building.

2.1.4. Primary Power

Operating power shall be provided as required by paragraph Power Supply for the System. Transfer from normal to emergency power or restoration from emergency to normal power shall be fully automatic and not cause transmission of a false alarm. Loss of ac power shall not prevent transmission of a signal via the fire reporting system upon operation of any initiating circuit.

2.1.5. Battery Backup Power

Battery backup power shall be through use of rechargeable, sealed-type storage batteries and battery charger.

2.1.6. Interface with Existing Fire Alarm Equipment

The equipment specified herein shall operate as an extension to an existing configuration. Submit certified copies of current approvals or listings issued by an independent test lab if not listed by UL, FM or other nationally recognized testing laboratory, showing compliance with specified NFPA standards. The new equipment shall be connected to an existing control panel in the existing part of the building. Existing control equipment shall be expanded, modified, or supplemented as necessary to extend the existing control functions to the new points or zones. New components shall be capable of merging with the existing configuration without degrading the performance of either system. The scope of the acceptance tests of paragraph Testing shall include aspects of operation that involve combined use of both new and existing portions of the final configuration.

The existing fire alarm control panel is a Simplex 4100ES with addressable devices.

2.1.7. Interface with Other Equipment

Interfacing components shall be furnished as required to connect to subsystems or devices which interact with the fire alarm system, such as supervisory or alarm contacts in suppression systems, operating interfaces for smoke control systems, door releases, etc.

2.2. STANDARD PRODUCTS

Provide material and equipment which are the standard products of a manufacturer regularly engaged in the manufacture of the products for at least 2 years prior to bid opening. Equipment shall be supported by a service organization that can provide service within 24 hours of notification.

2.3. NAMEPLATES

Major components of equipment shall have the manufacturer's name, address, type or style, voltage and current rating, and catalog number on a noncorrosive and nonheat-sensitive plate which is securely attached to the equipment.

2.4. CONTROL PANEL

Control Panel is an existing Simplex 4100ES Panel.

2.4.1. Remote System Audible/Visual Display

2.4.2. Circuit Connections
Connect circuit conductors entering or leaving the panel to screw-type terminals with each conductor and terminal marked for identification.

2.4.3. System Expansion and Modification Capabilities

Provide, as part of this contract, any equipment and software needed by qualified technicians to implement future changes to the fire alarm system.

2.4.4. Addressable Control Module

The control module shall be capable of operating as a relay (dry contact form C) for interfacing the control panel with other systems, and to control door holders or initiate elevator fire service. The module shall be UL listed as compatible with the control panel. The indicating device or the external load being controlled shall be configured as a Class B notification appliance circuits. The system shall be capable of supervising, audible, visual and dry contact circuits. The control module shall have both an input and output address. The supervision shall detect a short on the supervised circuit and shall prevent power from being applied to the circuit. The control model shall provide address setting means compatible with the control panel's SLC supervision and store an internal identifying code. The control module shall contain an integral LED that flashes each time the control module is polled. Existing fire alarm system notification appliance circuits shall be connected to a single module to power and supervise the circuit.

2.4.5. Addressable Initiating Device Circuits Module

Configure the initiating device being monitored as a Class B initiating device circuits. The system shall be capable of defining any module as an alarm module and report alarm trouble, loss of polling, or as a supervisory module, and reporting supervisory short, supervisory open or loss of polling. The module shall be UL listed as compatible with the control panel. The monitor module shall provide address setting means compatible with the control panel's SLC supervision and store an internal identifying code. Monitor module shall contain an integral LED that flashes each time the monitor module is polled. Pull stations with a monitor module in a common backbox are not required to have an LED. Existing fire alarm system initiating device circuits shall be connected to a single module to power and supervise the circuit.

2.5. STORAGE BATTERIES

Furnish and install all new batteries for power supplies, including existing power supplies.

Submit substantiating battery calculations for supervisory and alarm power requirements. Ampere-hour requirements for each system component and each panel component, and the battery recharging period shall be included.

Provide storage batteries which are 24 Vdc sealed, lead-calcium type requiring no additional water with ample capacity, with primary power disconnected, to operate the fire alarm system for a period of 48 hours. Following this period of battery operation, the batteries shall have ample capacity to operate all components of the system, including all alarm signaling devices in the total alarm mode for a minimum period of 15 minutes. Locate batteries at the bottom of the panel, or, in a separate battery cabinet. Provide batteries with overcurrent protection in accordance with NFPA 72. Separate battery cabinets shall have a lockable, hinged cover similar to the fire alarm panel. The lock shall be keyed the same as the fire alarm control panel. Paint the cabinets to match the fire alarm control panel.

2.6. BATTERY CHARGER

Battery charger shall be completely automatic, 24 Vdc with high/low charging rate, capable of restoring the batteries from full discharge (18 Volts dc) to full charge within 48 hours. A pilot light indicating when batteries are manually placed on a high rate of charge shall be provided as part of
the unit assembly, if a high rate switch is provided. Locate charger in control panel cabinet or in a separate battery cabinet.

2.7. ADDRESSABLE MANUAL FIRE ALARM STATIONS

Addressable manual fire alarm stations shall conform to the applicable requirements of UL 38. Manual stations shall be connected into signal line circuits. Stations shall be installed on flush mounted outlet boxes. Manual stations shall be mounted at 48 inches. Stations shall be [double action type. Stations shall be finished in red, with raised letter operating instructions of contrasting color. Stations requiring the breaking of glass or plastic panels for operation are not acceptable. Stations employing glass rods are not acceptable. The use of a key or wrench shall be required to reset the station. Gravity or mercury switches are not acceptable. Switches and contacts shall be rated for the voltage and current upon which they operate. Addressable pull stations shall be capable of being field programmed, shall latch upon operation and remain latched until manually reset. Stations shall have a separate screw terminal for each conductor. Surface mounted boxes shall be matched and painted the same color as the mounting surface.

2.8. FIRE DETECTING DEVICES

Fire detecting devices shall comply with the applicable requirements of NFPA 72, NFPA 90A, UL 268, UL 268A, and UL 521. The detectors shall be provided as indicated. Detector base shall have screw terminals for making connections. No solder connections will be allowed. Detectors located in concealed locations (above ceiling, raised floors, etc.) shall have a remote visible indicator LED/LCD. Addressable fire detecting devices, except flame detectors, shall be dynamically supervised and uniquely identified in the control panel. All fire alarm initiating devices shall be individually addressable, except where indicated.

2.8.1. Smoke Detectors

Design smoke detectors for detection of abnormal smoke densities. Smoke detectors shall be photoelectric type. Detectors shall contain a visible indicator LED/LCD that shows when the unit is in alarm condition. Detectors shall not be adversely affected by vibration or pressure. Detectors shall be the plug-in type in which the detector base contains terminals for making wiring connections. Detectors that are to be installed in concealed (above false ceilings, etc.) locations shall be provided with a remote indicator LED/LCD suitable for mounting in a finished, visible location.

2.8.1.1. Photoelectric Detectors

Detectors shall operate on a light scattering concept using an LED light source. Failure of the LED shall not cause an alarm condition. Detectors shall be factory set for sensitivity and shall require no field adjustments of any kind. Detectors shall have an obscuration rating in accordance with UL 268. Addressable smoke detectors shall be capable of having the sensitivity being remotely adjusted by the control panel.

2.8.1.2. Duct Detectors

Duct-mounted photoelectric smoke detectors shall be furnished and installed where indicated and in accordance with NFPA 90A. Units shall consist of a smoke detector as specified in paragraph Photoelectric Detectors, mounted in a special housing fitted with duct sampling tubes. Detector circuitry shall be mounted in a metallic enclosure exterior to the duct. Detectors shall have a manual reset. Detectors shall be rated for air velocities that include air flows between 500 and 4000 fpm. Detectors shall be powered from the fire alarm panel. Sampling tubes shall run the full width of the duct. The duct detector package shall conform to the requirements of NFPA 90A, UL 268A, and shall be UL listed for use in air-handling systems. The control functions, operation, reset, and bypass shall be controlled from the fire alarm control panel. Lights to indicate the operation and alarm condition; and the test and reset buttons shall be visible and accessible with the unit.
installed and the cover in place. Detectors mounted above 6 feet and those mounted below 6 feet that cannot be easily accessed while standing on the floor, shall be provided with a remote detector indicator panel containing test and reset switches. Remote lamps and switches as well as the affected fan units shall be properly identified in etched plastic placards. Detectors shall have auxiliary contacts to provide control, interlock, and shutdown functions. The detectors shall be supplied by the fire alarm system manufacturer to ensure complete system compatibility.

2.9. NOTIFICATION APPLIANCES

Audible appliances shall conform to the applicable requirements of UL 464. Devices shall be connected into notification appliance circuits. Devices shall have a separate screw terminal for each conductor. Audible appliances shall generate a unique audible sound from other devices provided in the building and surrounding area. Surface mounted audible appliances shall be painted red. Recessed audible appliances shall be installed with a grill that is painted red.

2.9.1. Alarm Horns

Not Used.

2.9.2. Visual Notification Appliances

Visual notification appliances shall conform to the applicable requirements of UL 1971 and the contract drawings. Appliances shall have clear high intensity optic lens, xenon flash tubes, and output white light. Strobe flash rate shall be between 1 to 3 flashes per second and a minimum of 15 candela. Strobe shall be semi-flush mounted.

2.9.3. Combination Audible/Visual Notification Appliances

Combination audible/visual notification appliances shall provide the same requirements as individual units except they shall mount as a unit in standard backboxes. Units shall be factory assembled. Any other audible notification appliance employed in the fire alarm systems shall be approved by the Contracting Officer.

2.9.4. Voice Evacuation System

The voice evacuation system shall provide for one-way voice communications, routing and pre-amplification of digital alarm tones and voice (digital and analog) messages. The system shall be zoned for messages (Custom and prerecorded) and tones as indicated on the drawings. The following electronic tones shall be available from the amplifier: Slow Whoop, High/Low, Horn, Chime, Beep, Stutter, Wail and Bell. The system shall have a microphone and allow for general paging within the space. Operation shall be either manually from a control switch or automatically from the fire alarm control panel. Reset shall be accomplished by the fire alarm control panel during panel reset.

2.10. FIRE DETECTION AND ALARM SYSTEM PERIPHERAL EQUIPMENT

2.10.1. Conduit

Conduit and fittings shall comply with NFPA 70, UL 6, UL 1242, and UL 797.

2.10.2. Wiring

Wiring shall conform to NFPA 70. Wiring for 120 Vac power shall be No. 12 AWG minimum. The SLC wiring shall be fiber optic or copper cable in accordance with the manufacturers requirements. Wiring for fire alarm dc circuits shall be No. 16 AWG minimum. Voltages shall not be mixed in any junction box, housing, or device, except
those containing power supplies and control relays. Wiring shall conform to NFPA 70. System field wiring shall be solid copper and installed in metallic conduit or electrical metallic tubing, except that rigid plastic conduit may be used under slab-on-grade. Conductors shall be color coded. Conductors used for the same functions shall be similarly color coded. Wiring code color shall remain uniform throughout the circuit. Pigtail or T-tap connections to initiating device circuits, supervisory alarm circuits, and notification appliance circuits are prohibited. T-tapping using screw terminal blocks is allowed for style 5 addressable systems.

2.11. TRANSMITTERS – Existing to remain.

3. PART 3 EXECUTION

3.1. EXAMINATION

After becoming familiar with details of the work, verify dimensions in the field and advise the Contracting Officer of any discrepancy before performing the work.

3.2. INSTALLATION

Install all work as shown, in accordance with NFPA 70 and NFPA 72, and in accordance with the manufacturer's diagrams and recommendations, unless otherwise specified. Smoke detectors shall not be installed until construction is essentially complete and the building has been thoroughly cleaned.

3.2.1. Power Supply for the System

Provide a single dedicated circuit connection for supplying power from a branch circuit to each building fire alarm system. The power shall be supplied as shown on the drawings. The power supply shall be equipped with a locking mechanism and marked in red with the words "FIRE ALARM CIRCUIT CONTROL".

3.2.2. Wiring

Conduit size for wiring shall be in accordance with NFPA 70. Wiring for the fire alarm system shall not be installed in conduits, junction boxes, or outlet boxes with conductors of lighting and power systems. Not more than two conductors shall be installed under any device screw terminal. The wires under the screw terminal shall be straight when placed under the terminal then clamped in place under the screw terminal. The wires shall be broken and not twisted around the terminal. Circuit conductors entering or leaving any mounting box, outlet box enclosure, or cabinet shall be connected to screw terminals with each terminal and conductor marked in accordance with the wiring diagram. Connections and splices shall be made using screw terminal blocks. The use of wire nut type connectors in the system is prohibited. Wiring within any control equipment shall be readily accessible without removing any component parts. The fire alarm equipment manufacturer's representative shall be present for the connection of wiring to the control panel.

3.2.3. Detectors

Detectors shall be located and installed in accordance with NFPA 72. Detectors shall be connected into signal line circuits or initiating device circuits as indicated on the drawings. Detectors shall be at least 12 inches from any part of any lighting fixture. Detectors shall be located at least 3 feet from diffusers of air handling systems. Each detector shall be provided with appropriate mounting hardware as required by its mounting location. Detectors which mount in open space shall be mounted directly to the end of the stubbed down rigid conduit drop. Conduit drops shall be firmly secured to minimize detector sway. Where length of conduit drop from ceiling or wall surface exceeds 3 feet, sway bracing
shall be provided. Detectors installed in concealed locations (above ceiling, raised floors, etc.) shall have a remote visible indicator LED/LCD in a finished, visible location.

3.2.4. Notification Appliances

Notification appliances shall be mounted 80 inches above the finished floor or 6 inches below the ceiling, whichever is lower.

3.2.5. Addressable Initiating Device Circuits Module

The initiating device circuits module shall be used to connect supervised conventional initiating devices (water flow switches, water pressure switches, manual fire alarm stations, high/low air pressure switches, and tamper switches). The module shall mount in an electrical box adjacent to or connected to the device it is monitoring and shall be capable of Style B supervised wiring to the initiating device. In order to maintain proper supervision, there shall be no T-taps allowed on style B lines. Addressable initiating device circuits modules shall monitor only one initiating device each. Contacts in suppression systems and other fire protection subsystems shall be connected to the fire alarm system to perform supervisory and alarm functions as specified in Section 21 13 13 WET PIPE SPRINKLER SYSTEM, FIRE PROTECTION, as indicated on the drawings and as specified herein.

3.2.6. Addressable Control Module

Addressable and control modules shall be installed in the outlet box or adjacent to the device they are controlling. If a supplementary suppression releasing panel is provided, then the monitor modules shall be mounted in a common enclosure adjacent to the suppression releasing panel and both this enclosure and the suppression releasing panel shall be in the same room as the releasing devices. All interconnecting wires shall be supervised unless an open circuit or short circuit abnormal condition does not affect the required operation of the fire alarm system. If control modules are used as interfaces to other systems, such as HVAC or elevator control, they shall be within the control panel or immediately adjacent to it. Control modules that control a group of notification appliances shall be adjacent to the first notification appliance in the notification appliance circuits. Control modules that connect to devices shall supervise the notification appliance circuits. Control modules that connect to auxiliary systems or interface with other systems (non-life safety systems) and where not required by NFPA 72, shall not require the secondary circuits to be supervised. Contacts in suppression systems and other fire protection subsystems shall be connected to the fire alarm system to perform required alarm functions as specified in Section 21 13 13 WET PIPE SPRINKLER SYSTEM, FIRE PROTECTION, as indicated on the drawings and as specified herein.

3.3. OVERVOLTAGE AND SURGE PROTECTION

3.3.1. Power Line Surge Protection

All equipment connected to alternating current circuits shall be protected from surges in accordance with IEEE C62.41.1/IEEE C62.41.2 B3 combination waveform and NFPA 70. Fuses shall not be used for surge protection. The surge protector shall be rated for a maximum let thru voltage of 350 Volts ac (line-to-neutral) and 350 Volt ac (neutral-to-ground).

3.3.2. Low Voltage DC Circuits Surge Protection

All IDC, NAC, and communication cables/conductors, except fiber optics, shall have surge protection installed at each point where it exits or enters a building. Equipment shall be protected from surges in accordance with IEEE C62.41.1/IEEE C62.41.2 B3 combination waveform and NFPA 70. The surge protector shall be rated to protect the 24 Volt dc
equipment. The maximum dc clamping voltages shall be 36 V (line-to-ground) and 72 Volt dc (line-to-line).

3.3.3. Signal Line Circuit Surge Protection

All SLC cables/conductors, except fiber optics, shall have surge protection/isolation circuits installed at each point where it exits or enters a building. The circuit shall be protected from surges in accordance with IEEE C62.41.1/IEEE C62.41.2 B3 combination waveform and NFPA 70. The surge protector/isolator shall be rated to protect the equipment.

3.4. GROUNDING

Grounding shall be provided by connecting to building ground system.

3.5. SUPERVISING STATION PROVISIONS

The supervising equipment shall be existing to remain.

3.5.1. Revisions to Existing Facilities

Existing supervising components shall be modified as indicated on the drawings and programming shall be updated if required to accommodate the revised configuration. Acceptance testing shall include procedures that would demonstrate that operation of existing equipment has not been degraded and that the revised configuration plus interfacing components operates compatibly with the new fire alarm system at the protected premises. Work on existing equipment shall be performed in accordance with the manufacturer's instructions or under supervision of the manufacturer's representative.

3.5.2. Additions to Existing Facilities

Supplemental components shall be added to the existing supervising equipment [as required to accommodate the new fire alarm system to be installed at the protected premises] [as indicated on the drawings]. All present functions shall be extended, including recording and storage in memory, and programming shall be updated if required to accommodate the revised configuration. Acceptance testing shall include procedures that would demonstrate that operation of existing equipment has not been degraded and that the expanded configuration operates compatibly with the new fire alarm system.

3.6. TRAINING

Submit lesson plans, operating instructions, maintenance procedures, and training data, furnished in manual format, for the training courses. The operations training shall familiarize designated government personnel with proper operation of the fire alarm system. Conduct the course in the building where the system is installed or as designated by the Contracting Officer.

a. The instructions shall cover items contained in the operating and maintenance instructions. In addition, training shall be provided on performance of expansions or modifications to the fire detection and alarm system. The training period for system expansions and modifications shall consist of at least 1 training days (8 hours per day) and shall start after the system is functionally completed but prior to final acceptance tests.

b. The maintenance training course shall provide the designated Government personnel adequate knowledge required to diagnose, repair, maintain, and expand functions inherent to the system. Provide training course for the maintenance staff. The training period for systems maintenance shall consist of 1 training days (8 hours per day) and shall start after the system is functionally completed but prior to final acceptance tests. Six copies of
maintenance manual listing routine maintenance procedures, possible breakdowns and repairs, and troubleshooting guide. The manuals shall include conduit layout, equipment layout and simplified wiring, and control diagrams of the system as installed. The manuals shall include complete procedures for system revision and expansion, detailing both equipment and software requirements. Original and backup copies of all software delivered for this project shall be provided, on each type of media utilized. Manuals shall be approved prior to training.

c. The training period for systems operation shall consist of 1 training days (8 hours per day) and shall start after the system is functionally completed but prior to final acceptance tests. Six copies of operating manual outlining step-by-step procedures required for system startup, operation, and shutdown. The manual shall include the manufacturer's name, model number, service manual, parts list, and complete description of equipment and their basic operating features.

3.7. TESTING

Notify the Contracting Officer at least 10 days before the preliminary and acceptance tests are to be conducted. Perform the tests in accordance with the approved test procedures in the presence of the Contracting Officer.

The control panel manufacturer's representative shall be present to supervise tests. Furnish instruments and personnel required for the tests.

a. Submit detailed test procedures, prepared and signed by a Registered Professional Engineer or a NICET Level 3 Fire Alarm Technician, for the fire detection and alarm system 60 days prior to performing system tests.

b. Submit test reports, in booklet form, showing field tests performed to prove compliance with the specified performance criteria, upon completion and testing of the installed system. Each test report shall document readings, test results and indicate the final position of controls. Include the NFPA 72 Certificate of Completion and NFPA 72 Inspection and Testing Form, with the appropriate test reports.

3.7.1. Preliminary Tests

Prior to the beginning of system installation, contractor shall test the existing system for faults and troubles. Provide testing certificate and report any existing issues of the system prior to starting work.

3.7.2. Acceptance Test

Acceptance testing shall not be performed until the Contractor has completed and submitted the Certificate of Completion. Conduct testing in accordance with NFPA 72. The recommended tests in NFPA 72 are considered mandatory and shall verify that previous deficiencies have been corrected. The Fire alarm Technician supervising the installation of the fire alarm system shall attend the testing of the system. The test shall include all requirements of NFPA 72 and the following:

a. Test of each function of the control panel.

b. Test of each circuit in both trouble and normal modes.

c. Tests of each alarm initiating devices in both normal and trouble conditions.

d. Tests of each control circuit and device.

e. Tests of each alarm notification appliance.
f. Tests of the battery charger and batteries.

g. Complete operational tests under emergency power supply.

h. Visual inspection of wiring connections.

i. Opening the circuit at each alarm initiating device and notification appliance to test the wiring supervisory feature.

j. Ground fault.

k. Short circuit faults.

l. Stray voltage.

m. Loop resistance.

--- END OF SECTION ---
PART 1 - GENERAL

1.1  SUMMARY

A.  Section Includes:

1.  Wood composite fences.
2.  Excavation for posts.

1.2  SUBMITTALS

A.  Product Data:

1.  Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for wood composite fences.

B.  Samples for Verification: For each component indicated and for each exposed finish required, prepared on Samples of size indicated below.

1.  For each finish product specified, two samples, minimum size 9 inches square, representing actual product, color, and patterns.

C.  Shop Drawings:

1.  Show locations of fence, posts, rails, and details of extended posts, and accessories. Indicate materials, dimensions, sizes, weights, and finishes of components. Include plans, elevations, and sections and other required installation and operational clearances, and details of post anchorage and attachment and bracing.

D.  Product Certificates:

1.  Signed by manufacturers of wood composite fences certifying that products furnished comply with requirements.

E.  Submittal List:

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<th>Submittal Item</th>
<th>Quantity</th>
<th>Action</th>
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<td>Shop Drawings</td>
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<td>Product Certificates</td>
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1.3 QUALITY ASSURANCE

A. Installer Qualifications:

1. An experienced installer who has completed wood composite fences similar in material, design, and extent to those indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

B. Source Limitations for wood composite fences:

1. Obtain each color, grade, finish, type, and variety of component for wood composite fences from one source with resources to provide wood composite fences of consistent quality in appearance and physical properties.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Products:

1. To establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other manufacturers, a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation. Subject to compliance with requirements, provide either the named products or equal products.

a. Basis-of-Design Products: Trex Fencing
   1) Horizons composite fencing

2.2 MATERIALS

A. Wood composite: Reclaimed wood and plastic with integral coloring; free from toxic chemicals and preservatives:

1. Characteristics:
   a. Abrasion resistance: 0.01 inch wear per 1000 revolutions, tested to ASTM D 2394.
   b. Hardness: 1124 pounds, tested to ASTM D 143.
   c. Self ignition temperature: 743 degrees F, tested to ASTM D 1929.
   d. Flash ignition temperature: 698 degrees F, tested to ASTM D 1929.
   e. Flame spread rating: 80, tested to ASTM E 84.
   f. Water absorption, 24 hour immersion, tested to ASTM D 1037:
      1) Sanded surface: 4.3 percent.
      2) Unsanded surface: 1.7 percent.
   g. Thermal expansion coefficient, 36 inch long samples:
1) Width: 35.2 x 10^-6 to 42.7 x 10^-6.
2) Length: 16.1 x 10^-6 to 19.2 x 10^-6.

h. Fastener withdrawal, tested to ASTM D 1761:
   1) Nail: 163 pounds per inch.
   2) Screw: 558 pounds per inch.

i. Static coefficient of friction:
   1) Dry: 0.53 to 0.55, tested to ASTM D 2047.
   2) Dry: 0.59 to 0.70, tested to ASTM F 1679.
   3) Wet: 0.70 to 0.75, tested to ASTM F 1679.

j. Fungus resistance, white and brown rot: No decay, tested to ASTM D 1413.

k. Termite resistance: 9.6 rating, tested to AWPA E-1.

l. Specific gravity: 0.91 to 0.95, tested to ASTM D 2395.

m. Compression:
   1) Parallel: 1806 PSI ultimate, 550 PSI design, tested to ASTM D 198.
   2) Perpendicular: 1944 PSI ultimate, 625 PSI design, tested to ASTM D 143.

n. Tensile strength: 854 PSI ultimate, 250 PSI design, tested to ASTM D 198.

o. Shear strength: 561 PSI ultimate, 200 PSI design, tested to ASTM D 143.

p. Modulus of rupture: 1423 PSI ultimate, 250 PSI design, tested to ASTM D 4761.

q. Modulus of elasticity: 175,000 PSI ultimate, 100,000 PSI design, tested to ASTM D 4761.

r. Thermal conductivity: 1.57 BTU per inch per hour per square foot at 85 degrees F, tested to ASTM C 177.

2.3 COMPONENTS

A. FENCE SYSTEM:

1. Fence height
   a. 8 feet.

2. Components:
   a. Fence posts
   b. Post caps
      1) Crown
   c. Top rail
   d. Bottom rail
   e. Vertical front rail
   f. Vertical back rail
   g. Fence brackets

3. Surface texture: Smooth

4. Color:
   a. Winchester Grey

2.4 ACCESSORIES

A. Fasteners: 1-5/8 inch galvanized or corrosion-resistant coated steel. Provide finish nails where applicable.

B. Concrete: Provide concrete conforming to ASTM C 94; minimum 2500 PSI compressive strength at 28 days, with a 3 to 5 inch slump.
PART 3 - EXECUTION

3.1 INSTALLATION

A. Install in accordance with manufacturer's instructions.
B. Cut and drill wood composite using carbide tipped blades.
C. Space posts maximum 8 feet on center.
D. Drill post holes into undisturbed or compacted soil; excavate deeper in soft or loose soils and for posts with heavy lateral loads.
E. Drill posts to 12 inch diameter. Locate bottom of post 30 inches below grade or below frost line whichever is greater.
F. Place top of concrete flush with finished grade.
G. Screw fence brackets to posts with four 1-5/8 inch long exterior screws.
H. Cut top rails, bottom rail covers and aluminum bottom rails to lengths required.
I. Slide bottom rail covers over aluminum bottom rail pieces
J. Position aluminum bottom rail on fence brackets with deeper side of rail channel facing downward.
K. Position top rail and screw attach to top brackets with 1-5/8 inch long exterior screws.
L. Place post caps over post tops and secure with construction adhesive or four finish nails.

3.2 ADJUSTING, CLEANING, AND PROTECTION

A. Clean wood composite to remove stains:
   1. Mold, mildew, and berry and leaf stains: Clean surfaces with conventional deck wash containing detergent or sodium hypochlorite.
   2. Rust and ground-in dirt: Clean surfaces with cleaner containing oxalic or phosphoric acid.
   3. Oil and grease: Clean surfaces with detergent containing degreasing agent
B. PROTECTION
   1. Protect installed products until completion of project.
   2. Touch-up, repair or replace damaged products

END OF SECTION