ADDENDUM NO. 1
FOR
“Interior Renovations and Alterations to the Monmouth County
Seaview Building”
AT
2407 Route 66 in the Township of Ocean, Monmouth County, New Jersey

RFB # F-197-2018

July 8, 2019

This Addendum forms a part of the Contract Documents for the above Project and must be
acknowledged on the bid form. Please attach this Addendum notice to the back of the front cover of
your Contract Specifications. Statements made herein shall amend, supersede and take precedence over
any made in previous documents including previously issued addenda.

This ADDENDUM consists of the following:

Project Specifications Manual:
A. SECTION 010100 – SUMMARY OF WORK
   Adjusted completion dates of various phases of work and added an approximate date for N.O.A.

B. SECTION 092600 – GYPSUM BOARD ASSEMBLIES
   Section 2.3 Accessories / Paragraph C item 2.b is to be deleted from the specification

C. DIVISION 27 – COMMUNICATIONS SPECIFICATIONS
   Sections 27001 / 270100 / 270526 / 270528 / 270536 / 270544 / 271500 are included as part of
   this Addendum

D. SECTION 323113 – CHAIN LINK FENCING
   Included as part of this Addendum

Plans:
A. DRAWING SHEET CV-001 Sanitary Pump Station
   Plan is included as part of this Addendum

B. G-101 Phasing Plan
   The copy of this drawing included in this Addendum clarifies the scope of Phase 2 and 2a scope
   of work

C. D-001 Demolition Plan
   The copy of this drawing included in this Addendum clarifies the scope of demolition. Keynote
   #16 – GPR under slab survey

D. A-101 Partial Plan- Finance, Juvenile Probation, Child Support
   Door CS/EOI in Child Support open office CS-01 is to be furnished w/ a Rim Type Exit Device,
   Exit Only with local alarm feature & all appropriate components to tie door into LV Security
   System

E. A-301 Partial RCP- Finance, Juvenile Probation, Child Support
   The copy of this drawing included in this Addendum corrects detail tags

F. A-600 Roof Plan & Details
   The copies of these drawings included in this Addendum clarify the scope of additional overflow
   scuppers & repairs to existing overflow scuppers.
**A. GENERAL**

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Item</th>
</tr>
</thead>
<tbody>
<tr>
<td>A-1</td>
<td><strong>No Change to Location, Date and Time for Receipt of Bids.</strong>&lt;br&gt;Sealed bids will be received by the Monmouth County Division of Purchasing for the Interior Renovations &amp; Alterations to the Monmouth County Seaview Building to be opened and read in public in the Freeholder Meeting Room, Hall of Records, 2nd Floor, 1 East Main St, Freehold NJ, 07728 on Wednesday, July 17, at 10:00am prevailing time.</td>
</tr>
<tr>
<td>A-2</td>
<td><strong>Hazardous Material Survey</strong>&lt;br&gt;Seaview Building dated May 11, 2018 is included as an attachment to this addendum, for information purposes. Refer to supplementary general conditions section 10.3 for Owner &amp; Contractors responsibilities regarding testing &amp; abatement of ACM.</td>
</tr>
</tbody>
</table>

**B. MODIFICATIONS TO SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Item</th>
</tr>
</thead>
<tbody>
<tr>
<td>B-1</td>
<td><strong>Specification Section “323113 – Chain Link Fencing”</strong>&lt;br&gt;Included as part of this Addendum</td>
</tr>
<tr>
<td>B-2</td>
<td><strong>Division 27 – Communications Specifications</strong>&lt;br&gt;Sections 270001 / 270100 / 270526 / 270528 / 270536 / 270544 / 271500 are included as part of this Addendum.</td>
</tr>
<tr>
<td>B-3</td>
<td><strong>Revised Specification Section 010100 Summary of Work</strong>&lt;br&gt;Adjusted completion dates of various phases of work and added an approximate date for N.O.A is included as part of this Addendum.</td>
</tr>
<tr>
<td>B-4</td>
<td><strong>Specification Section 092600 – Gypsum Board Assemblies</strong>&lt;br&gt;Section 2.3 Accessories / Paragraph C item 2.b is to be deleted from the specification</td>
</tr>
</tbody>
</table>

**C. MODIFICATIONS TO DRAWINGS**

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Item</th>
</tr>
</thead>
<tbody>
<tr>
<td>C-1</td>
<td><strong>CV-001 Sanitary Pump Station</strong>&lt;br&gt;Plan is included as part of this Addendum.</td>
</tr>
<tr>
<td>C-2</td>
<td><strong>G-101 Phasing Plan</strong>&lt;br&gt;The copy of this drawing included in this Addendum clarifies the scope of Phase 2 and 2a Scope of Work</td>
</tr>
<tr>
<td>C-3</td>
<td><strong>D-001 Demolition Plan</strong>&lt;br&gt;The copy of this drawing included in this Addendum clarifies the scope of demolition. Keynote # 16 – GPR under slab survey</td>
</tr>
<tr>
<td>C-4</td>
<td><strong>A-301 Partial RCP- Finance, Juvenile Probation, Child Support</strong>&lt;br&gt;The copy of this drawing included in this Addendum corrects detail tags</td>
</tr>
</tbody>
</table>
# D. CLARIFICATIONS

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Item</th>
</tr>
</thead>
<tbody>
<tr>
<td>D-1</td>
<td>“Marlite- Atrizan” decorative FRP panels are to be used where noted on drawing A-203</td>
</tr>
<tr>
<td>D-2</td>
<td>Existing window sill material is plastic laminate</td>
</tr>
<tr>
<td>D-3</td>
<td>Existing acoustic ceiling panels are “USG 2310 Radar”</td>
</tr>
<tr>
<td>D-4</td>
<td>Cut sheets for security equipment to be relocated are included as part of this addendum</td>
</tr>
</tbody>
</table>
| D-5     | Bidders are advised to include the cost of a non-destructive moisture analysis of the new roof in their bid. This analysis will be conducted after the first major rain event. The moisture analysis will include the following:  
  a. Detailed report based on the findings of infrared technology  
  b. A scale CAD drawing identifying wet areas  
  c. Thermal images supporting the infrared scan shall be provided in the report  
  d. Wet areas found during the moisture analysis will be marked on the roof using marking paint. |
| D-6     | Bidders are to follow specification section 01500 for description of temporary partitions |
| D-7     | Provide progress photos as directed in specification section 01323 |
| D-8     | “Bandit Barrier” noted on drawing A-302 detail 3 is the same frame & glazing as noted on Drawing a-404 for frames G4, S, T1, T2. Product equal to “Creative Industries Inc – Exchange Vision Window” |
| D-9     | Metal Studs to be actual 4”, 16 ga. spaced 12” O/C w/ diagonal stud bracing at alternate studs & black iron lateral bracing starting 12” from top of stud then 4”-0’ O/C max to top of gyp board. |
| D-10    | For gyp board soffits, fascias & ceilings use type 1 gyp board as described in spec section 092900 |
| D-11    | Drawing G-100 Phase I Phasing Plan  
  a. It is the Owners’ intent to have the new Social Service Break Room complete with TCO for this space so that the existing break room can be demolished; balance of Phase I is completed & TCO issued for this work.  
  b. Note regarding temporary partition with detention grade door & hardware. This can be installed as Phase I comes to completion. Temporary partitions needed at the start of Phase I are clearly noted. |
| D-14    | See structural drawings for steel specifications. |
All new concrete is to be 4,000 psi with no air entrainment, with a maximum water / cement ratio of 0.47. Provide (3) cylinders & slump test by independent testing agency.

Bidders are advised that repairs to parking lot paving damaged during construction includes restriping of these areas.

E. ATTACHMENTS

A. Hazardous Material Survey
   Seaview Building dated May 11, 2018 is included as an attachment to this Addendum

B. SPECIFICATION SECTION 010100 - REVISED SUMMARY OF WORK – July 5, 2019

C. DIVISION 27 – COMMUNICATIONS SPECIFICATION – July 5, 2019

D. SPECIFICATION SECTION 323113 – CHAIN LINK FENCING – July 5, 2019

E. CV-001 SANITARY PUMP STATION

F. G-101 PHASING PLAN – July 5, 2019

G. D-001 DEMOLITION PLAN – July 5, 2019

H. A-301 PARTIAL RCP - July 5, 2019

I. A-600 ROOF PLAN & DETAILS – July 5, 2019

J. AD-1.1 OVER FLOW SCUPPER DETAIL – July 5, 2019

K. CUT SHEETS FOR SECURITY EQUIPMENT – July 5, 2019

END OF ADDENDUM NO. 1
HAZARDOUS MATERIALS SURVEY

SEAVIEW BUILDING

County of Monmouth
Department of Public Works & Engineering
Division of Engineering & Traffic Safety
Hall of Records Annex
One East Main Street, Freehold, New Jersey 07728

May 11, 2018
RBA Project #: 728616-0000264.00

May 11, 2018
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<th>TITLE</th>
<th>PAGE</th>
</tr>
</thead>
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<td>SUMMARY OF CONFIRMED ASBESTOS CONTAINING MATERIALS</td>
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<tr>
<td>2.0</td>
<td>SURVEY OVERVIEW</td>
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<td>INSPECTION FINDINGS</td>
<td>3</td>
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<td>ASBESTOS CONTAINING MATERIALS TECHNICAL INSPECTION DATA</td>
<td></td>
</tr>
<tr>
<td>APPENDIX II</td>
<td>CERTIFICATIONS/ACCREDITATIONS</td>
<td></td>
</tr>
</tbody>
</table>
SECTION 1.0  SUMMARY OF CONFIRMED HAZARDOUS MATERIALS

The following materials were identified by a third party independent laboratory to contain asbestos in sufficient quantity to be classified as ASBESTOS CONTAINING MATERIAL (ACM) by State and Federal Regulatory Standards.

Seaview Building

ASBESTOS CONTAINING MATERIALS

<table>
<thead>
<tr>
<th>Material Identified</th>
<th>Residual Floor Tile Mastic – Beneath Renovations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Approx. Total Quantity</td>
<td>63,660 Square Feet</td>
</tr>
</tbody>
</table>

Photographic Documentation of Material Location

- Residual Floor Tile Mastic (Homo Material Code 11)
- Maintenance Area
- Unoccupied Areas
**Recommended Response Action**

RBA recommends Operations and Management protocols to preserve the existing material in place. Any impact to these materials should only be performed by a New Jersey Department Of Labor and Workforce Development licensed asbestos abatement contractor under controlled conditions. This material should be abated according to the provisions of NJAC 5:23-8 prior to any major renovation activity.

**LEAD BASED PAINT**

NV5 detected no lead based paint present on accessible surfaces when analyzed by X Ray Fluorescence inspection. While no quantities of lead were detected with the Seaview Building at concentrations greater than 1.0 mg/cm² - the designated threshold as set by the State of New Jersey regulations, the Occupational Health and Safety Administration (OSHA) does not set an exposure limit for fumes and dust that may contain lead or other trace elements. It is recommended that any renovation/construction activity be conducted using the provisions of OSHA’s “Lead Safe Work Practices” regarding technical procedures, personal protective equipment, and waste stream characterization requirements.
SECTION 2.0 SURVEY OVERVIEW

NV5 conducted visual assessment and analytical sample collection for potential Hazardous Building Materials located at the Seaview Building Complex in Ocean Township, New Jersey.

Mr. Ryan Broadwater, an accredited Asbestos Hazard Emergency Response Act (AHERA) asbestos building inspector and management planner, performed the inspection and analytical sample collection activities for suspected Asbestos Containing Materials (ACM). Mr. Broadwater also conducted a limited survey for Lead Based Paint utilizing an XRF Portable Detection System. Mr. Broadwater is a license Lead Inspector/Risk Assessor under the New Jersey Department of Health and Senior Services.

NV5 identified potential ACMs, catalogued their locations, and collected bulk samples in adequate quantities to perform analysis via Polarized Light Microscopy (PLM) or Transmission Electron Microscopy (TEM) to determine the presence or absence of asbestos (greater than 1% by weight). In addition, samples requiring TEM analysis, classified as "Non-Friable Organically Bound" (NOB), were submitted for analysis in accordance with Emergency Amendments to New Jersey’s Administrative Code (N.J.A.C.) 8:60/12:120. NV5’s initial inspections were conducted in February and April 2018.

Appendix I contains NV5’s inspection data for ACM including corresponding field documentation, sampling, and analytical data reflected on the Bulk Sample Data Collection Sheets/Chains of Custody. Analytical Certifications are in Appendix II.

NV5 performed a lead based paint screening for suspect surfaces utilizing a state of the art X-Ray Fluorescence lead based paint detection system to determine if lead based paint films are present that require treatment or management in place.

SECTION 3.0 INSPECTION FINDINGS

3.1 ASBESTOS CONTAINING MATERIAL FINDINGS

The ACM survey was performed in accordance with 40 CFR, Part 763, AHERA/ASHARA and included suspect materials located within the designated areas. During the inspection, suspect materials were sampled in sufficient quantity as mandated by 40 CFR, Part 763.87(a). NV5 noted a total of 22 suspect materials located on the property. Of the materials sampled, One (1) material was confirmed to be ACM (greater than 1% by weight) and One (1) material is assumed to be ACM. The samples collected were submitted to EMSL Analytical, Inc. (EMSL)
located in Cinnaminson, New Jersey. EMSL is accredited by the American Industrial Hygiene Association (AIHA) and participates in the National Voluntary Laboratory Accreditation Program (NVLAP).

**Regulatory Overview**

Analyses were performed utilizing PLM, where the microscope's polarizing filters are orientated so that light vibrates in one (1) plane, at right angles. A trained microscopist can interpret extinction, relief, sign of elongation, morphology, color, birefringence, etc., of a bulk sample for asbestos.

Prior to analysis, a small portion of the bulk sample material is teased onto a glass microscope slide. A cover slip is placed over the specimen and a small drop of refractive index oil is allowed to flow between the slide and the cover slip to immerse the specimen. The slide is placed on the stage of the PLM microscope and analyzed. Fibers from the specimen are differentiated and percentages by weight of the specimen represent the material concentration.

As per Emergency Amendments to New Jersey's Administrative Code (N.J.A.C.) 8:60/12:120, those suspect non-friable organically bound materials (NOBs) determined to be None Detected or less than 1% by weight via PLM are to be analyzed via TEM utilizing USEPA Method 600/R-93/116, Section 2.5.5.1. TEM analysis can differentiate between asbestos and non-asbestos containing fibers at a higher magnification using electron imaging, where smaller fibers cannot be viewed by PLM analysis. Results are reported in percentage by weight.

Asbestos is a naturally occurring mineral, which exists in two (2) groups, Serpentine and Amphibole, utilized in more than 3,600 products for its fire resistant, tensile strength, inertness, and chemical binding properties.

The Serpentine Group is comprised of Chrysotile asbestos, while the Amphibole Group consists of Amosite, Crocidolite, Tremolite, Anthophyllite, and other forms of asbestos.

According to the USEPA, materials that are greater than 1% asbestos by weight are classified as ACM. The following is a summary of analytical results for each location:
<table>
<thead>
<tr>
<th>Homogeneous Material Code</th>
<th>Material</th>
<th>Analytical Results</th>
<th>Estimated Quantity of ACM Present</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>White/Tan Linoleum – Bathrooms Throughout Renovation Areas</td>
<td>Assumed</td>
<td>NA</td>
</tr>
<tr>
<td>02</td>
<td>Gypsum Paper Drywall and Associated Joint Compound – Renovation Areas</td>
<td>None Detected</td>
<td>NA</td>
</tr>
<tr>
<td>03</td>
<td>1'x1' Off-White Floor Tile with Tan Mottle Pattern and Mastic</td>
<td>None Detected</td>
<td>NA</td>
</tr>
<tr>
<td>04</td>
<td>Black 3” Cove Base and Mastic</td>
<td>None Detected</td>
<td>NA</td>
</tr>
<tr>
<td>05</td>
<td>2'x4' Suspended Ceiling Tile with Pinhole and Fissure Patterns</td>
<td>None Detected</td>
<td>NA</td>
</tr>
<tr>
<td>06</td>
<td>1'x1' Light Blue Floor Tile with Mottled Pattern and Mastic</td>
<td>None Detected</td>
<td>NA</td>
</tr>
<tr>
<td>07</td>
<td>3” Light Blue Cove Base and Mastic</td>
<td>None Detected</td>
<td>NA</td>
</tr>
<tr>
<td>08</td>
<td>Grey Sink Coating</td>
<td>None Detected</td>
<td>NA</td>
</tr>
<tr>
<td>09</td>
<td>1'x1' Off-White Floor Tile with Tan Mottled Pattern and Mastic</td>
<td>None Detected</td>
<td>NA</td>
</tr>
<tr>
<td>10</td>
<td>Skimcoat/Joint Compound – Old Section</td>
<td>None Detected</td>
<td>NA</td>
</tr>
<tr>
<td>11</td>
<td>Residual Black Floor Tile Mastic</td>
<td>5% Chrysotile</td>
<td>63,660 SF</td>
</tr>
<tr>
<td>12</td>
<td>Dark Grey 3” Cove Base and Mastic</td>
<td>None Detected</td>
<td>NA</td>
</tr>
<tr>
<td>13</td>
<td>1’x1’ Dark Blue Floor Tile with Mottled Pattern and Mastic</td>
<td>None Detected</td>
<td>NA</td>
</tr>
<tr>
<td>14</td>
<td>1’x1’ Light Blue Floor Tile with Blue Mottled Pattern and Mastic</td>
<td>None Detected</td>
<td>NA</td>
</tr>
<tr>
<td></td>
<td>Description</td>
<td>Test Result</td>
<td>Notation</td>
</tr>
<tr>
<td>----</td>
<td>-----------------------------------------------------------------------------</td>
<td>-------------------</td>
<td>----------</td>
</tr>
<tr>
<td>15</td>
<td>Gypsum Paper Drywall and Associated Joint Compound (Vacant Areas)</td>
<td>None Detected</td>
<td>NA</td>
</tr>
<tr>
<td>16</td>
<td>Green Leveling Compound (Vacant Areas)</td>
<td>None Detected</td>
<td>NA</td>
</tr>
<tr>
<td>17</td>
<td>1'x1' Light Blue Floor Tile with Spotted Pattern and Mastic (Vacant Areas)</td>
<td>None Detected</td>
<td>NA</td>
</tr>
<tr>
<td>18</td>
<td>3&quot; Dark Blue Cove Base and Mastic (Vacant Areas)</td>
<td>None Detected</td>
<td>NA</td>
</tr>
<tr>
<td>19</td>
<td>Black Antiskid Flooring (Vacant Area)</td>
<td>None Detected</td>
<td>NA</td>
</tr>
<tr>
<td>20</td>
<td>Panel Mastic (Vacant Areas)</td>
<td>None Detected</td>
<td>NA</td>
</tr>
<tr>
<td>21</td>
<td>Multilayer Roofing (5 Levels)</td>
<td>None Detected</td>
<td>NA</td>
</tr>
<tr>
<td>22</td>
<td>Roof/Asphaltic Mastic</td>
<td>None Detected</td>
<td>NA</td>
</tr>
</tbody>
</table>

* Samples from Tremco, Inc. dated 4/8/2013

3.1 LEAD BASED PAINT INSPECTION FINDINGS

NV5 employed the use of a portable X-Ray Fluorescence (XRF) Lead Based Paint Detection System to identify films and coatings containing lead compounds that may be present within the Seaview Office Facility. The inspection was conducted on February 28, 2018 utilizing a Heuresis System Model Pb200i (serial # 1556) XRF instrument.

Three (3) calibration readings were recorded at the start and conclusion of the survey for quality control purposes using a 1.0 milligram of lead per square centimeter (mg/cm²) standard for Quality Assurance/Quality Control (QA/QC).

The United States Department of Housing and Urban Development (HUD), USEPA and New Jersey Administrative Code (N.J.A.C.) 5:17, define any paint film which contains greater than 1.0 milligram of lead per square centimeter (mg/cm²) as lead based paint. The following table(s) reflects the sequential testing results and findings:
Table I - Testing Results for Lead Based Paint
Seaview Building

<table>
<thead>
<tr>
<th>Test #</th>
<th>Testing Combination</th>
<th>Results (mg/cm²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Calibration #1 – 1.0 mg/cm²</td>
<td>0.9</td>
</tr>
<tr>
<td>2</td>
<td>Calibration #2 – 1.0 mg/cm²</td>
<td>1.0</td>
</tr>
<tr>
<td>3</td>
<td>Calibration #3 – 1.0 mg/cm²</td>
<td>1.0</td>
</tr>
<tr>
<td>4</td>
<td>Exterior Wall – North Side</td>
<td>0.1</td>
</tr>
<tr>
<td>5</td>
<td>Exterior Wall – West Side</td>
<td>0.0</td>
</tr>
<tr>
<td>6</td>
<td>Exterior Wall – South Side</td>
<td>0.2</td>
</tr>
<tr>
<td>7</td>
<td>Exterior Wall – West Side</td>
<td>0.1</td>
</tr>
<tr>
<td>8</td>
<td>Maintenance – Brick Wall</td>
<td>0.2</td>
</tr>
<tr>
<td>9</td>
<td>Maintenance Area – Steel Support Beams</td>
<td>0.2</td>
</tr>
<tr>
<td>10</td>
<td>Maintenance Area – CMU Block Walls</td>
<td>0.0</td>
</tr>
<tr>
<td>11</td>
<td>Maintenance Area – Gypsum Board Walls</td>
<td>0.1</td>
</tr>
<tr>
<td>12</td>
<td>Probation Holding – Walls</td>
<td>0.1</td>
</tr>
<tr>
<td>13</td>
<td>Probation Holding – Door Trim</td>
<td>0.0</td>
</tr>
<tr>
<td>14</td>
<td>Probation Holding – Door</td>
<td>0.2</td>
</tr>
<tr>
<td>15</td>
<td>Probation Holding – Bathroom Walls</td>
<td>0.0</td>
</tr>
<tr>
<td>16</td>
<td>Probation Holding – Window Frame</td>
<td>0.2</td>
</tr>
<tr>
<td>17</td>
<td>Probation Reception - Walls</td>
<td>-0.0</td>
</tr>
<tr>
<td>18</td>
<td>Probation Reception – Door Frame</td>
<td>0.1</td>
</tr>
<tr>
<td>19</td>
<td>Probation Reception – Bathroom Walls</td>
<td>0.0</td>
</tr>
<tr>
<td>20</td>
<td>Probation Reception – Bathroom Door</td>
<td>0.1</td>
</tr>
<tr>
<td></td>
<td>Description</td>
<td>Value</td>
</tr>
<tr>
<td>---</td>
<td>--------------------------------------------------</td>
<td>-------</td>
</tr>
<tr>
<td>21</td>
<td>Probation Interview – Walls</td>
<td>0.0</td>
</tr>
<tr>
<td>22</td>
<td>Probation Interview – Door Frame</td>
<td>0.1</td>
</tr>
<tr>
<td>23</td>
<td>Probation Interview – Window Frame</td>
<td>0.0</td>
</tr>
<tr>
<td>24</td>
<td>Rear Entrance Foyer – Walls</td>
<td>0.2</td>
</tr>
<tr>
<td>25</td>
<td>Human Services Reception – Walls</td>
<td>0.1</td>
</tr>
<tr>
<td>26</td>
<td>Human Services Reception – Door Frame</td>
<td>0.2</td>
</tr>
<tr>
<td>27</td>
<td>Human Services Reception – Window Frame</td>
<td>-0.1</td>
</tr>
<tr>
<td>28</td>
<td>Human Services Office Area - Wall</td>
<td>0.2</td>
</tr>
<tr>
<td>29</td>
<td>Human Services Office Area – Wall</td>
<td>0.0</td>
</tr>
<tr>
<td>30</td>
<td>Human Services Office Area – Wall</td>
<td>0.1</td>
</tr>
<tr>
<td>31</td>
<td>Human Services Office Area – Wall</td>
<td>0.2</td>
</tr>
<tr>
<td>32</td>
<td>Human Services IT Room – Door</td>
<td>0.1</td>
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<tr>
<td>33</td>
<td>Human Services IT Room – Wall</td>
<td>0.2</td>
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<tr>
<td>34</td>
<td>Human Services Break Room – Wall A</td>
<td>0.3</td>
</tr>
<tr>
<td>35</td>
<td>Human Services Break Room – Wall C</td>
<td>0.1</td>
</tr>
<tr>
<td>36</td>
<td>Human Services Exterior Front Door</td>
<td>0.2</td>
</tr>
<tr>
<td>37</td>
<td>Vacant Area – Front Doorways</td>
<td>0.0</td>
</tr>
<tr>
<td>38</td>
<td>Vacant Area – Block Walls</td>
<td>0.1</td>
</tr>
<tr>
<td>39</td>
<td>Vacant Area – Drywall</td>
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<td>Vacant Area – Window Frames</td>
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<td>Vacant Area – Bathroom Walls</td>
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<td>Vacant Area – Electrical Room Walls</td>
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<td>Calibration #2 – 1.0 mg/cm²</td>
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<td>Calibration #3 – 1.0 mg/cm²</td>
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</table>
All ACM field inspection data, bulk sample Chains of Custody, and laboratory analysis results are attached in Appendix I of this report.

Respectfully Submitted:

[Signature]

Ryan Broadwater
Senior Environmental Specialist
NV5
APPENDIX I

ASBESTOS CONTAINING MATERIALS
INSPECTION DATA
### ASBESTOS ANALYSIS OF BULK MATERIALS via EPA600/R-93/116

<table>
<thead>
<tr>
<th>SAMPLE #</th>
<th>LOCATION</th>
<th>MATERIAL TYPE</th>
<th>ID CODE</th>
<th>ANALYSIS REQUESTED</th>
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</thead>
<tbody>
<tr>
<td>01 RB032818</td>
<td>Human Services Reception</td>
<td>Gypsum Paper Drywall and Associated Joint Compound - Recent Renovations</td>
<td>02</td>
<td>PLM</td>
</tr>
<tr>
<td>02 RB032818</td>
<td>Probation Offices</td>
<td>Gypsum Paper Drywall and Associated Joint Compound - Recent Renovations</td>
<td>02</td>
<td>PLM</td>
</tr>
<tr>
<td>03 RB032818</td>
<td>Probation Reception</td>
<td>1'x1' Off-White Floor Tile with Tan Mottled and Mastic</td>
<td>03</td>
<td>PLM</td>
</tr>
<tr>
<td>04 RB032818</td>
<td>Probation Holding</td>
<td>1'x1' Off-White Floor Tile with Tan Mottled and Mastic</td>
<td>03</td>
<td>PLM - TEM</td>
</tr>
<tr>
<td>05 RB032818</td>
<td>Probation Offices</td>
<td>Black 3&quot; Cove Base</td>
<td>04</td>
<td>PLM</td>
</tr>
<tr>
<td>06 RB032818</td>
<td>Probation Interview</td>
<td>Black 3&quot; Cove Base</td>
<td>04</td>
<td>PLM - TEM</td>
</tr>
<tr>
<td>07 RB032818</td>
<td>Probation Holding</td>
<td>2'x4' Suspended Ceiling Tile with Pinholes and Fissures</td>
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<td>PLM</td>
</tr>
<tr>
<td>08 RB032818</td>
<td>Probation Reception</td>
<td>2'x4' Suspended Ceiling Tile with Pinholes and Fissures</td>
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<td>PLM</td>
</tr>
<tr>
<td>09 RB032818</td>
<td>Probation Holding</td>
<td>1'x1' Light Blue Floor Tile with Mottled Pattern and Mastic</td>
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<tr>
<td>10 RB032818</td>
<td>Probation Interview</td>
<td>1'x1' Light Blue Floor Tile with Mottled Pattern and Mastic</td>
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<td>PLM - TEM</td>
</tr>
<tr>
<td>11 RB032818</td>
<td>Probation Reception</td>
<td>3&quot; Light Blue Cove Base</td>
<td>07</td>
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</tr>
<tr>
<td>12 RB032818</td>
<td>Probation Reception</td>
<td>3&quot; Light Blue Cove Base</td>
<td>07</td>
<td>PLM - TEM</td>
</tr>
</tbody>
</table>

**CHECK EACH BOX THAT APPLIES**

- [ ] TEM ANALYSIS IF NONE DETECTED BY PLM (7 Week TAT) Where Indicated *
- [ ] STOP AND FIRST POSITIVE BY HOMOGENEOUS ID/CODE
- [ ] POINT COUNT IF < 10% BY WEIGHT FOR PLM
- [ ] ANALYZE ALL LAYERS

**CHAIN OF CUSTODY RECORD (CCR)**

<table>
<thead>
<tr>
<th>RELINQUISHED BY</th>
<th>DATE</th>
<th>TIME</th>
<th>RECEIVED BY:</th>
<th>DATE</th>
<th>TIME</th>
<th>REASON FOR CCR</th>
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<tbody>
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**ADDITIONAL INSTRUCTIONS:**
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<tr>
<td>13 RB032818</td>
<td>Probation Break Room</td>
<td>Grey Sink Coating</td>
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<td>PLM</td>
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<td>Probation Break Room</td>
<td>Grey Sink Coating</td>
<td>08</td>
<td>PLM</td>
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<td>15 RB032818</td>
<td>Maintenance Shop</td>
<td>1&quot;x1&quot; Off-White Floor Tile with Tan Mottled and Mastic (Old Section)</td>
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<tr>
<td>16 RB032818</td>
<td>Rear Entry Door - Maintenance</td>
<td>1&quot;x1&quot; Off-White Floor Tile with Tan Mottled and Mastic (Old Section)</td>
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<td>17 RB032818</td>
<td>Maintenance Shop</td>
<td>Skimcoat/Joint Compound (Old Section)</td>
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<td>Rear Entry Door - Maintenance</td>
<td>Skimcoat/Joint Compound (Old Section)</td>
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<td>19 RB032818</td>
<td>Vacant Area</td>
<td>Residual Black Floor Tile Mastic (Throughout)</td>
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<td>Maintenance Shop</td>
<td>Residual Black Floor Tile Mastic (Throughout)</td>
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<tr>
<td>21 RB032818</td>
<td>Human Services</td>
<td>Dark Grey 3&quot; Cove Base</td>
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<td>22 RB032818</td>
<td>Human Services</td>
<td>Dark Grey 3&quot; Cove Base</td>
<td>12</td>
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<tr>
<td>23 RB032818</td>
<td>Human Services - IT Room</td>
<td>1&quot;x1&quot; Dark Blue Floor Tile with Mottled Pattern and Mastic</td>
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<td>PLM</td>
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<td>24 RB032818</td>
<td>Human Services - IT Room</td>
<td>1&quot;x1&quot; Dark Blue Floor Tile with Mottled Pattern and Mastic</td>
<td>13</td>
<td>PLM - TEM</td>
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CHECK EACH BOX THAT APPLIES

☐ TEM ANALYSIS IF NONE DETECTED BY PLM (.1 Week TAT) Where Indicated
☐ STOP AND FIRST POSITIVE BY HOMOGENEOUS ID/CODE
☐ POINT COUNT IF < 10% BY WEIGHT FOR PLM
☐ ANALYZE ALL LAYERS

CHAIN OF CUSTODY RECORD (CCR)

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<th>TIME</th>
<th>RECEIVED BY</th>
<th>DATE</th>
<th>TIME</th>
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ADDITIONAL INSTRUCTIONS:________________________________________________________
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<td>1'x1' Light Blue Floor Tile with Blue Mottled Pattern and Mastic</td>
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<td>Lobby – Human Services</td>
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<td>27 RB032818</td>
<td>Vacant Areas</td>
<td>Gypsum Paper Drywall and Associated Joint Compound – Vacant Areas</td>
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<td>PLM</td>
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<td>Vacant Areas</td>
<td>Gypsum Paper Drywall and Associated Joint Compound – Vacant Areas</td>
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<td>Green Flooring/Leveling Compound</td>
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<td>31 RB032818</td>
<td>Vacant Areas</td>
<td>1'x1' Light Blue Floor Tile with Spotted Pattern and Mastic</td>
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<td>Vacant Areas</td>
<td>3&quot; Dark Blue Cove Base</td>
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<td>PLM - TEM</td>
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<td>35 RB032818</td>
<td>Vacant Areas</td>
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<td>Black Antiskid Flooring</td>
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**CHECK EACH BOX THAT APPLIES**

- TEM ANALYSIS IF NONE DETECTED BY PLM (.1 Week TAT) Where Indicated
- 24 HOUR TAT
- STOP AND FIRST POSITIVE BY HOMOGENEOUS ID/CODE
- 48 HOUR TAT
- POINT COUNT IF < 10% BY WEIGHT FOR PLM
- OTHER 72 HOUR
- ANALYZE ALL LAYERS

**CHAIN OF CUSTODY RECORD (CCR)**

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<th>TIME</th>
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<td>3/28/18</td>
<td>7:30 am</td>
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**ADDITIONAL INSTRUCTIONS:**
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<td>37 RB032818</td>
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<td>Vacant Areas</td>
<td>Panel Mastic</td>
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**CHECK EACH BOX THAT APPLIES**

- TEM ANALYSIS IF NONE DETECTED BY PLM (_1 Week TAT_) Where Indicated *
- STOP AND FIRST POSITIVE BY HOMOGENEOUS ID/CODE
- POINT COUNT IF < 10% BY WEIGHT FOR PLM
- ANALYZE ALL LAYERS

**CHAIN OF CUSTODY RECORD (CCR)**

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**ADDITIONAL INSTRUCTIONS:**
# Summary Test Report for Asbestos Analysis in Accordance with N.J.A.C. 8:60 and 12:120 via EPA 600/R-93/116

**Client Sample ID:** 01-RB032818-Gypsum Paper Drywall  
**Sample Description:** Human Services Reception - Recent Renovations/Gypsum Paper Drywall

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<tr>
<th>TEST</th>
<th>Analyzed Date</th>
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<th>Non-Asbestos</th>
<th>Asbestos</th>
<th>Comment</th>
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</thead>
<tbody>
<tr>
<td>PLM</td>
<td>3/26/2018</td>
<td>Brown/White</td>
<td>20%</td>
<td>80%</td>
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**Client Sample ID:** 01-RB032819-Joint Compound  
**Sample Description:** Human Services Reception - Recent Renovations/Joint Compound

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<th>Color</th>
<th>Non-Asbestos</th>
<th>Asbestos</th>
<th>Comment</th>
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<tbody>
<tr>
<td>PLM</td>
<td>3/29/2018</td>
<td>White</td>
<td>0%</td>
<td>100%</td>
<td>None Detected</td>
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**Client Sample ID:** 02-RB032818-Gypsum Paper Drywall  
**Sample Description:** Probation Offices/Gypsum Paper Drywall

<table>
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<tr>
<th>TEST</th>
<th>Analyzed Date</th>
<th>Color</th>
<th>Non-Asbestos</th>
<th>Asbestos</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>PLM</td>
<td>3/29/2018</td>
<td>Brown/White</td>
<td>20%</td>
<td>80%</td>
<td>None Detected</td>
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**Client Sample ID:** 02-RB032819-Joint Compound  
**Sample Description:** Probation Offices/Joint Compound

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<th>Asbestos</th>
<th>Comment</th>
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<tr>
<td>PLM</td>
<td>3/29/2018</td>
<td>White</td>
<td>0%</td>
<td>100%</td>
<td>None Detected</td>
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**Client Sample ID:** 03-RB032818-Floor Tile  
**Sample Description:** Probation Reception/1'x1' Off White Floor Tile with Tan Mottled

<table>
<thead>
<tr>
<th>TEST</th>
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<th>Color</th>
<th>Non-Asbestos</th>
<th>Asbestos</th>
<th>Comment</th>
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</thead>
<tbody>
<tr>
<td>PLM</td>
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<td>Tan/White</td>
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**Client Sample ID:** 03-RB032818-Mastic  
**Sample Description:** Probation Reception/Mastic

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<tr>
<th>TEST</th>
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<th>Color</th>
<th>Non-Asbestos</th>
<th>Asbestos</th>
<th>Comment</th>
</tr>
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<tbody>
<tr>
<td>PLM</td>
<td>3/29/2018</td>
<td>Black</td>
<td>0%</td>
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<td>None Detected</td>
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</table>

**Client Sample ID:** 04-RB032818-Floor Tile  
**Sample Description:** Probation Holding/1'x1' Off White Floor Tile with Tan Mottled

<table>
<thead>
<tr>
<th>TEST</th>
<th>Analyzed Date</th>
<th>Color</th>
<th>Non-Asbestos</th>
<th>Asbestos</th>
<th>Comment</th>
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<tbody>
<tr>
<td>PLM</td>
<td>3/29/2018</td>
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<td>TEM</td>
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<td>Tan/White</td>
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# Summary Test Report for Asbestos Analysis in Accordance with N.J.A.C. 8:80 and 12:120

via EPA 600/R-93/116

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<tr>
<td>05-RB032818-Cove Base</td>
<td>041899180-0005</td>
<td>Probation Offices/Black 3° Cove Base</td>
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<tr>
<td>06-RB032818-Cove Base</td>
<td>041899180-0006</td>
<td>Probation Interview/Black 3° Cove Base</td>
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<tr>
<td>07-RB032818</td>
<td>041899180-0007</td>
<td>Probation Holding/2'x4' Suspended Ceiling Tile with Pinholes &amp; Fissures</td>
</tr>
<tr>
<td>08-RB032818</td>
<td>041899180-0008</td>
<td>Probation Reception/2'x4' Suspended Ceiling Tile with Pinholes &amp; Fissures</td>
</tr>
<tr>
<td>09-RB032818-Floor Tile</td>
<td>041899180-0009</td>
<td>Probation Holding/1'x1' Light Blue Floor tile with Mottled Pattern</td>
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Test Report:EMSLTests-7.32.2.D Printed: 4/05/2018 07:15PM
## Summary Test Report for Asbestos Analysis in Accordance with N.J.A.C. 8:60 and 12:120 via EPA 600/R-93/116

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Summary Test Report for Asbestos Analysis in Accordance with N.J.A.C. 8:60 and 12:120 via EPA 600/R-93/116

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Summary Test Report for Asbestos Analysis in Accordance with N.J.A.C. 8:60 and 12:120 via EPA 600/R-93/116

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## Summary Test Report for Asbestos Analysis in Accordance with N.J.A.C. 8:60 and 12:120 via EPA 600/R-93/116

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</thead>
<tbody>
<tr>
<td>Sample Description:</td>
<td>Human Services - IT Room/Mastic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TEST</td>
<td>Analyzed Date</td>
<td>Color</td>
<td>Non-Asbestos</td>
</tr>
<tr>
<td>PLM</td>
<td>3/29/2018</td>
<td>Black</td>
<td>0%</td>
</tr>
<tr>
<td>TEM Grav. Reduction</td>
<td>4/05/2018</td>
<td>Black</td>
<td>0.0%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Client Sample ID:</th>
<th>25-RB032818-Floor Tile</th>
<th>Lab Sample ID:</th>
<th>041809180-0025</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample Description:</td>
<td>Hallway - Human Services/1'x1' Light Blue Floor Tile with Blue Mottled Pattern</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TEST</td>
<td>Analyzed Date</td>
<td>Color</td>
<td>Non-Asbestos</td>
</tr>
<tr>
<td>PLM</td>
<td>3/29/2018</td>
<td>Blue</td>
<td>0%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Client Sample ID:</th>
<th>25-RB032818-Mastic</th>
<th>Lab Sample ID:</th>
<th>041809180-0025A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample Description:</td>
<td>Break Room - Human Services/Mastic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TEST</td>
<td>Analyzed Date</td>
<td>Color</td>
<td>Non-Asbestos</td>
</tr>
<tr>
<td>PLM</td>
<td>3/29/2018</td>
<td>Black</td>
<td>0%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Client Sample ID:</th>
<th>26-RB032818-Floor Tile</th>
<th>Lab Sample ID:</th>
<th>041809180-0026</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample Description:</td>
<td>Lobby - Human Services/1'x1' Light Blue Floor Tile with Blue Mottled Pattern</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TEST</td>
<td>Analyzed Date</td>
<td>Color</td>
<td>Non-Asbestos</td>
</tr>
<tr>
<td>PLM</td>
<td>3/29/2018</td>
<td>Blue</td>
<td>0%</td>
</tr>
<tr>
<td>TEM Grav. Reduction</td>
<td>4/06/2018</td>
<td>Blue</td>
<td>0.0%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Client Sample ID:</th>
<th>26-RB032818-Mastic</th>
<th>Lab Sample ID:</th>
<th>041809180-0026A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample Description:</td>
<td>Lobby - Human Services/Mastic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TEST</td>
<td>Analyzed Date</td>
<td>Color</td>
<td>Non-Asbestos</td>
</tr>
<tr>
<td>PLM</td>
<td>3/29/2018</td>
<td>Positive Stop (Not Analyzed)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Client Sample ID:</th>
<th>27-RB032818-Gypsum Paper Drywall</th>
<th>Lab Sample ID:</th>
<th>041809180-0027</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample Description:</td>
<td>Vacant Areas/Gypsum Paper Drywall</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TEST</td>
<td>Analyzed Date</td>
<td>Color</td>
<td>Non-Asbestos</td>
</tr>
<tr>
<td>PLM</td>
<td>3/29/2018</td>
<td>Brown/White</td>
<td>20%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Client Sample ID:</th>
<th>27-RB032818-Joint Compound</th>
<th>Lab Sample ID:</th>
<th>041809180-0027A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample Description:</td>
<td>Vacant Areas/Joint Compound</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TEST</td>
<td>Analyzed Date</td>
<td>Color</td>
<td>Non-Asbestos</td>
</tr>
<tr>
<td>PLM</td>
<td>3/29/2018</td>
<td>White</td>
<td>0%</td>
</tr>
</tbody>
</table>
### Summary Test Report for Asbestos Analysis in Accordance with N.J.A.C. 8:60 and 12:120 via EPA 600/R-93/116

**Client Sample ID:** 28-RB032818-Gypsum Paper Drywall  
**Sample Description:** Vacant Areas/Gypsum Paper Drywall

<table>
<thead>
<tr>
<th>TEST</th>
<th>Analyzed Date</th>
<th>Color</th>
<th>Non-Asbestos</th>
<th>Asbestos</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>PLM</td>
<td>3/29/2018</td>
<td>Brown/White</td>
<td>20%</td>
<td>80%</td>
<td>None Detected</td>
</tr>
</tbody>
</table>

**Client Sample ID:** 28-RB032819-Joint Compound  
**Sample Description:** Vacant Areas/Joint Compound

<table>
<thead>
<tr>
<th>TEST</th>
<th>Analyzed Date</th>
<th>Color</th>
<th>Non-Asbestos</th>
<th>Asbestos</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>PLM</td>
<td>3/29/2018</td>
<td>White</td>
<td>0%</td>
<td>100%</td>
<td>None Detected</td>
</tr>
</tbody>
</table>

**Client Sample ID:** 31-RB032818-Floor Tile  
**Sample Description:** Vacant Areas/1'x1' Light Blue Floor Tile with Spotted Pattern

<table>
<thead>
<tr>
<th>TEST</th>
<th>Analyzed Date</th>
<th>Color</th>
<th>Non-Asbestos</th>
<th>Asbestos</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>PLM</td>
<td>3/29/2018</td>
<td>Blue</td>
<td>0%</td>
<td>100%</td>
<td>None Detected</td>
</tr>
</tbody>
</table>

**Client Sample ID:** 31-RB032818-Mastic  
**Sample Description:** Vacant Areas/Mastic

<table>
<thead>
<tr>
<th>TEST</th>
<th>Analyzed Date</th>
<th>Color</th>
<th>Non-Asbestos</th>
<th>Asbestos</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>PLM</td>
<td>3/29/2018</td>
<td>Black</td>
<td>0%</td>
<td>100%</td>
<td>None Detected</td>
</tr>
</tbody>
</table>

**Client Sample ID:** 32-RB032818-Floor Tile  
**Sample Description:** Vacant Areas/1'x1' Light Blue Floor Tile with Spotted Pattern

<table>
<thead>
<tr>
<th>TEST</th>
<th>Analyzed Date</th>
<th>Color</th>
<th>Non-Asbestos</th>
<th>Asbestos</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>PLM</td>
<td>3/29/2018</td>
<td>Blue</td>
<td>0%</td>
<td>100%</td>
<td>None Detected</td>
</tr>
<tr>
<td>TEM Grav. Reduction</td>
<td>4/06/2018</td>
<td>Blue</td>
<td>0.0%</td>
<td>100%</td>
<td>None Detected</td>
</tr>
</tbody>
</table>

**Client Sample ID:** 32-RB032818-Mastic  
**Sample Description:** Vacant Areas/Mastic

<table>
<thead>
<tr>
<th>TEST</th>
<th>Analyzed Date</th>
<th>Color</th>
<th>Non-Asbestos</th>
<th>Asbestos</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>PLM</td>
<td>3/29/2018</td>
<td>Black</td>
<td>0%</td>
<td>100%</td>
<td>None Detected</td>
</tr>
<tr>
<td>TEM Grav. Reduction</td>
<td>4/06/2018</td>
<td>Black</td>
<td>0%</td>
<td>100%</td>
<td>Insufficient Material</td>
</tr>
</tbody>
</table>
Summary Test Report for Asbestos Analysis in Accordance with N.J.A.C. 8:60 and 12:120
via EPA 600/R-93/116

<table>
<thead>
<tr>
<th>Client Sample ID</th>
<th>Sample Description</th>
<th>Lab Sample ID</th>
</tr>
</thead>
<tbody>
<tr>
<td>33-RB032818-Cove Base</td>
<td>Vacant Areas/3&quot; Dark Blue Cove Base</td>
<td>041809180-0033</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TEST</th>
<th>Analyzed Date</th>
<th>Color</th>
<th>Non-Asbestos Fibrous</th>
<th>Non-Asbestos Non-Fibrous</th>
<th>Asbestos</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>PLM</td>
<td>3/29/2018</td>
<td>Blue</td>
<td>0%</td>
<td>100%</td>
<td>None Detected</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Client Sample ID</th>
<th>Sample Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>33-RB032818-Mastic</td>
<td>Vacant Areas/Mastic</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TEST</th>
<th>Analyzed Date</th>
<th>Color</th>
<th>Non-Asbestos Fibrous</th>
<th>Non-Asbestos Non-Fibrous</th>
<th>Asbestos</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>PLM</td>
<td>3/23/2018</td>
<td>Tan</td>
<td>0%</td>
<td>100%</td>
<td>None Detected</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Client Sample ID</th>
<th>Sample Description</th>
<th>Lab Sample ID</th>
</tr>
</thead>
<tbody>
<tr>
<td>34-RB032818-Cove Base</td>
<td>Vacant Areas/3&quot; Dark Blue Cove Base</td>
<td>041809180-0034</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TEST</th>
<th>Analyzed Date</th>
<th>Color</th>
<th>Non-Asbestos Fibrous</th>
<th>Non-Asbestos Non-Fibrous</th>
<th>Asbestos</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>PLM</td>
<td>3/30/2018</td>
<td>Blue</td>
<td>0%</td>
<td>100%</td>
<td>None Detected</td>
<td></td>
</tr>
<tr>
<td>TEM Grav. Reduction</td>
<td>4/05/2018</td>
<td>Blue</td>
<td>6.0%</td>
<td>100%</td>
<td>None Detected</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Client Sample ID</th>
<th>Sample Description</th>
<th>Lab Sample ID</th>
</tr>
</thead>
<tbody>
<tr>
<td>34-RB032818-Mastic</td>
<td>Vacant Areas/Mastic</td>
<td>041809180-0034A</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
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<th>Analyzed Date</th>
<th>Color</th>
<th>Non-Asbestos Fibrous</th>
<th>Non-Asbestos Non-Fibrous</th>
<th>Asbestos</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>PLM</td>
<td>3/30/2018</td>
<td>Tan</td>
<td>0%</td>
<td>100%</td>
<td>None Detected</td>
<td></td>
</tr>
<tr>
<td>TEM Grav. Reduction</td>
<td>4/05/2018</td>
<td>Tan</td>
<td>6.0%</td>
<td>100%</td>
<td>None Detected</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Client Sample ID</th>
<th>Sample Description</th>
<th>Lab Sample ID</th>
</tr>
</thead>
<tbody>
<tr>
<td>35-RB032818-Flooring</td>
<td>Vacant Areas/Black Anti-skid Flooring</td>
<td>041809180-0035</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TEST</th>
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<th>Color</th>
<th>Non-Asbestos Fibrous</th>
<th>Non-Asbestos Non-Fibrous</th>
<th>Asbestos</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>PLM</td>
<td>3/29/2018</td>
<td>Black</td>
<td>0%</td>
<td>100%</td>
<td>None Detected</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Client Sample ID</th>
<th>Sample Description</th>
<th>Lab Sample ID</th>
</tr>
</thead>
<tbody>
<tr>
<td>35-RB032818-Mastic</td>
<td>Vacant Areas/Black Anti-skid Flooring</td>
<td>041809180-0035A</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TEST</th>
<th>Analyzed Date</th>
<th>Color</th>
<th>Non-Asbestos Fibrous</th>
<th>Non-Asbestos Non-Fibrous</th>
<th>Asbestos</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>PLM</td>
<td>3/30/2018</td>
<td>Yellow</td>
<td>0%</td>
<td>100%</td>
<td>None Detected</td>
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</table>

<table>
<thead>
<tr>
<th>Client Sample ID</th>
<th>Sample Description</th>
<th>Lab Sample ID</th>
</tr>
</thead>
<tbody>
<tr>
<td>36-RB032818</td>
<td>Vacant Areas/Black Anti-skid Flooring</td>
<td>041809180-0036</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TEST</th>
<th>Analyzed Date</th>
<th>Color</th>
<th>Non-Asbestos Fibrous</th>
<th>Non-Asbestos Non-Fibrous</th>
<th>Asbestos</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>PLM</td>
<td>3/30/2018</td>
<td>Black</td>
<td>0%</td>
<td>100%</td>
<td>None Detected</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Client Sample ID</th>
<th>Sample Description</th>
<th>Lab Sample ID</th>
</tr>
</thead>
<tbody>
<tr>
<td>37-RB032818</td>
<td>Vacant Areas/Panel Mastic</td>
<td>041809180-0037</td>
</tr>
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</table>

<table>
<thead>
<tr>
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<th>Analyzed Date</th>
<th>Color</th>
<th>Non-Asbestos Fibrous</th>
<th>Non-Asbestos Non-Fibrous</th>
<th>Asbestos</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>PLM</td>
<td>3/29/2018</td>
<td>Tan</td>
<td>0%</td>
<td>100%</td>
<td>None Detected</td>
<td></td>
</tr>
</tbody>
</table>

Summary Test Report for Asbestos Analysis in Accordance with N.J.A.C. 8:60 and 12:120 via EPA 600/R-93/116

<table>
<thead>
<tr>
<th>TEST</th>
<th>Analyzed Date</th>
<th>Color</th>
<th>Non-Asbestos Fibrous</th>
<th>Non-Asbestos Non-Fibrous</th>
<th>Asbestos</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>PLM</td>
<td>3/30/2016</td>
<td>Tan</td>
<td>0%</td>
<td>100%</td>
<td>None Detected</td>
<td></td>
</tr>
<tr>
<td>TEM Grav. Reduction</td>
<td>4/05/2016</td>
<td>Tan</td>
<td>0.0%</td>
<td>100%</td>
<td>None Detected</td>
<td></td>
</tr>
</tbody>
</table>

Analyst(s):

John Flanagan PLM (29)
Natalia Dispensa PLM (32)
Sarah Richey TEM Grav. Reduction (18)

Reviewed and approved by:

Benjamin Ellis, Laboratory Manager
or Other Approved Signatory

EMSL maintains liability limited to cost of analysis. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. This test report must not be used to claim product endorsement by NVLAP or any agency of the U.S. Government. EMSL bears no responsibility for sample collection activities or analytical method limitations. The laboratory is not responsible for the accuracy of results when requested to physically separate and analyze layered samples. PLM alone is not consistently reliable in detecting asbestos in floor coverings and similar NOBs.

Samples analyzed by EMSL Analytical, Inc. Cinnaminson, NJ NVLAP Lab Code 101048-0, AIHA-LAP, LLC-IHLAF Lab 100194, NYS ELAP 10872, NJ DEP 03036

Initial report time: 03/30/2018 03:19
Test Report: EMA MultiTests-7.32.2.0 D Printed: 04/05/2018 07:15PM
ASBESTOS CORE TEST

Prepared especially for:

COUNTY OF MONMOUTH

April 08, 2013
ASBESTOS CORE TESTING

Asbestos Core Testing represents the state of the art laboratory analysis for asbestos in roofing materials. The results of this analysis are based on findings derived from extensive laboratory analysis of individual roof core samples. Tremco accepts no liability or responsibility for any cost associated with asbestos contained materials which were not sampled or analyzed for asbestos content for inclusion in this report. The laboratory (NVLAP LAB Code 200887-0) is accredited by the by the U.S. Department of Commerce, National Institute of Standards and Technology, National Voluntary Laboratory Accreditation Program (NVLAP) to provide Asbestos fiber analysis by the NVLAP Test Method Code 18/A01 - Test Method Designation: 40 Code of Federal Regulations Chapter I (1-1-87 edition) Part 763, Subpart F, Appendix A, Pages 292-299 of the current U.S. Environmental Protection Agency method for the analysis of asbestos in building materials by polarized light microscopy. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST or any agency of the United States Government.

The presence of asbestos in your roofing system may have significant consequences for any actions planned in the future of your roofing system. The impact may not only be performance related but may be due to the regulations concerning the presence and handling of asbestos in your facility's structure. It is important that you be aware of legal ramifications of asbestos in your roofing system before any work is planned.
ACT ANALYTICAL REPORT FOR COUNTY OF MONMOUTH
ASBESTOS CORE TESTING

Core: Seaview Bldg., Bottom Roof
Identification Number: 30791H058

NVLAP Test Code: 18/A0f
NVLAP Lab Code: 200887-0
Test Method: EPA/600/R-93/116 & EPA-600/M4-82-020

<table>
<thead>
<tr>
<th>Layer</th>
<th>Color</th>
<th>Asbestos</th>
<th>Other Fibrous</th>
<th>Nonfibrous</th>
</tr>
</thead>
<tbody>
<tr>
<td>One</td>
<td>black</td>
<td>None Detected</td>
<td>Cellulose</td>
<td>90 Binder</td>
</tr>
<tr>
<td>Two</td>
<td>black</td>
<td>None Detected</td>
<td>Cellulose</td>
<td>90 Binder</td>
</tr>
<tr>
<td>Three</td>
<td>black</td>
<td>None Detected</td>
<td>Cellulose</td>
<td>90 Binder</td>
</tr>
<tr>
<td>Four</td>
<td>black</td>
<td>None Detected</td>
<td>Cellulose</td>
<td>90 Binder</td>
</tr>
<tr>
<td>MASTIC</td>
<td></td>
<td>None Detected</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td>None Detected</td>
<td>Cellulose</td>
<td>10 Coal Tar</td>
</tr>
</tbody>
</table>

Notice: The results of this analysis are based on findings determined from laboratory analysis of individual roof core samples and include the inherent uncertainty of measurement for estimating percentages by polarized light microscopy. Tremco accepts no liability or responsibility for any costs associated with asbestos containing material which were not sampled or analyzed for asbestos content for inclusion in this report. The results relate only to the items tested; and the report shall not be reproduced except in full, without written approval of the laboratory.

APPROVED: [Signature] DATE: 4/13/13

3 of 4
# ACT ANALYTICAL REPORT FOR COUNTY OF MONMOUTH

## ASBESTOS CORE TESTING

<table>
<thead>
<tr>
<th>Layer</th>
<th>Color</th>
<th>Asbestos Type, %</th>
<th>Other Fibrous Type, %</th>
<th>Nonfibrous Type, %</th>
</tr>
</thead>
<tbody>
<tr>
<td>One</td>
<td>white</td>
<td>None Detected</td>
<td>Fiberglass 95</td>
<td>Binder 5</td>
</tr>
<tr>
<td>Two</td>
<td>white</td>
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<td>Fiberglass 95</td>
<td>Binder 5</td>
</tr>
<tr>
<td>Three</td>
<td>white</td>
<td>None Detected</td>
<td>Fiberglass 95</td>
<td>Binder 5</td>
</tr>
<tr>
<td>Four</td>
<td>white</td>
<td>None Detected</td>
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<td>white</td>
<td>None Detected</td>
<td>Fiberglass 95</td>
<td>Binder 5</td>
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<tr>
<td>MASTIC</td>
<td></td>
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Notice: The results of this analysis are based on findings determined from laboratory analysis of individual roof core samples and include the inherent uncertainty of measurement for estimating percentages by polarized light microscopy. Tremco accepts no liability or responsibility for any costs associated with asbestos containing material which were not sampled or analyzed for asbestos content for inclusion in this report. The result relate only to the items tested; and the report shall not be reproduced except in full, without written approval of the laboratory.

APPROVED: [Signature]  
DATE: 4/8/17
Certificate of Accreditation to ISO/IEC 17025:2005

Trenoico, Inc.-Roofing Division, An RPM Company
Beachwood, OH

NVLAP CODE: 2008870-0

Bulk 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-IACAF Communiqué-4 effective dates

Effective dates
2012-10-01 through 2013-09-30

For the National Institute of Standards and Technology

[Signature]

NVLAP-41C (REV. 2008-01-20)
SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005

Tremco, Inc.- Roofing Division, An RPM Company
3735 Green Road
Beachwood, OH 44122
Mr. Edward Buczek
Phone: 216-292-5054  Fax:
E-Mail: ebuczek@tremcoinc.com

BULK ASBESTOS FIBER ANALYSIS (PLM)  NVLAP LAB CODE  200887-0

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2012-10-01 through 2013-09-30

For the National Institute of Standards and Technology

Page 1 of 1
APPENDIX - I:
BUILDING ENVELOPE PHOTOGRAPHS

PHOTO NO. 1 – FAILING EXPANSION JOINT FILLER

PHOTO NO. 2 – FAILING EXPANSION JOINT FILLER
PHOTO NO. 3 – IMPROPER BASE TERMINATION OF EFIS

PHOTO NO. 4 – SAMPLE OF CRACKING & DAMAGE TO EFIS SYSTEM
PHOTO NO.5 – STAINING OF EFIS FROM FAULTY GUTTERS

PHOTO NO.6 – RUSTING DOOR FRAME & IMPROPER EFIS BASE TERMINATION
APPENDIX II

CERTIFICATIONS/ACCREDITATIONS
RYAN BROADWATER
NEW YORK STATE/USEPA ASBESTOS BUILDING INSPECTOR
LICENSE NUMBER 03-06118
EXPIRES 06-30-2018
Certificate of Accreditation to ISO/IEC 17025:2005

NVLAP LAB CODE: 101048-0

EMSL Analytical, Inc.
Cinnaminson, NJ

is accredited by the National Voluntary Laboratory Accreditation Program for specific services, listed on the Scope of Accreditation, for:

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-ILAC-IAF Communique dated January 2009).

2017-07-01 through 2018-06-30
Effective Dates

For the National Voluntary Laboratory Accreditation Program
RYAN BROADWATER
NEW JERSEY DEPARTMENT OF HEALTH
LEAD INSPECTOR/RISK ASSESSOR
PERMIT NO: 031866
EXPIRES 01/31/2019
SECTION 323113 – CHAIN LINK FENCING

PART 1 – GENERAL

1.1 SUMMARY

A. Section Includes:
1. Fence framework, fabric, and accessories.
2. Excavation for post bases.
3. Concrete foundation for posts and center drop for gates.
5. Privacy slats.

1.2 REFERENCES

A. American Society for Testing and Materials:
1. ASTM A121 - Standard Specification for Zinc-Coated (Galvanized) Steel Barbed Wire.
6. ASTM A569/A569M - Standard Specification for Steel, Carbon (0.15 Maximum, Percent), Hot-Rolled Sheet and Strip Commercial Quality.

B. Chain Link Fence Manufacturers Institute:
1. CLFMI - Product Manual.
1.3 SYSTEM DESCRIPTION

A. Fence Height as indicated on Drawings.
B. Line Post Spacing: At intervals not exceeding 10 feet.
C. Fence Post and Rail Strength: Conform to ASTM F1043 quality.

1.4 SUBMITTALS

A. Section 013000 - Submittal Procedures: Requirements for submittals.
B. Shop Drawings: Indicate plan layout, spacing of components, post foundation dimensions, hardware anchorage, gates, and schedule of components.
C. Product Data: Submit data on fabric, posts, accessories, fittings and hardware.
D. Manufacturer's Installation Instructions: Submit installation requirements and post foundation anchor bolt templates.

1.5 CLOSEOUT SUBMITTALS

A. Section 017000 - Execution Requirements: Closeout procedures.
B. Project Record Documents: Accurately record actual locations of property perimeter posts relative to property lines and easements.
C. Operation and Maintenance Data: Procedures for submittals.

1.6 QUALITY ASSURANCE

A. Supply material in accordance with CLFMI - Product Manual.
B. Perform installation in accordance with ASTM F567.

1.7 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum three years documented experience.
B. Installer: Company specializing in performing work of this section with minimum three years documented experience approved by manufacturer.
1.8 DELIVERY, STORAGE AND HANDLING

A. Section 016000 – Material and Equipment: Requirements for transporting, handling, storing, and protecting products.

B. Deliver fence fabric and accessories in packed cartons or firmly tied rolls.

C. Identify each package with manufacturer’s name.

D. Store fence fabric and accessories in secure and dry place.

Part 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers:
   1. Anchor Fence Inc.
   2. Cyclone Inc.
   3. Page Aluminized Steel Corp.

2.2 MATERIALS AND COMPONENTS

A. Materials and Components: Conform to CLFMI Product Manual.

B. Fabric Size: CLFMI Heavy Strength service.

C. Intermediate Posts: Type I round.

D. Terminal, Corner, Rail, Brace, and Gate Posts: Type I round.

2.3 ACCESSORIES

A. Caps: Aluminum alloy; sized to post diameter, set screw retainer.

B. Fittings: Sleeves, bands, clips, rail ends, tension bars, fasteners and fittings; galvanized steel.

C. Gate Hardware: Fork latch with gravity drop or center gate stop and drop rod; two 180 degree gate hinges for each leaf and hardware for padlock keyed to match hardware specified in Section 08710.
2.4 GATES

A. General:
   1. Gate Types, Opening Widths and Directions of Operation: As indicated on Drawings.
   2. Factory assemble gates.
   3. Conform to requirements specified for PVC coated steel chain link fence except that PVC coated aluminum alloy framing conforming to ASTM B429 may be used.
   4. Design gates for operation by one person.

B. Swing Gates:
   1. Fabricate gates to permit 180 degree swing.
   2. Gates Construction: ASTM F900 with welded corners. Use of corner fittings is not permitted.

2.5 PRIVACY SLATS

A. Privacy Slats: Vinyl strips, flat configuration, sized to fit fence fabric, color as selected by owner.

2.6 FINISHES

A. Components and Fabric: Vinyl coating, dark green color in accordance with ASTM F934 as selected over coating of 1.8 oz/sq ft galvanizing.

B. Vinyl Components: Color to match fabric as selected.

C. Hardware: Galvanized to ASTM A153/A153M, 1.8 oz/sq ft coating.

D. Accessories: Same finish as framing.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install framework, fabric, accessories and gates in accordance with ASTM F567.

B. Set intermediate, terminal, gate, and posts plumb, in concrete footings with top of footing 6 inches (150 mm) below finish grade. Slope top of concrete for water runoff.

C. Line Post Footing Depth Below Finish Grade: ASTM F567.

D. Corner, Gate and Terminal Post Footing Depth Below Finish Grade: ASTM F567.

E. Brace each gate and corner post to adjacent line post with horizontal center brace rail and diagonal truss rods. Install brace rail one bay from end and gate posts.
F. Install top rail through line post tops and splice with 6 inch long rail sleeves.

G. Install center and bottom brace rail on corner gate leaves.

H. Place fabric on outside of posts and rails.

I. Do not stretch fabric until concrete foundation has cured 28 days.

J. Stretch fabric between terminal posts or at intervals of 100 feet (30 m) maximum, whichever is less.

K. Position bottom of fabric 2 inches above finished grade.

L. Fasten fabric to top rail, line posts, braces, and bottom tension wire with tie wire at maximum 15 inches (380 mm) on centers.

M. Attach fabric to end, corner, and gate posts with tension bars and tension bar clips.

N. Install bottom tension strap stretched taut between terminal posts.

O. Install support arms sloped inward and attach barbed wire; tension and secure.

P. Support gates from gate posts. Do not attach hinged side of gate from building wall.

Q. Install gate with fabric to match fence. Install three hinges on each gate leaf, latch, catches, drop bolt foot bolts and sockets torsion spring retainer and retainer and locking clamp.

R. Provide concrete center drop to footing depth and drop rod retainers at center of double gate openings.

S. Install posts with 6 inches (150 mm) maximum clear opening from end posts to buildings, fences and other structures.

T. Excavate holes for posts to diameter and spacing indicated on Drawings without disturbing underlying materials.

U. Center and align posts. Place concrete around posts, and vibrate or tamp for consolidation. Verify vertical and top alignment of posts and make necessary corrections.

V. Extend concrete footings 1 inches (25 mm) above grade, and trowel, forming crown to shed water.

W. Allow footings to cure minimum 7 days before installing fabric and other materials attached to posts.

### 3.2 PRIVACY SLATS

A. Install slat inserts in vertical or diagonal pattern woven through fence fabric.

B. Fasten slats according to manufacturers instructions.
3.3 ERECTION TOLERANCES

A. Maximum Variation From Plumb: 1/4 inch.

B. Maximum Offset From Indicated Position: 1 inch.

C. Minimum distance from property line: 6 inches.

END OF SECTION 323113
SECTION 270001- CONSTRUCTION ADMINISTRATION FOR COMMUNICATIONS WORK

PART 1 - GENERAL

1.1 GENERAL

A. This Section contains requirements for Construction Administration of Communications work. These requirements are in addition to any requirements listed elsewhere in the Contract Documents. Where conflicts exist between this section and other sections, the more stringent requirement shall apply.

1.2 SECTION INCLUDES

A. Coordination drawings
B. As-built drawings
C. Requests for Information (RFI)
D. Schedule of Values
E. Equipment Manufacturer List
F. Shop Drawing (Submittal) Schedule
G. Shop Drawings (Submittals)
H. Substitutions
I. Service Interruption Schedule
J. Operations & Maintenance Manuals
K. Record Drawings
L. Substantial Completion
M. Punchlist Request
N. Appendix A – Construction Administration Forms
   1. Request for Information (RFI) - Example
   2. Shop Drawing Submission Schedule - Example
   3. Shop Drawing Submission Form / Transmittal – Example
   4. Substantial Completion Notification - Example
   5. Punchlist Completion Notification – Example
1.3 RELATED REQUIREMENTS

A. See Section 01 3000 - Administrative Requirements for submittal procedures

1.4 COORDINATION DRAWINGS

A. Definition:

1. Contractor-prepared drawings submitted by Contractor to Owner to demonstrate: (1) The coordination of methods, materials, equipment, systems, plans, or sequence the Contractor proposes to use for installation of different components within the architectural, structural, civil and environmental envelope; (2) The coordination required for installation of Products and materials Fabricated by separate entities; and (3) The relationship of components shown on separate Shop Drawings or Submittals, when coordination among these components is required.

B. Contract Documents

1. Documents are diagrammatic in nature with respect to mechanical, electrical, plumbing, fire protection, specialty systems (medical/industrial gasses, compressed air, etc.), and related low voltage (life safety and non-life safety) systems. Not every bend, offset and direction change is shown in the Contract Documents. The Contract Documents represent that these systems will fit in the spaces allotted; however, it is the responsibility of the Contractor to assign space priorities, lay out and route the systems so they will fit efficiently in the allotted spaces and allow for convenient and code-conforming access and maintenance space to all valves, dampers, filters, panels and other devices.

2. Layout of utility rooms is also diagrammatic in nature. The Contract Documents represent that that equipment identified to be installed in utility rooms will fit in the spaces allotted. However, because the Contractor must submit and provide for equipment to be installed in utility rooms, it is the Contractor’s responsibility to lay-out the equipment room such that all equipment will fit.

3. The Contractor must examine all of the Contract drawings, especially architectural for ceiling space dimensions, and structural for beam/column obstructions, and make allowances in the Contractor’s planned coordination efforts, work sequence, and routing of the systems.

4. Routing shown for pipes, ducts, and conduits on Drawings are shown by graphic symbols only; make runs parallel with lines of building.

5. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.

6. Conceal pipes, ducts, and wiring in finished areas, unless otherwise indicated; coordinate locations of fixtures and outlets with finish elements.

7. Size ductwork, mechanical pipe, plumbing, electrical, and sprinkler system components as shown in the Contract Documents and Drawings. Downsizing of Mechanical/Electrical/Plumbing/Fire Protection (M/E/P/FP) systems is not permitted.

C. Coordination Drawing Development

1. Contractor shall prepare, and submit for acceptance, Coordination Drawings as a submittal/shop drawing prior to equipment or system installation. Contractor shall prepare Coordination Drawings in order to resolve potential installation and
constructability problems prior to Installation so that construction cost and schedule are not impacted.

2. Coordination Drawings shall include dates and signatures of the Contractor and all Subcontractors whose work occurs in the space; signed Coordination Drawings shall be subject to examination by the Owner at any time.

3. Contractor shall require Subcontractors to develop Subcontractor Coordination Plans of the same scale as Contractor’s Coordination Drawings to assist in making transcripts for transfer to Coordination Drawings; use approved Shop Drawings for Coordination Drawings.

4. Contractor shall require Subcontractors to develop Subcontractor Coordination Plans of the same scale as Contractor’s Coordination Drawings to assist in making transcripts for transfer to Coordination Drawings; use approved Shop Drawings for Coordination Drawings.

5. Coordination drawings will be developed, at a minimum, as editable AutoCAD drawings with separate layers for each system or trade. Contractor shall make drawing available for Owner upon request.

6. Coordination drawings shall be used as the baseline for development and submission of As-Built drawings by the Contractor.

D. Coordination Drawing Elements To Be Clearly Shown

1. Layout and routing of mechanical, electrical, plumbing, fire protection and related low voltage (life safety and non-life safety) systems in above-ceiling spaces, utility chases, raised flooring (if applicable), other interstitial spaces, and underground ducts. Elements to include in Coordination Drawings include:
   a. Mechanical ducts and pipes, including floor penetrations;
   b. Plumbing pipes, including supply and gravity drain lines;
   c. Fire branch lines and sprinkler heads;
   d. Electrical panels, conduit, bus ducts;
   e. Voice/data cable trays and conduits;
   f. Interstitial space access;
   g. Identification and resolution of Interfering Structural elements: beams, columns, slabs, hangers, bracing, etc. and mechanical/electrical systems;
   h. Identification and resolution of conflicts with mechanical/electrical systems and fire-rated walls;
   i. Identification and resolution of conflicts between mechanical/electrical systems and Suspended ceilings and light fixtures;
   j. Identification and resolution of conflicts between mechanical/electrical systems and Insulation;
   k. Security system elements;
   l. The relationship of components that are shown on separate Shop Drawings or Submittals.
   m. Seismic restraints where required on systems.
   n. All Work above ceilings performed by separate entities that must interface or for which space provided is limited; and
o. Others as necessary.

2. Actual physical relationships of the various elements and systems and their interfacing with other elements and systems. The Drawings use graphic symbols to show certain physical relationships. Establishing and coordinating the actual physical relationships is the responsibility of the Contractor. Layout and arrange all elements to contribute to safety and efficiency while maintaining the intent of the design. Before work proceeds in areas of potential conflict for installing different components of the work, Contractor shall prepare Coordination drawings for review and acceptance by the Owner, that clearly demonstrate resolution of any conflicts.

3. Dimensions and elevations where conflicts may exist. Final Coordination drawings shall show resolution of any potential field conflicts.

4. Location, for maintenance and repair purposes, of all above-ceiling valves, fire dampers, control devices, meters and gauges, and heating coils, and the access hatches (in "hard lid) ceilings that provide a means of access to these devices. These devices and appurtenances must be located such that a workman has unimpeded access to perform maintenance, repair or replacement. "Unimpeded access" means that a workman can access the device from a location immediately below the device, via the removal of a lay-in ceiling tile, or an access door/panel. All above-ceiling valves, fire dampers, control devices and heating coils shall be located such that there are no interferences from systems furniture, or above-ceiling mechanical or electrical systems. The Coordination drawings must clearly represent this accessibility.

5. How equipment, controls, valves, power panels and disconnects will fit in ceilings, equipment room(s) space, and still comply with code, and manufacturer's maintenance requirements, with respect to clearance.

6. Maintenance of fire-rating of so-designated walls. Contractor shall review the architectural drawings for the location of fire-rated walls, and ensure that the placement of ducts, pipes or other systems do not compromise the fire-rating of walls. If ducts do penetrate fire-rated walls, the coordination drawings must show such penetrations, and shall indicate the placement of required Fire-smoke dampers. If the fire rating of designated walls cannot be maintained due to pipe or duct penetrations, as part of the Coordination Drawing process, the Contractor shall immediately bring these situations to the attention of the Owner.

E. Contractor Coordination Drawing Responsibilities

1. Oversee preparation of Coordination Drawings, as required by this Section.

2. Assign space priorities

3. Notify Owner in writing of unresolved conflicts or interferences found during preparation of Coordination Drawings.

1.5 AS-BUILT DRAWINGS

A. Contractor to maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings onsite. Review As-built Drawings and shop drawings monthly with the Owner, for approval.

1. Preparation: Daily mark As-built Drawings to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up As-built Drawings.
a. Specifically document information on concealed elements that would be difficult to identify or measure and record later.

b. Accurately record information in an acceptable drawing technique.

c. Record data as soon as possible after obtaining it.

d. Record and check the markup before enclosing concealed installations.

2. Content: Types of items requiring marking include, but are not limited to, the following:

   a. Dimensional changes to Drawings.
   b. Revisions to details shown on Drawings.
   c. Depths of foundations below first floor.
   d. Locations, routing and depths (invert elevations) of underground utilities.
   e. Revisions to routing of piping and conduits.
   f. Revisions to electrical circuitry and lighting.
   g. Revisions to low voltage systems (both life safety and non-life safety).
   h. Actual equipment locations.
   i. Duct and piping sizes and routing.
   j. Locations of concealed internal utilities.
   k. Changes made by Change Order or Change Directive.
   l. Changes made following the Owner’s written orders.
   m. Details not on the original Contract Drawings.
   n. Field records for variable and concealed conditions.
   o. Record information on the Work that is shown only schematically.

3. Mark the Contract Drawings and Shop Drawings completely and accurately. Utilize personnel proficient at recording graphic information in production of marked-up as-built prints.

4. Mark as-built sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.

5. Mark important additional information that was either shown schematically or omitted from original Drawings.

6. Mark all changes requested by Owner, architect or engineer.

7. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.

B. Deliverable

1. As-built drawings will be separated by trade in a manner consistent with the Contract Documents.

2. As-built documents shall be available for review by Owner, Architect or Engineer at the end of each week.
1.6 REQUESTS FOR INFORMATION

A. Requests For Information (RFI) are questions posed by the Contractor intended to resolve vagueness and conflicts during bidding or construction.

B. To submit a RFI, the Contractor must fill out the Request For Information form found in Appendix A of this specification section. The Contractor may use a different form or format of their choosing provided all information shown on example in Appendix A is included. Only complete RFI forms will be acknowledged.

C. Alternately, the Contractor may, where approved by Engineer, submit an RFI electronically using a common Subject Line format. An electronically submitted RFI must include all information found on the form found in Appendix A:
   1. Subject Line (Example): Project Name – Trade (MEP or FP) RFI #XXXX
   2. All RFI requests must be copied electronically to the architect (where applicable).

D. All RFI must be submitted with a proposed solution, response, selection or approach. RFI submitted without this information will be returned unchecked.

E. Where possible, all RFI should be accompanied with pictures, tables, graphs, sketches or supplementary explanatory material. This procedure allows the responder to have as much information as practical at the time of review for timely and accurate responses.

F. Prior to submitting a RFI, the Contractor must thoroughly review the Construction Documents and Specifications and forward the RFI only if the issue in question cannot be resolved. If an RFI questions a clearly noted item or standard construction method which should be known by the Contractor, the Engineer may back charge the Contractor for time spent responding to the RFI.

1.7 SCHEDULE OF VALUES

A. Prior to initiating any work, the Contractor shall submit a Schedule of Values on an AIA G-703 Continuation Sheet outlining Material and Labor costs for each item.

B. Include in the Schedule of Values a line item for resolving Punchlist issues equal to 5% of the total contract value.

C. No Payment Applications will be processed until the Schedule of Values form has been approved by the Engineer.

1.8 EQUIPMENT MANUFACTURER LIST

A. Within ten (10) business days of the contract award date, the Contractor shall submit a list of equipment manufacturers, for the engineer's review and approval, that he intends to use on this project.

1.9 SHOP DRAWING (SUBMITTAL) SUBMISSION SCHEDULE

A. Prior to submitting any Shop Drawings, the Contractor shall issue a Shop Drawing Submission Schedule. The purpose of this schedule is to identify which items require Shop Drawings and...
when these Shop Drawings will be submitted to the Engineer. By agreeing to this schedule at the beginning of the project, Shop Drawings will be reviewed in a timely fashion and long lead items can be prioritized and reviewed first.

B. Refer to the Shop Drawing Submission Schedule in Appendix A of this specification section. The Contractor shall list all the items that require submittals per the Contract Documents and Specifications. The Contractor shall fill out the Submittal Date column for each item and return the completed form to the Engineer for review. The Contractor may use a different form of their choosing provided all required information is provided.

C. No Shop Drawings will be reviewed until the Shop Drawing Submission Schedule is approved by the Engineer.

1.10 SHOP DRAWINGS (SUBMITTALS)

A. Shop Drawings will not be reviewed until the Equipment Manufacturer List and Shop Drawing Submission Schedule have been submitted to, and approved by, the Engineer.

B. Engineer shall review and return submittals shall within ten (10) business days of receipt. Expedited review of submittals may occur, however such review must be approved by the Engineer prior submission and be noted in the Shop Drawing Submission Schedule. Note that Contractor may only identify a limited number of submittals as requiring Expedite Review.

C. Shop Drawings must include a completed copy of the Shop Drawing Submittal Form found in Appendix A of this specification section.

1. Contractor must review and stamp all Shop Drawings prior to submission. Space has been provided for the Contractor's stamp on the Shop Drawing Submittal Form. Submittals without the Contractor's stamp will be returned unchecked.

2. Contractor stamp must include a general affidavit of the following:

   a. Contractor “X” has reviewed the shop drawings, product data, samples and other submittals that related to this submission. All dimension, quantities, field dimensions existing work interface with other trades and conditions have been verified. These submittals are approved to the extent approval is required by the Contract Documents.

D. Contractor shall submit PDF version of submittal, with cover sheet, to the Engineer for review.

1. Submitted items shall be clearly identified on all copies of the Shop Drawings. The Engineer will return any Shop Drawings that are not clearly marked.

E. It is the responsibility of the Contractor to make every attempt to ensure thoroughness and accuracy of his submittals. If Shop Drawings are not approved following a maximum of two (2) reviews, the Contractor will be back-charged for the Engineer's effort.

F. Submittals shall be segregated as individual elements to for timely review and to ensure rejection of one item does not unduly delay other items within the same submittal. Submittals encompassing both equipment and materials (e.g.: pumps and piping) will be returned to the Contractor unchecked.
1.11  SUBSTITUTIONS

A. Substitutions for specified equipment must include a detailed comparison checklist identifying all pertinent similarities and differences between the two items. Substituted items without a comparison checklist will not be considered.

1. Where substituted items affect other trades, this Contractor is responsible for adjusting the installation as required to accommodate the substitution. This includes, but is not limited to, changes in Architectural, Structural, Mechanical, Electrical, Plumbing and Fire Protection Systems. This Contractor will pay for all associated costs.

B. Incomplete submittals will be returned rejected

1.12  SERVICE INTERRUPTION SCHEDULE

A. Within ten (10) business days of the contract award date, the Contractor shall submit a Schedule of Shutdowns of equipment and/or systems for Owner and Engineer review.

B. The Contractor shall notify the Owner and Engineer in writing at least five (5) business days prior to each equipment and/or system shutdown.

1.13  OPERATION AND MAINTENANCE MANUALS

A. Furnish three copies of complete operations and maintenance manuals to the architect/engineer for approval prior to delivery to the owner, on all equipment and systems.

1. Manuals shall be printed on 8-1/2" x 11" paper and bound in three ring binders with clear covers.

2. Electronic Copies May Be Submitted In Place Of Physical Submissions If Permission Is Granted By Architect And Engineer.

B. The following shall be included:

1. Title sheet with job name, and the names, addresses and phone numbers of the contractor, subcontractor, control subcontractor, related contractors, material and equipment suppliers. the equipment model numbers and serial numbers shall be listed.

2. A comprehensive table of contents for all sections.

3. Printed operating instructions for the owner's personnel describing how to operate (start, stop, and perform normal and emergency operating procedures) each piece of equipment, how to set the temperature control system for normal operation and normal restarting procedures, and caution / warning notices.

4. A copy of acknowledgment of instruction to the owner's operating personnel in the operation of all equipment and systems, signed by the owner or his authorized representative.

5. Approved shop drawings, product data, and parts and maintenance booklet for each item of material and equipment furnished under this contract.

6. Test and balance reports.
7. Copies of certificates of inspection and warranties, including extended warranties (where applicable).

C. Deliver the manuals to the owner prior to submitting application for final payment.

1.14 RECORD DRAWINGS

A. The contractor shall prepare a complete set of record drawings of all systems including electrical and control diagrams prior to final payment. Final payment shall not be made until the record drawings are deemed complete for all trades and approved by the Engineer.

B. The drawings shall be drafted by a professional draftsman using AutoCAD (DWG format) with discreet file and layer as described in the AIA CAD Layer Guidelines or similar convention. Other software or layer naming conventions will be approved only in writing by owner and architect/engineer.

C. Record drawings shall clearly indicate the installed conditions of the MEP/FP work as noted in the As-Built drawings for all trades. Contractor shall provide owner with:

1. Digital storage media containing editable, vector-based, electronic AutoCAD files with required blocks, XREFs, linetypes and styles.
2. One (1) full size and two (2) half size prints, bound.
3. PDF of above listed items on digital storage media for owner records.

D. Upon completion and acceptance of work, contractor shall furnish type-written updated panel schedules for any panel in which work was done. Provide a hard copy and electronic copy to the owner.

1.15 SUBSTANTIAL COMPLETION LETTER

A. The purpose of this letter is to inform the Engineer that the Contractor has reached Substantial Completion.

B. Upon Substantial Completion, the Contractor shall copy the Substantial Completion Letter onto company letterhead, complete the letter and send it to the Engineer. Refer to Appendix A of this specification for this letter.

C. This letter shall be received at the Engineer's office no later than four (4) weeks before the project completion date. Upon receiving the letter, the Engineer will perform a Punch List. The Contractor shall have two (2) weeks to complete the Punch List items upon receiving the Punch List.

1.16 PUNCHLIST COMPLETION LETTER

A. The purpose of this letter is to inform the Engineer that the Contractor has completed all Punchlist items. The Contractor must ensure that all Punchlist items are indeed complete prior to submitting this letter.

B. Upon Punchlist Completion, the Contractor shall copy the Punchlist Completion Letter onto company letterhead, complete the letter and send it to the Engineer. Refer to Appendix A of this specification for this letter.
C. This letter shall be received at the Engineer's office no later than One (1) week before the project completion date. Upon receiving this letter, the Engineer will perform a final walkthrough.

D. Should the Engineer discover during the final walkthrough that not all Punchlist items have not been completed, the time and expenses associated with a return visit by the Engineer shall be chargeable to the Contractor.

PART 2 - PRODUCTS - Not Used.

PART 3 - EXECUTION - Not Used.

END OF SECTION 260001
Appendix A

Construction Administration Forms
REQUEST FOR INFORMATION

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<td>Proposed Reviewer's Name (optional)</td>
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Certification by Requestor

I certify that I have thoroughly reviewed the Documents and am unable to reconcile this issue. I acknowledge that if the issue is easily reconcilable by reviewing the Documents or is asking direction on standard construction methods that should be known by the Contractor, the Professionals can backcharge the Requestor for the effort involved in the review and response.

RFI Classification

<table>
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<tr>
<th>Related RFI ID's</th>
<th>Urgency (typical response within 5 business days)</th>
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If urgency requires a fast turnaround, state why faster than normal response is needed:

Which Disciplines are involved with this RFI?

Which Drawing ID's & which Specification Sections are involved?

Request

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<th>Request Title (30 characters or less, used as an abbreviated title in RFI Log)</th>
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Request Description:

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Engineer's Response:

- See Attached Sketch
- See Attached Description
- See Comments Above
SHOP DRAWING SUBMISSION SCHEDULE

Project Name: [   ]
DLB Project ID: [   ]

Contractor:_____________________
Completed By:___________________
Date:__________________________

**Electrical**

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SHOP DRAWING SUBMITTAL FORM

Project Name:

To: DLB Associates

265 Industrial Way West

Eatontown, NJ 07724

From:

Attention: Date:

Phone #: (732) 774-2000

DLB Project ID [ ]

#:

We are sending you:

☐ Prints, ☐ Sepia/Vellums, ☐ Manufacturer's Literature, ☐ Letter, ☐

Purpose: Shop Drawings Is this a Resubmittal?: YES / NO If YES Previous Submittal #: 

Referencing:

Drawing Number(s): Specification Section(s):

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REMARKS:

COPYRIGHT © COPYRIGHT©

Filing: Construction

Copy To: ________________________________

If material is not as listed, please call at once.

CONTRACTOR'S STAMP

SHEET____OF _____
THIS PAGE WAS INTENTIONALLY LEFT BLANK
Date: ___________

[dlb Construction Manager]
DLB Associates Consulting Engineers, P.C.
265 Industrial Way West
Eatontown, NJ 07724
(732) 774-2000

Re: Substantial Completion Notification
   [Project Name]
   [Project Address]
   (DLB Project # [ ])

Dear __________:

Please be advised that we have reached Substantial Completion for the above mentioned project. We understand that DLB Associates should receive this letter at least four (4) weeks prior to the project completion date. We are prepared for the Punchlist review and assure that any items found to be incomplete will be fixed within two (2) weeks of receiving the Punchlist.

Should you have any questions, please do not hesitate to contact this office.

Very truly yours,

________________________________________________________
(company)

________________________________________________________
(signature)

________________________________________________________
(print)

c:
Date: __________

[dlb Construction Manager]
DLB Associates Consulting Engineers, P.C.
265 Industrial Way West
Eatontown, NJ 07724
(732) 774-2000

Re: Punchlist Completion Notification
   [Project Name]
   [Project Address]
   (DLB Project # [ ])

Dear __________:

Please be advised that we have completed all Punchlist items for the above mentioned project and consider the construction to be 100% complete. We understand that DLB Associates should receive this letter at least one (1) week prior to the project completion date. We are prepared for the final walk through and review.

Should you have any questions, please do not hesitate to contact this office.

Very truly yours,

______________________________
(company)

______________________________
(signature)

______________________________
(print)

c:
Attn:

(DLB Project Manager/Construction Manager Name)

DLB Associates Consulting Engineers, P.C.
265 Industrial Way West, Eatontown, NJ 07724
(732) 774-2000
Re: Electronic Document Exchange Agreement

(Project Name)

(Project Address)

(DLB Project Number)

Computer generated (AutoCAD or BIM/Revit) design document data is provided at the request of, and for the convenience of the Recipient only. The data has been prepared as a DLB Associates (DLB) internal working document and as such, it may be incomplete or contain unintentional accuracies. Additionally, subsequent revisions to actual infrastructure locations after these documents were created may not be reflected in the data files. DLB makes no warranties, either express or implied, as to the accuracy of the data or drawings. The user is warned that while all digital data appears to be extremely accurate, this apparent accuracy is an artifact of the techniques used in its creation and should in no way imply actual accuracy. Recipient of this data takes full responsibility for the accuracy and correctness of all measurements, areas, elevations, inventories, and related information extracted from files either manually or with the use of a computer.

DLB employs an automated system of complex files links and customized drawing elements to create contract documents. As a result, DLB is unable to simply copy files for distribution. DLB must edit the individual files to create a format which is compatible for outside users. Without these steps, files would be nearly unusable and ultimately take longer for Recipients to adapt versus starting from scratch.

DLB office policy is to charge for electronic document preparation so the Recipient can make use of the data. Charges are based on currently published hourly labor rates. NOTE: Floor plans will be made available for the Recipient. Specifications, spreadsheets, native engineering calculation files, details, general notes, title blocks, diagrams, risers, etc. will not be provided.

Recipient is advised that any translation of data from one computer system or environment to another can result in the loss of important data. Losses can include but are not limited to portions of text and dimensions, the existence, location or scale of symbols or other graphical elements and the internal structure of the data (including layers, data attributes, styles or line weights.) DLB makes no representation as to usability of the data on any outside system.

Recipient confirms, by acceptance and use of data provided, the above conditions, and agrees to the fullest extent of the law, to indemnify and hold DLB harmless from any damage, liability or cost, including but not limited to reasonable attorney’s fees and cost of defense, arising from such use, or from any changes made by these files by anyone other than DLB, or from any reuse from the files and data without the prior written consent of DLB.

(Company Name)

(Authorized Signature)

(Printed Name & Date)
SECTION 270100 – TELECOMMUNICATIONS CABLE TESTING

PART 1 - GENERAL

1.1 SCOPE OF WORK

A. General

1. Provide engineering, labor, materials, apparatus, tools, equipment, and transportation as required to test a completed telecommunication cabling system installation as specified and indicated.

2. Full testing of a completed communication infrastructure cabling system including:
   a. Horizontal Category 6 Unshielded Twisted Pair (UTP) Cabling
   b. Fiber Optic Cable
   c. Coax Cable
   d. Procedure Submittals.
   e. Testing.
   f. Test Results.

B. Related Sections

1. Section 16710 / 27 15 00: Telecommunications Cabling.

1.2 REFERENCES

A. Conform to the following:

1. FCC Regulations:
   b. Part 68 – Connection of Terminal Equipment to the Telephone Network


3. National, State, Local and any other binding building and fire codes.


1.3 SYSTEM DESCRIPTION

A. General
1. Refer to Drawings and Section 16710 / 27 15 00 for the telecommunications cabling system description.

B. Horizontal / Station Cabling
1. The horizontal cabling, in general, consists of one UTP cable to each IWS/LAN workstation and peripheral equipment (such as printers, faxes, etc). Refer to drawings for specific requirements.
2. The horizontal cabling will be routed through adjustable cable support pathways of the general office space above the lay-in grid ceiling.
3. The workstations, in general, will be modular/systems furniture. The telecommunications outlets will be installed into the modular furniture and at other wall mounted locations.

1.4 SUBMITTALS

A. Furnish submittal data neatly bound in an 8-1/2" x 11" 3-ring binder.

B. Submittals shall consist of test equipment information including serial numbers and software/firmware versions of testers to be used, and test results including printed and electronic versions. Furnish two copies of each format. Hand-written test reports are not acceptable.

C. Submit the following information for review and approval at the completion of construction:
1. Catalog information for test equipment showing proof of conformance with relevant UL, & TIA/EIA listings, certifications and specifications.
2. Test equipment serial numbers and software/firmware version number.
3. Upon request, the contractor may be required to submit the user manuals for the testers being utilized on the project for review by the owner’s representative.
4. Test Reports
   a. Provide a title page which includes:
      1) Field Office Name
      2) Field Office Code Number
      3) Field Office Address
      4) Contractor’s Name
      5) Date of Submittal
   b. Provide tabs which break down the test results per MDF and IDF rooms.
   c. UTP Test Results: Provide summary test result information containing:
      1) Test equipment make, model and serial number(s).
      2) Date and time of last calibration.
      3) Test personnel name(s).
      4) Ambient temperature.
5) Cable ID

6) Overall Test Result (e.g., PASSED)

7) Category or Rating Tested To (i.e., Category 6)

8) Cable Length

9) Date and time of test.

d. Furnish complete test results in printed, hard-copy format and CD format in their native data format and an exported Microsoft Excel compatible or PDF file format. Include all necessary software to allow viewing and printing of individual test results. Label CD with the project name, contractor name, and date of submission.

e. Submit test report to SSA Office Manager and owner's representative on or before the SIT date.

1.5 QUALITY ASSURANCE

A. General

1. Only products and applications listed in this Section may be used on the project.

B. Contractor Qualifications

1. Furnish technician(s) qualified to operate the test equipment with experience using the same test equipment on at least three other sites and having a minimum of three years experience installing and testing the type of cabling systems specified and indicated.

2. Supply all required test equipment, report forms, 3-ring binders, etc. as specified.

C. Coordination Services

1. Coordinate the telecommunication testing work with other trades.

PART 2 - PRODUCTS

2.1 GENERAL

A. The product numbers listed in this section are subject to change by the manufacturer at any time. In the event a product number is invalid or conflicts with the written test description, notify Contracting Officer in writing prior to testing.

2.2 MANUFACTURERS

A. Category 6 Testers

1. Ideal LanTEK III (latest software version)

2. Fluke (latest software version)

3. Or as approved.
B. Fiber Optic Tester  
   1. Fluke Certifiber Pro Optical Loss Test Set  
   2. Ideal FiberTEK III  
   3. Or Approved Equal  

C. Coax Tester  
   1. Ideal Networks R171000  
   2. Fluke CableIQ Tester  
   3. Or Approved Equal.

D. PART 3 - EXECUTION

3.1 GENERAL
   A. Prepare a test schedule for the specified activities and submit to Contracting Officer for approval prior to testing.  
   B. The Contracting Officer and SSA management reserve the right to be present during the testing.

3.2 FIELD QUALITY CONTROL AND TESTING
   A. Permanently record and present test result in a format acceptable to the Contracting Officer and owner’s representative before system acceptance. Remove and replace cables and conductors failing to meet the indicated standards, with cables which prove in testing, to meet the standards. The installation will not be accepted until testing has indicated a 100% availability of all cables and conductors or the owner’s representative has approved any deviation from this requirement.  
   B. Calibrate each test set and associated equipment per the manufacturers printed instructions at the beginning of each day’s testing and after each battery charge. Fully charge the test sets prior to each day’s testing to ensure proper operation.

3.3 TWISTED PAIR CABLING TESTING REQUIREMENTS
   A. General  
      1. The installation will be accepted when testing has indicated a 100% passing of all terminated copper UTP pairs or the owner’s representative has approved any deviation from this requirement.  
   B. Procedure  
      1. Perform a basic link test on Category 6 systems as described in ANSI/TIA/EIA-568.
2. Test the Category 6 systems using a tester, which meets the ANSI/TIA/EIA-568 Level II-E accuracy performance requirements.

3. Provide the necessary quantity of 2-meter (6-foot) long Category 6 stranded test equipment cords, approved for use by the test equipment manufacturer.

4. Perform the following Category 6 Field testing and include in test report:
   a. Wire Map (results to indicate that cabling has no shorts, crossed pairs, reversed pairs, split pairs, any other miswiring and has end to end connectivity)
   b. Total physical cable length (including test equipment cords)
   c. Attenuation or Insertion Loss
   d. Near End Crosstalk (NEXT)
   e. Power Sum Near End Crosstalk (PSNEXT)
   f. Equal Level Far End Crosstalk (ELFEXT), or Attenuation to Crosstalk Ratio, Far End (ACR-F)
   g. Power Sum Equal-Level Far End Crosstalk (PSELFEXT), or Power Sum Attenuation to Crosstalk Ratio, Far End (PS ACR-F)
   h. Structural Return Loss
   i. Propagation Delay
   j. Delay Skew
   k. Attenuation to Crosstalk Ratio (ACR) or Attenuation to Crosstalk Ratio, Near End (ACR-N)

5. Check each piece of test equipment for accuracy by performing a consistency check on the field tester per the manufacturer's recommendations. Document the results of the tests and submit them to owner's representative for review.

6. Links which report a Fail for any of the individual tests are considered as an overall link Fail. All individual test results must result in a Pass to achieve an overall Pass.

7. Retest for conformance reconfigurations of link components required as a result of a test Fail.

END OF SECTION 270100
PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
   1. Grounding conductors.
   2. Grounding connectors.
   3. Grounding busbars.
   4. Grounding rods.
   5. Grounding labeling.

1.3 DEFINITIONS

A. BCT: Bonding conductor for telecommunications.
B. EMT: Electrical metallic tubing.
C. TGB: Telecommunications grounding busbar.
D. TMGB: Telecommunications main grounding busbar.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.
B. Shop Drawings: For communications equipment room signal reference grid. Include plans, elevations, sections, details, and attachments to other work.

1.5 INFORMATIONAL SUBMITTALS

A. As-Built Data: Plans showing as-built locations of grounding and bonding infrastructure, including the following:
   1. Ground rods.
   2. Ground and roof rings.
   3. BCT, TMGB, TGBs, and routing of their bonding conductors.
B. Qualification Data: For Installer, installation supervisor, and field inspector.
C. Qualification Data: For testing agency and testing agency’s, field supervisor.
D. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For grounding to include in emergency, operation, and maintenance manuals.

1. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:
   a. Result of the ground-resistance test, measured at the point of BCT connection.
   b. Result of the bonding-resistance test at each TGB and its nearest grounding electrode.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: Cabling Installer must have personnel certified by BICSI on staff.

1. Installation Supervision: Installation shall be under the direct supervision of ITS Technician, who shall be present at all times when Work of this Section is performed at Project site.
2. Field Inspector: Currently registered by BICSI as a registered communications distribution designer to perform the on-site inspection.

PART 2 - PRODUCTS

2.1 SYSTEM COMPONENTS

A. Comply with TIA-607-B.

2.2 CONDUCTORS

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

1. Harger Lightning and Grounding.
2. Panduit Corp.
3. Tyco Electronics Corp.

B. Comply with UL 486A-486B.

C. Insulated Conductors: Stranded copper wire, green or green with yellow stripe insulation, insulated for 600 V, and complying with UL 83.

1. Ground wire for custom-length equipment ground jumpers shall be No. 6 AWG, 19-strand, UL-listed, Type THHN wire.
2. Cable Tray Equipment Grounding Wire: No. 6 AWG.

D. Cable Tray Grounding Jumper:

1. Not smaller than No. 6 AWG 26 kcmils (13.3 sq. mm) and not longer than 12 inches (300 mm). If jumper is a wire, it shall have a crimped grounding lug with two holes and long...
barrel for two crimps. If jumper is a flexible braid, it shall have a one-hole ferrule. Attach with grounding screw or connector provided by cable tray manufacturer.

E. Bare Copper Conductors:
   4. Bonding Cable: 28 kcmils (14.2 sq. mm), 14 strands of No. 17 AWG conductor, and 1/4 inch (6.3 mm) in diameter.
   5. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
   6. Bonding Jumper: Tinned-copper tape, braided conductors terminated with two-hole copper ferrules; 1-5/8 inches (41 mm) wide and 1/16 inch (1.6 mm) thick.

2.3 CONNECTORS

A. Irreversible connectors listed for the purpose. Listed by an NRTL as complying with NFPA 70 for specific types, sizes, and combinations of conductors and other items connected. Comply with UL 486A-486B.

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Burndy; Part of Hubbell Electrical Systems.
   2. Chatsworth Products, Inc.
   3. Harger Lightning and Grounding.
   4. Panduit Corp.
   5. Tyco Electronics Corp.

C. Compression Wire Connectors: Crimp-and-compress connectors that bond to the conductor when the connector is compressed around the conductor. Comply with UL 467.
   1. Electroplated tinned copper, C and H shaped.

D. Signal Reference Grid Connectors: Combination of compression wire connectors, access floor grounding clamps, bronze U-bolt grounding clamps, and copper split-bolt connectors, designed for the purpose.

E. Busbar Connectors: Cast silicon bronze, solderless compression or exothermic-type, mechanical connector; with a long barrel and two holes spaced on 5/8- or 1-inch (15.8- or 25.4-mm) centers for a two-bolt connection to the busbar.

F. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

2.4 GROUNDING BUSBARS

A. Refer to drawings.

B. Standoff insulators for mounting shall be Lexan or PVC. Comply with UL 891 for use in 600-V switchboards, impulse tested at 5000 V.
C. Rack and Cabinet Grounding Busbars: Rectangular bars of hard-drawn solid copper, accepting conductors ranging from No. 14 to No. 2/0 AWG, NRTL listed as complying with UL 467, and complying with TIA-607-B. Predrilling shall be with holes for use with lugs specified in this Section.
   1. Cabinet-Mounted Busbar: Terminal block, with stainless steel or copper-plated hardware for attachment to the cabinet.
   2. Rack-Mounted Horizontal Busbar: Designed for mounting in 19- or 23-inch (483- or 584-mm) equipment racks. Include a copper splice bar for transitioning to an adjoining rack, and stainless steel or copper-plated hardware for attachment to the rack.
   3. Rack-Mounted Vertical Busbar: 72 or 36 inches (1827 or 914 mm) long, with stainless steel or copper-plated hardware for attachment to the rack.

2.5 GROUND RODS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Harger Lightning and Grounding.
   2. Tyco Electronics Corp.

B. Ground Rods: Copper-clad steel, sectional type; 3/4 inch by 10 feet (19 mm by 3 m) in diameter.

2.6 LABELING

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   2. HellermannTyton.
   3. Panduit Corp.

B. Comply with TIA/EIA-606-B and UL 969 for a system of labeling materials, including label stocks, laminating adhesives, and inks used by label printers.

C. Adhesive Film Label with Clear Protective Overlay: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch (10 mm). Overlay shall provide a weatherproof and UV-resistant seal for label.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine the ac grounding electrode system and equipment grounding for compliance with requirements for maximum ground-resistance level and other conditions affecting performance of grounding and bonding of the electrical system.

B. Inspect the test results of the ac grounding system measured at the point of BCT connection.

C. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
D. Proceed with connection of the BCT only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Bonding shall include the ac utility power service entrance, the communications cable entrance, and the grounding electrode system. The bonding of these elements shall form a loop so that each element is connected to at least two others.

B. Comply with NECA 1.

C. Comply with TIA-607-B.

3.3 APPLICATION

A. Conductors: Install solid conductor for No. 8 AWG and smaller and stranded conductors for No. 6 AWG and larger unless otherwise indicated.
   1. The bonding conductors between the TGB and structural steel of steel-frame buildings shall not be smaller than No. 6 AWG.
   2. The bonding conductors between the TMGB and structural steel of steel-frame buildings shall not be smaller than No. 6 AWG.

B. Underground Grounding Conductors: Install bare tinned-copper conductor, No. 2 AWG minimum.

C. Conductor Terminations and Connections:
   1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
   2. Underground Connections: Welded connectors except at test wells and as otherwise indicated.
   3. Connections to Ground Rods at Test Wells: Bolted connectors.

D. Conductor Support:
   1. Secure grounding and bonding conductors at intervals of not less than 36 inches (900 mm).

E. Grounding and Bonding Conductors:
   1. Install in the straightest and shortest route between the origination and termination point, and no longer than required. The bend radius shall not be smaller than eight times the diameter of the conductor. No one bend may exceed 90 degrees.
   2. Install without splices.
   3. Support at not more than 36-inch (900-mm) intervals.
   4. Install grounding and bonding conductors in 3/4-inch (21-mm) PVC conduit until conduit enters a telecommunications room. The grounding and bonding conductor pathway through a plenum shall be in EMT. Conductors shall not be installed in EMT unless otherwise indicated.
      a. If grounding and bonding conductor is installed in ferrous metallic conduit, bond the conductor to the conduit using a grounding bushing that complies with requirements in Section 270528 "Pathways for Communications Systems," and bond both ends of the conduit to a TGB.
3.4 GROUNDING ELECTRODE SYSTEM

A. The BCT between the TMGB and the AC service equipment ground shall not be smaller than No. 3/0 AWG.

3.5 GROUNDING BUSBARS

A. Indicate locations of grounding busbars on Drawings. Install busbars horizontally, on insulated spacers 2 inches (50 mm) minimum from wall, 12 inches (300 mm) above finished floor unless otherwise indicated.

B. Where indicated on both sides of doorways, route bus up to top of door frame, across top of doorway, and down; connect to horizontal bus.

3.6 CONNECTIONS

A. Bond metallic equipment in a telecommunications equipment room to the grounding busbar in that room, using equipment grounding conductors not smaller than No. 6 AWG.

B. Stacking of conductors under a single bolt is not permitted when connecting to busbars.

C. Assemble the wire connector to the conductor, complying with manufacturer’s written instructions and as follows:
   1. Use crimping tool and the die specific to the connector.
   2. Pretwist the conductor.
   3. Apply an antioxidant compound to all bolted and compression connections.

D. Primary Protector: Bond to the TMGB with insulated bonding conductor.

E. Interconnections: Interconnect all TGBs with the TMGB with the telecommunications backbone conductor. If more than one TMGB is installed, interconnect TMGBs using the grounding equalizer conductor. Refer to drawings for size of telecommunications backbone conductor.

F. Telecommunications Enclosures and Equipment Racks: Bond metallic components of enclosures to the telecommunications bonding and grounding system. Install top-mounted rack grounding busbar unless the enclosure and rack are manufactured with the busbar. Bond the equipment grounding busbar to the TGB No. 2 AWG bonding conductors.

G. Structural Steel: Where the structural steel of a steel frame building is readily accessible within the room or space, bond each TGB and TMGB to the vertical steel of the building frame.

H. Electrical Power Panelboards: Where an electrical panelboard for telecommunications equipment is located in the same room or space, bond each TGB to the ground bar of the panelboard.

I. Shielded Cable: Bond the shield of shielded cable to the TGB in communications rooms and spaces. Comply with TIA/EIA-568-B.1 and TIA/EIA-568-B.2 when grounding screened, balanced, twisted-pair cables.

J. Rack- and Cabinet-Mounted Equipment: Bond powered equipment chassis to the cabinet or rack grounding bar. Power connection shall comply with NFPA 70; the equipment grounding conductor in the power cord of cord- and plug-connected equipment shall be considered as a supplement to bonding requirements in this Section.
3.7 IDENTIFICATION

A. Labels shall be preprinted or computer-printed type.
   1. Label TMGB(s) with "fs-TMGB," where "fs" is the telecommunications space identifier for
      the space containing the TMGB.
   2. Label TGB(s) with "fs-TGB," where "fs" is the telecommunications space identifier for the
      space containing the TGB.
   3. Label the BCT and each telecommunications backbone conductor at its attachment point:
      "WARNING! TELECOMMUNICATIONS BONDING CONDUCTOR. DO NOT REMOVE
      OR DISCONNECT!"

3.8 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Perform tests and inspections.

C. Tests and Inspections:
   1. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical
      connections with a calibrated torque wrench according to manufacturer's written
      instructions.
   2. Test the bonding connections of the system using an ac earth ground-resistance tester,
      taking two-point bonding measurements in each telecommunications equipment room
      containing a TMGB and a TGB and using the process recommended by BICSI TDMM. Conduct
      tests with the facility in operation.
      a. Measure the resistance between the busbar and the nearest available grounding
         electrode. The maximum acceptable value of this bonding resistance is 100
         milliohms.
   3. Test for ground loop currents using a digital clamp-on ammeter, with a full-scale of not
      more than 10 A, displaying current in increments of 0.01 A at an accuracy of plus/minus
      2.0 percent.
      a. With the grounding infrastructure completed and the communications system
         electronics operating, measure the current in every conductor connected to the
         TMGB and in each TGB. Maximum acceptable ac current level is 1 A.

D. Excessive Ground Resistance: If resistance to ground at the BCT exceeds 5 ohms, notify
   Construction Manager promptly and include recommendations to reduce ground resistance.

E. Grounding system will be considered defective if it does not pass tests and inspections.

F. Prepare test and inspection reports.

END OF SECTION 270526
SECTION 270528 – PATHWAYS FOR COMMUNICATIONS SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Metal conduits and fittings.
2. Nonmetallic conduits and fittings.
3. Optical-fiber-cable pathways and fittings.
4. Metal wireways and auxiliary gutters.
5. Nonmetallic wireways and auxiliary gutters.
8. Handholes and boxes for exterior underground cabling.

B. Related Requirements:

1. Section 260533 "Raceways and Boxes for Electrical Systems" for conduits, wireways, surface raceways, boxes, enclosures, cabinets, handholes, and faceplate adapters serving electrical systems.

1.3 DEFINITIONS

A. GRC: Galvanized rigid steel conduit.

1.4 ACTION SUBMITTALS

A. Product Data: For surface pathways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.

B. Shop Drawings: For custom enclosures and cabinets. Include plans, elevations, sections, and attachment details.
C. Samples: For wireways nonmetallic wireways and surface pathways and for each color and texture specified, 12 inches (300 mm) long.

1.5 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Pathway routing plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of items involved:

1. Structural members in paths of pathway groups with common supports.
2. HVAC and plumbing items and architectural features in paths of conduit groups with common supports.

B. Qualification Data: For professional engineer.

C. Seismic Qualification Certificates: For pathway racks, enclosures, cabinets, equipment racks and their mounting provisions, including those for internal components, from manufacturer.

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
3. Detailed description of equipment anchorage devices on which certification is based and their installation requirements.
4. Detailed description of conduit support devices and interconnections on which certification is based and their installation requirements.

D. Source quality-control reports.

PART 2 - PRODUCTS

A. METAL CONDUITS AND FITTINGS

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

1. AFC Cable Systems, Inc.
3. Alpha Wire Company.
4. Anamet Electrical, Inc.
5. Electri-Flex Company.
7. Picoma Industries.
8. Republic Conduit.
9. Robroy Industries.
10. Southwire Company.
12. Western Tube and Conduit Corporation.

C. General Requirements for Metal Conduits and Fittings:
   1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
   2. Comply with TIA-569-B.

D. GRC: Comply with ANSI C80.1 and UL 6.

E. ARC: Comply with ANSI C80.5 and UL 6A.

F. PVC-Coated Steel Conduit: PVC-coated rigid steel conduit.
   1. Comply with NEMA RN 1.
   2. Coating Thickness: 0.040 inch (1 mm), minimum.

G. EMT: Comply with ANSI C80.3 and UL 797.

H. Fittings for Metal Conduit: Comply with NEMA FB 1 and UL 514B.
   1. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 886 and NFPA 70.
   2. Fittings for EMT:
      a. Material: Steel.
      b. Type: Setscrew or compression.
   3. Expansion Fittings: PVC or steel to match conduit type, complying with UL-467, rated for environmental conditions where installed, and including flexible external bonding jumper.
   4. Coating for Fittings for PVC-Coated Conduit: Minimum thickness of 0.040 inch (1 mm), with overlapping sleeves protecting threaded joints.

I. Joint Compound for GRC: Approved, as defined in NFPA 70, by authorities having jurisdiction for use in conduit assemblies, and compounded for use to lubricate and protect threaded conduit joints from corrosion and to enhance their conductivity.

2.2 NONMETALLIC CONDUITS AND FITTINGS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. AFC Cable Systems, Inc.
   3. Anamet Electrical, Inc.
   4. Armco Corporation.
   5. CANTEX Inc.
   6. CertainTeed Corporation.
8. Electri-Flex Company.
10. Lamson & Sessions; Carlon Electrical Products.
11. Niedax-Kleinhuis USA, Inc.
12. RACO; Hubbell.

B. General Requirements for Nonmetallic Conduits and Fittings:
   1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
   2. Comply with TIA-569-B.

C. RNC: Type EPC-40-PVC, complying with NEMA TC 2 and UL 651 unless otherwise indicated.

D. Rigid HDPE: Comply with UL 651A.

E. Continuous HDPE: Comply with UL 651B.

F. RTRC: Comply with UL 1684A and NEMA TC 14.

G. Fittings for RNC: Comply with NEMA TC 3; match to conduit or tubing type and material.

H. Solvent cements and adhesive primers shall have a VOC content of 510 and 550 g/L or less, respectively, when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

I. Solvent cements and adhesive primers shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.3 OPTICAL-FIBER-CABLE PATHWAYS AND FITTINGS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Alpha Wire Company.
   2. Arnco Corporation.
   3. Endot Industries Inc.
   4. IPEX.
   5. Lamson & Sessions; Carlon Electrical Products.

B. Description: Comply with UL 2024; flexible-type pathway, approved for plenum or general-use installation unless otherwise indicated.
   1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
   2. Comply with TIA-569-B.
2.4 METAL WIREWAYS AND AUXILIARY GUTTERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Cooper B-Line, Inc.
   2. Hoffman.
   4. Square D.

B. Description: Sheet metal, complying with UL 870 and NEMA 250, Type 1 Type 3R unless otherwise indicated, and sized according to NFPA 70.
   1. Metal wireways installed outdoors shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
   2. Comply with TIA-569-B.

C. Fittings and Accessories: Include covers, couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.

D. Wireway Covers: Hinged type Screw-cover type unless otherwise indicated.

E. Finish: Manufacturer's standard enamel finish.

2.5 NONMETALLIC WIREWAYS AND AUXILIARY GUTTERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Allied Moulded Products, Inc.
   2. Hoffman.
   3. Lamson & Sessions; Carlon Electrical Products.
   4. Niedax-Kleinhuis USA, Inc.

B. General Requirements for Nonmetallic Wireways and Auxiliary Gutters:
   1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
   2. Comply with TIA-569-B.

C. Description: Fiberglass polyester, extruded and fabricated to required size and shape, without holes or knockouts. Cover shall be gasketed with oil-resistant gasket material and fastened with captive screws treated for corrosion resistance. Connections shall be flanged and have stainless-steel screws and oil-resistant gaskets.

D. Fittings and Accessories: Couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings shall match and mate with wireways as required for complete system.
E. Solvent cements and adhesive primers shall have a VOC content of 510 and 550 g/L or less, respectively, when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.6 SURFACE PATHWAYS

A. General Requirements for Surface Pathways:

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. Comply with TIA-569-B.

B. Surface Metal Pathways: Galvanized steel with snap-on covers complying with UL 5. Manufacturer's standard enamel finish in color selected by Architect.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Mono-Systems, Inc.
   b. Niedax-Kleinhuis USA, Inc.
   c. Panduit Corp.
   d. Wiremold / Legrand.

C. Surface Nonmetallic Pathways: Two- or three-piece construction, complying with UL 5A, and manufactured of rigid PVC with texture and color selected by Architect from manufacturer's standard colors. Product shall comply with UL-94 V-0 requirements for self-extinguishing characteristics.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Lamson & Sessions; Carlon Electrical Products.
   b. Mono-Systems, Inc.
   c. Panduit Corp.
   e. Wiremold / Legrand.

2.7 BOXES, ENCLOSURES, AND CABINETS

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

1. Adalet.
2. Cooper Technologies Company; Cooper Crouse-Hinds.
3. EGS/Appleton Electric.
5. Hoffman.
6. Lamson & Sessions; Carlon Electrical Products.
7. Milbank Manufacturing Co.
8. Mono-Systems, Inc.
11. RACO; Hubbell.
12. Robroy Industries.
13. Spring City Electrical Manufacturing Company.
15. Thomas & Betts Corporation.
16. Wiremold / Legrand.

B. General Requirements for Boxes, Enclosures, and Cabinets:
   1. Comply with TIA-569-B.
   2. Boxes, enclosures and cabinets installed in wet locations shall be listed for use in wet locations.

C. Sheet-Metal Outlet and Device Boxes: Comply with NEMA OS 1 and UL 514A.

D. Cast-Metal Outlet and Device Boxes: Comply with NEMA FB 1, ferrous alloy, Type FD, with gasketed cover.

E. Box extensions used to accommodate new building finishes shall be of same material as recessed box.

F. Metal Floor Boxes:
   1. Material: Cast metal.
   2. Type: Fully adjustable.
   3. Shape: Rectangular.
   4. Listing and Labeling: Metal floor boxes shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

G. Nonmetallic Floor Boxes: Nonadjustable, rectangular.
   1. Listing and Labeling: Nonmetallic floor boxes shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

H. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.

I. Cast-Metal Access, Pull, and Junction Boxes: Comply with NEMA FB 1 and UL 1773, galvanized, cast iron with gasketed cover.

J. Device Box Dimensions: 4 inches square by 2-1/8 inches deep (100 mm square by 60 mm deep).

K. Gangable boxes are allowed.

L. Nonmetallic Outlet and Device Boxes: Comply with NEMA OS 2 and UL 514C.
M. Hinged-Cover Enclosures: Comply with UL 50 and NEMA 250, Type 1 Type 3R with continuous-hinge cover with flush latch unless otherwise indicated.

1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
2. Nonmetallic Enclosures:
   b. Finished inside with radio-frequency-resistant paint.
3. Interior Panels: Steel; all sides finished with manufacturer's standard enamel.

N. Cabinets:

1. NEMA 250, Type 1 Type 3R, galvanized-steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.
2. Hinged door in front cover with flush latch and concealed hinge.
3. Key latch to match panelboards.
4. Metal barriers to separate wiring of different systems and voltage.
5. Accessory feet where required for freestanding equipment.
6. Nonmetallic cabinets shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.8 SOURCE QUALITY CONTROL FOR UNDERGROUND ENCLOSURES

A. Handhole and Pull-Box Prototype Test: Test prototypes of handholes and boxes for compliance with SCTE 77. Strength tests shall be for specified tier ratings of products supplied.

1. Tests of materials shall be performed by an independent testing agency.
2. Strength tests of complete boxes and covers shall be by either an independent testing agency or manufacturer. A qualified registered professional engineer shall certify tests by manufacturer.
3. Testing machine pressure gages shall have current calibration certification complying with ISO 9000 and ISO 10012, and traceable to NIST standards.

PART 3 - EXECUTION

3.1 PATHWAY APPLICATION

A. Outdoors: Apply pathway products as specified below unless otherwise indicated:

1. Exposed Conduit: GRC.
2. Concealed Conduit, Aboveground: GRC RNC, Type EPC-40-PVC.
3. Underground Conduit: RNC, Type EPC-40-PVC Type EPC-80-PVC under roadways
4. Boxes and Enclosures, Aboveground: NEMA 250, Type 3R Type 4.

B. Indoors: Apply pathway products as specified below unless otherwise indicated:
1. Exposed, Not Subject to Physical Damage: EMT
2. Exposed, Not Subject to Severe Physical Damage: EMT
3. Exposed and Subject to Severe Physical Damage: GRC. Pathway locations include the following:
4. Concealed in Ceilings and Interior Walls and Partitions: EMT
5. Damp or Wet Locations: GRC.
6. Pathways for Optical-Fiber or Communications Cable in Spaces Used for Environmental Air: Plenum-type, optical-fiber-cable pathway Plenum-type, communications-cable pathway EMT.
7. Pathways for Optical-Fiber or Communications-Cable Risers in Vertical Shafts: Riser-type, optical-fiber-cable pathway Riser-type, communications-cable pathway EMT.
9. Boxes and Enclosures: NEMA 250 Type 1, except use NEMA 250 Type 4 stainless steel in institutional and commercial kitchens and damp or wet locations.

C. Minimum Pathway Size: 3/4-inch (21-mm) trade size. Minimum size for optical-fiber cables is 1 inch (27 mm).

D. Pathway Fittings: Compatible with pathways and suitable for use and location.
1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.
2. EMT: Use setscrew connectors. Comply with NEMA FB 2.10.

E. Do not install aluminum conduits, boxes, or fittings in contact with concrete or earth.

F. Install surface metal raceway on existing masonry walls in finished areas.

G. Do not install nonmetallic conduit where ambient temperature exceeds 120 deg F (49 deg C).

3.2 INSTALLATION

A. Comply with NECA 1, NECA 101, and TIA-569-B for installation requirements except where requirements on Drawings or in this article are stricter. Comply with NECA 102 for aluminum pathways. Comply with NFPA 70 limitations for types of pathways allowed in specific occupancies and number of floors.

B. Keep pathways at least 6 inches (150 mm) away from parallel runs of flues and steam or hot-water pipes. Install horizontal pathway runs above water and steam piping.

C. Complete pathway installation before starting conductor installation.

D. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for hangers and supports.

E. Arrange stub-ups so curved portions of bends are not visible above finished slab.
F. Install no more than the equivalent of two 90-degree bends in any pathway run. Support within 12 inches (300 mm) of changes in direction. Utilize long radius ells for all optical-fiber cables.

G. Conceal conduit and EMT within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.

H. Support conduit within 12 inches (300 mm) of enclosures to which attached.

I. Pathways Embedded in Slabs:
   1. Run conduit larger than 1-inch (27-mm) trade size, parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support. Secure pathways to reinforcement at maximum 10-foot (3-m) intervals.
   2. Arrange pathways to cross building expansion joints at right angles with expansion fittings.
   3. Arrange pathways to keep a minimum of 2 inches (50 mm) of concrete cover in all directions.
   4. Do not embed threadless fittings in concrete unless specifically approved by Architect for each specific location.
   5. Change from ENT to RNC, Type EPC-40-PVC, GRC before rising above floor.

J. Stub-ups to Above Recessed Ceilings:
   1. Use EMT for pathways.
   2. Use a conduit bushing or insulated fitting to terminate stub-ups not terminated in hubs or in an enclosure.

K. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of pathway and fittings before making up joints. Follow compound manufacturer's written instructions.

L. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install insulated bushings on conduits terminated with locknuts.

M. Install pathways square to the enclosure and terminate at enclosures with locknuts. Install locknuts hand tight plus 1/4 turn more.

N. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure to assure a continuous ground path.

O. Cut conduit perpendicular to the length. For conduits of 2-inch (53-mm) trade size and larger, use roll cutter or a guide to ensure cut is straight and perpendicular to the length.

P. Install pull wires in empty pathways. Use polypropylene or monofilament plastic line with not less than 200-lb (90-kg)tensile strength. Leave at least 12 inches (300 mm) of slack at each end of pull wire. Cap underground pathways designated as spare above grade alongside pathways in use.

Q. Surface Pathways:
   1. Install surface pathway for surface telecommunications outlet boxes on existing masonry walls in finished areas.
2. Install surface pathway with a minimum 2-inch (50-mm) radius control at bend points.

3. Secure surface pathway with screws or other anchor-type devices at intervals not exceeding 48 inches (1200 mm) and with no less than two supports per straight pathway section. Support surface pathway according to manufacturer's written instructions. Tape and glue are not acceptable support methods.

R. Pathways for Optical-Fiber and Communications Cable: Install pathways, metal and nonmetallic, rigid and flexible, as follows:

1. 3/4-Inch (21-mm) Trade Size and Smaller: Install pathways in maximum lengths of 50 feet (15 m).

2. 1-Inch (27-mm) Trade Size and Larger: Install pathways in maximum lengths of 75 feet (23 m).

3. Install with a maximum of two 90-degree bends or equivalent for each length of pathway unless Drawings show stricter requirements. Separate lengths with pull or junction boxes or terminations at distribution frames or cabinets where necessary to comply with these requirements.

S. Install pathway sealing fittings at accessible locations according to NFPA 70 and fill them with listed sealing compound. For concealed pathways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install pathway sealing fittings according to NFPA 70.

T. Install devices to seal pathway interiors at accessible locations. Locate seals so no fittings or boxes are between the seal and the following changes of environments. Seal the interior of all pathways at the following points:

1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.

2. Where an underground service pathway enters a building or structure.

3. Where otherwise required by NFPA 70.

U. Comply with manufacturer's written instructions for solvent welding PVC conduit and fittings.

V. Expansion-Joint Fittings:

1. Install in each run of aboveground RNC that is located where environmental temperature change may exceed 30 deg F (17 deg C), and that has straight-run length that exceeds 25 feet (7.6 m). Install in each run of aboveground RMC and EMT conduit that is located where environmental temperature change may exceed 100 deg F (55 deg C) and that has straight-run length that exceeds 100 feet (30 m).

2. Install type and quantity of fittings that accommodate temperature change listed for each of the following locations:
   a. Outdoor Locations Not Exposed to Direct Sunlight: 125 deg F (70 deg C) temperature change.
   b. Outdoor Locations Exposed to Direct Sunlight: 155 deg F (86 deg C) temperature change.
   c. Indoor Spaces Connected with Outdoors without Physical Separation: 125 deg F (70 deg C) temperature change.
d. Attics: 135 deg F (75 deg C) temperature change.
e. Install fitting(s) that provide expansion and contraction for at least 0.00041 inch per foot of length of straight run per deg F (0.06 mm per meter of length of straight run per deg C) of temperature change for PVC conduits. Install fitting(s) that provide expansion and contraction for at least 0.000078 inch per foot of length of straight run per deg F (0.0115 mm per meter of length of straight run per deg C) of temperature change for metal conduits.
f. Install expansion fittings at all locations where conduits cross building or structure expansion joints.
g. Install each expansion-joint fitting with position, mounting, and piston setting selected according to manufacturer's written instructions for conditions at specific location at time of installation. Install conduit supports to allow for expansion movement.

W. Mount boxes at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements. Install boxes with height measured to center of box unless otherwise indicated.

X. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block, and install box flush with surface of wall. Prepare block surface to provide a flat surface for a raintight connection between box and cover plate or supported equipment and box.

Y. Horizontally separate boxes mounted on opposite sides of walls so they are not in the same vertical channel.

Z. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for the purpose.

AA. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.

BB. Set metal floor boxes level and flush with finished floor surface.

CC. Set nonmetallic floor boxes level. Trim after installation to fit flush with finished floor surface.

3.3 INSTALLATION OF UNDERGROUND HANDHOLES AND BOXES

A. Install handholes and boxes level and plumb and with orientation and depth coordinated with connecting conduits to minimize bends and deflections required for proper entrances.

B. Unless otherwise indicated, support units on a level bed of crushed stone or gravel, graded from 1/2-inch (12.5-mm) sieve to No. 4 (4.75-mm) sieve and compacted to same density as adjacent undisturbed earth.

C. Elevation: In paved areas, set so cover surface will be flush with finished grade. Set covers of other enclosures 1 inch (25 mm) above finished grade.

D. Install handholes with bottom below frost line, below grade.

E. Install removable hardware, including pulling eyes, cable stanchions, cable arms, and insulators, as required for installation and support of cables and conductors and as indicated. Select arm lengths to be long enough to provide spare space for future cables, but short enough to preserve adequate working clearances in enclosure.
F. Field cut openings for conduits according to enclosure manufacturer's written instructions. Cut wall of enclosure with a tool designed for material to be cut. Size holes for terminating fittings to be used, and seal around penetrations after fittings are installed.

3.4 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR COMMUNICATIONS PENETRATIONS

A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 270544 "Sleeves and Sleeve Seals for Communications Pathways and Cabling."

3.5 FIRESTOPPING

A. Install firestopping at penetrations of fire-rated floor and wall assemblies. Comply with requirements in Section 078413 "Penetration Firestopping."

3.6 PROTECTION

A. Protect coatings, finishes, and cabinets from damage or deterioration.

1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.

END OF SECTION 270528
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SECTION 270536 – CABLE TRAYS FOR COMMUNICATIONS SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
   1. Ladder cable trays.

B. Related Requirements:
   1. Section 260536 "Cable Trays for Electrical Systems" for cable trays and accessories serving electrical systems.

1.3 ACTION SUBMITTALS

A. Product Data: For cable tray.
   1. Include data indicating dimensions and finishes for cable tray indicated.

B. Shop Drawings: For cable tray.
   1. Show fabrication and installation details of cable trays, including plans, elevations, and sections of components and attachments to other construction elements. Designate components and accessories, including clamps, brackets, hanger rods, splice-plate connectors, expansion-joint assemblies, straight lengths, and fittings.

C. Delegated-Design Submittal: For seismic restraints.
   1. Seismic-Restraint Details: Signed and sealed by a qualified professional engineer, licensed in the state where Project is located, who is responsible for their preparation.
   2. Design Calculations: Calculate requirements for selecting seismic restraints.
   3. Detail fabrication, including anchorages and attachments to structure and to supported cable trays.

1.4 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Floor plans and sections, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
1. Include scaled cable tray layout and relationships between components and adjacent structural, electrical, and mechanical elements.
2. Vertical and horizontal offsets and transitions.
3. Clearances for access above and to side of cable trays.
4. Vertical elevation of cable trays above the floor or below bottom of ceiling structure.

B. Seismic Qualification Certificates: For cable trays, accessories, and components, from manufacturer.

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

C. Field quality-control reports.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design cable tray supports and seismic bracing.

B. Seismic Performance: Cable trays and supports shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

1. The term "withstand" means "the cable trays will remain in place without separation of any parts when subjected to the seismic forces specified."
2. Component Importance Factor: 1.5.

C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes in cable tray installed outdoors.

1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

2.2 GENERAL REQUIREMENTS FOR CABLE TRAYS

A. Cable Trays and Accessories: Identified as defined in NFPA 70 and marked for intended location, application, and grounding.

1. Source Limitations: Obtain cable trays and components from single manufacturer.

B. Sizes and Configurations: See the Cable Tray Schedule on Drawings for specific requirements for types, materials, sizes, and configurations.
C. Structural Performance: See articles for individual cable tray types for specific values for the following parameters:

1. Uniform Load Distribution: Capable of supporting a uniformly distributed load on the indicated support span when supported as a simple span and tested according to NEMA VE 1.
2. Concentrated Load: A load applied at midpoint of span and centerline of tray.
3. Load and Safety Factors: Applicable to both side rails and rung capacities.

2.3 LADDER CABLE TRAYS

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

1. Allied Tube & Conduit; a Tyco International Ltd. Co.
2. Chalfant Manufacturing Company.
3. Cooper B-Line, Inc.
5. MP Husky.
6. Niedax-Kleinhuis USA, Inc.

B. Description:

1. Configuration: Two I-beam side rails with transverse rungs welded to side rails.
2. Rung Spacing: 9 inches (225 mm) o.c.
3. Radius-Fitting Rung Spacing: 9 inches (225 mm) at center of tray's width.
4. Minimum Cable-Bearing Surface for Rungs: 7/8-inch (22-mm) width with radius edges.
5. No portion of the rungs shall protrude below the bottom plane of side rails.
6. Structural Performance of Each Rung: Capable of supporting a maximum cable load, with a safety factor of 1.5, plus a 200-lb (90-kg) concentrated load, when tested according to NEMA VE 1.
7. Minimum Usable Load Depth: 3 inches (75 mm).
8. Straight Section Lengths: 10 feet (3 m) except where shorter lengths are required to facilitate tray assembly.
9. Width: 9 inches (225 mm) unless otherwise indicated on Drawings.
10. Fitting Minimum Radius: 12 inches (300 mm).
11. Class Designation: Comply with NEMA VE 1, Class 12B.
12. Splicing Assemblies: Bolted type using serrated flange locknuts.
14. Splice Plate Capacity: Splices located within support span shall not diminish rated loading capacity of cable tray.
2.4 MATERIALS AND FINISHES

A. Steel:

1. Straight Section and Fitting Side Rails and Rungs: Steel complies with the minimum mechanical properties of ASTM A 1011/A 1011M, SS, Grade 33.

2. Steel Tray Splice Plates: ASTM A 1011/A 1011M, HSLAS, Grade 50, Class 1.

3. Fasteners: Steel complies with the minimum mechanical properties of ASTM A 510/A 510M, Grade 1008.


5. Finish: Hot-dip galvanized after fabrication.
   b. Hardware: Stainless steel, Type 316, ASTM F 593 and ASTM F 594.

6. Finish: Factory-standard primer, ready for field painting, with chromium-zinc-plated hardware according to ASTM F 1136.

2.5 CABLE TRAY ACCESSORIES

A. Fittings: Tees, crosses, risers, elbows, and other fittings as indicated, of same materials and finishes as cable tray.

B. Covers: Louvered type made of same materials and with same finishes as cable tray.

C. Barrier Strips: Same materials and finishes as for cable tray.

D. Cable tray supports and connectors, including bonding jumpers, as recommended by cable tray manufacturer.

2.6 WARNING SIGNS

A. Lettering: 1-1/2-inch- (40-mm-) high, black letters on yellow background with legend "Warning! Not To Be Used as Walkway, Ladder, or Support for Ladders or Personnel."

B. Comply with requirements for fasteners in Section 260553 "Identification for Electrical Systems."

2.7 SOURCE QUALITY CONTROL

A. Testing: Test and inspect cable trays according to NEMA FG 1.
PART 3 - EXECUTION

3.1 CABLE TRAY INSTALLATION

A. Install cable trays according to NEMA FG 1.

B. Install cable trays as a complete system, including fasteners, hold-down clips, support systems, barrier strips, adjustable horizontal and vertical splice plates, elbows, reducers, tees, crosses, cable dropouts, adapters, covers, and bonding.

C. Install cable trays so that the tray is accessible for cable installation and all splices are accessible for inspection and adjustment.

D. Remove burrs and sharp edges from cable trays.

E. Join aluminum cable tray with splice plates; use four square neck-carriage bolts and locknuts.

F. Fasten cable tray supports to building structure and install seismic restraints.

G. Design fasteners and supports to carry cable tray, the cables, and a concentrated load of 200 lb (90 kg). Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems." Comply with seismic-restraint details according to Section 260548.16 "Seismic Controls for Electrical Systems."

H. Place supports so that spans do not exceed maximum spans on schedules and provide clearances shown on Drawings. Install intermediate supports when cable weight exceeds the load-carrying capacity of the tray rungs.

I. Construct supports from channel members, threaded rods, and other appurtenances furnished by cable tray manufacturer. Arrange supports in trapeze or wall-bracket form as required by application.

J. Support bus assembly to prevent twisting from eccentric loading.

K. Install center-hung supports for single-rail trays designed for 60 versus 40 percent eccentric loading condition, with a safety factor of 3.

L. Locate and install supports according to NEMA FG 1. Do not install more than one cable tray splice between supports.

M. Support trapeze hangers for wire-basket trays with 3/8-inch- (10-mm-) diameter rods.

N. Make connections to equipment with flanged fittings fastened to cable trays and to equipment. Support cable trays independent of fittings. Do not carry weight of cable trays on equipment enclosure.

O. Install expansion connectors where cable trays cross building expansion joints and in cable tray runs that exceed dimensions recommended in NEMA FG 1. Space connectors and set gaps according to applicable standard.

P. Make changes in direction and elevation using manufacturer’s recommended fittings.

Q. Make cable tray connections using manufacturer's recommended fittings.
R. Seal penetrations through fire and smoke barriers. Comply with requirements in Section 078413 "Penetration Firestopping."

S. Install capped metal sleeves for future cables through firestop-sealed cable tray penetrations of fire and smoke barriers.

T. Install cable trays with enough workspace to permit access for installing cables.

U. Install barriers to separate cables of different systems, such as power, communications, and data processing; or of different insulation levels, such as 600, 5000, and 15 000 V.

V. Install permanent covers, if used, after installing cable. Install cover clamps according to NEMA VE 2.

W. Clamp covers on cable trays installed outdoors with heavy-duty clamps.

X. Install warning signs in visible locations on or near cable trays after cable tray installation.

### 3.2 CABLE TRAY GROUNDING

A. Ground cable trays according to NFPA 70 unless additional grounding is specified. Comply with requirements in Section 260526 "Grounding and Bonding for Electrical Systems."

B. Cable trays with communications cable shall be bonded together with splice plates listed for grounding purposes or with listed bonding jumpers.

C. Cable trays with control conductors shall be bonded together with splice plates listed for grounding purposes or with listed bonding jumpers.

D. When using epoxy- or powder-coat painted cable trays as a grounding conductor, completely remove coating at all splice contact points or ground connector attachment. After completing splice-to-grounding bolt attachment, repair the coated surfaces with coating materials recommended by cable tray manufacturer.

E. Bond cable trays to power source for cables contained within with bonding conductors sized according to NFPA 70, Article 250.122, "Size of Equipment Grounding Conductors."

### 3.3 CABLE INSTALLATION

A. Install cables only when each cable tray run has been completed and inspected.

B. Fasten cables on horizontal runs with cable clamps or cable ties according to NEMA VE 2. Tighten clamps only enough to secure the cable, without indenting the cable jacket. Install cable ties with a tool that includes an automatic pressure-limiting device.

C. Fasten cables on vertical runs to cable trays every 18 inches (450 mm).

D. Fasten and support cables that pass from one cable tray to another or drop from cable trays to equipment enclosures. Fasten cables to the cable tray at the point of exit and support cables independent of the enclosure. The cable length between cable trays or between cable tray and enclosure shall be no more than 72 inches (1800 mm).
3.4 CONNECTIONS

A. Remove paint from all connection points before making connections. Repair paint after the connections are completed.

B. Connect pathways to cable trays according to requirements in NEMA VE 2 and NEMA FG 1.

3.5 FIELD QUALITY CONTROL

A. Perform the following tests and inspections with the assistance of a factory-authorized service representative:

1. After installing cable trays and after electrical circuitry has been energized, survey for compliance with requirements.

2. Visually inspect cable insulation for damage. Correct sharp corners, protuberances in cable trays, vibrations, and thermal expansion and contraction conditions, which may cause or have caused damage.

3. Verify that the number, size, and voltage of cables in cable trays do not exceed that permitted by NFPA 70. Verify that communications or data-processing circuits are separated from power circuits by barriers or are installed in separate cable trays.

4. Verify that there are no intruding items such as pipes, hangers, or other equipment in the cable tray.

5. Remove dust deposits, industrial process materials, trash of any description, and any blockage of tray ventilation.

6. Visually inspect each cable tray joint and each ground connection for mechanical continuity. Check bolted connections between sections for corrosion. Clean and retorque in suspect areas.

7. Check for improperly sized or installed bonding jumpers.

8. Check for missing, incorrect, or damaged bolts, bolt heads, or nuts. When found, replace with specified hardware.

9. Perform visual and mechanical checks for adequacy of cable tray grounding; verify that all takeoff raceways are bonded to cable trays. Test entire cable tray system for continuity. Maximum allowable resistance is 1 ohm.

B. Prepare test and inspection reports.

3.6 PROTECTION

A. Protect installed cable trays and cables.

1. Install temporary protection for cables in open trays to safeguard exposed cables against falling objects or debris during construction. Temporary protection for cables and cable tray can be constructed of wood or metal materials and shall remain in place until the risk of damage is over.

2. Repair damage to galvanized finishes with zinc-rich paint recommended by cable tray manufacturer.
3. Repair damage to paint finishes with matching touchup coating recommended by cable tray manufacturer.

END OF SECTION 270536
SECTION 270544 – SLEEVES AND SLEEVE SEALS FOR COMMUNICATIONS PATHWAYS AND CABLELING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
   1. Sleeves for pathway and cable penetration of non-fire-rated construction walls and floors.
   2. Sleeve-seal systems.
   5. Silicone sealants.

B. Related Requirements:
   1. Section 078413 "Penetration Firestopping" for penetration firestopping installed in fire-resistance-rated walls, horizontal assemblies, and smoke barriers, with and without penetrating items.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 SLEEVES

A. Wall Sleeves:
   2. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop unless otherwise indicated.

B. Sleeves for Conduits Penetrating Non-Fire-Rated Gypsum Board Assemblies: Galvanized-steel sheet; 0.0239-inch (0.6-mm) minimum thickness; round tube closed with welded longitudinal joint, with tabs for screw-fastening the sleeve to the board.
C. Molded-PVC Sleeves: With nailing flange for attaching to wooden forms.

D. Sleeves for Rectangular Openings:
   2. Minimum Metal Thickness:
      a. For sleeve cross-section rectangle perimeter less than 50 inches (1270 mm) and
         with no side larger than 16 inches (400 mm), thickness shall be 0.052 inch (1.3 mm).
      b. For sleeve cross-section rectangle perimeter 50 inches (1270 mm) or more and one
         or more sides larger than 16 inches (400 mm), thickness shall be 0.138 inch (3.5
         mm).

2.2 SLEEVE-SEAL SYSTEMS

A. Description: Modular sealing device, designed for field assembly, to fill annular space between
   sleeve and pathway or cable.
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the
      following:
         a. Advance Products & Systems, Inc.
         b. CALPICO, Inc.
         c. Metraflex Company (The).
         d. Pipeline Seal and Insulator, Inc.
         e. Proco Products, Inc.
   2. Sealing Elements: EPDM rubber interlocking links shaped to fit surface of pipe. Include
      type and number required for pipe material and size of pipe.
   3. Pressure Plates: Carbon steel.
   4. Connecting Bolts and Nuts: Carbon steel, with corrosion-resistant coating, of length
      required to secure pressure plates to sealing elements.

2.3 SLEEVE-SEAL FITTINGS

A. Description: Manufactured plastic, sleeve-type, waterstop assembly made for embedding in
   concrete slab or wall. Unit shall have plastic or rubber waterstop collar with center opening to
   match piping OD.
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the
      following:
         a. Presealed Systems.

2.4 GROUT

A. Description: Nonshrink; recommended for interior and exterior sealing openings in non-fire-rated
   walls or floors.

C. Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.

D. Packaging: Premixed and factory packaged.

2.5 SILICONE SEALANTS

A. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below.

1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces that are not fire rated.

2. Sealant shall have VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.

PART 3 - EXECUTION

3.1 SLEEVE INSTALLATION FOR NON-FIRE-RATED ELECTRICAL PENETRATIONS

A. Comply with NECA 1.

B. Comply with NEMA VE 2 for cable tray and cable penetrations.

C. Sleeves for Conduits Penetrating Above-Grade Non-Fire-Rated Concrete and Masonry-Unit Floors and Walls:

1. Interior Penetrations of Non-Fire-Rated Walls and Floors:
   a. Seal annular space between sleeve and pathway or cable, using joint sealant appropriate for size, depth, and location of joint. Comply with requirements in Section 079200 "Joint Sealants."
   b. Seal space outside of sleeves with mortar or grout. Pack sealing material solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect material while curing.

2. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.

3. Size pipe sleeves to provide 1/4-inch (6.4-mm) annular clear space between sleeve and pathway or cable unless sleeve seal is to be installed or unless seismic criteria require different clearance.

4. Install sleeves for wall penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of walls. Cut sleeves to length for mounting flush with both surfaces of walls. Deburr after cutting.

5. Install sleeves for floor penetrations. Extend sleeves installed in floors 2 inches (50 mm) above finished floor level. Install sleeves during erection of floors.
D. Sleeves for Conduits Penetrating Non-Fire-Rated Gypsum Board Assemblies:
   1. Use circular metal sleeves unless penetration arrangement requires rectangular sleeved opening.
   2. Seal space outside of sleeves with approved joint compound for gypsum board assemblies.

E. Roof-Penetration Sleeves: Seal penetration of individual pathways and cables with flexible boot-type flashing units applied in coordination with roofing work.

F. Aboveground, Exterior-Wall Penetrations: Seal penetrations using steel pipe sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch (25-mm) annular clear space between pipe and sleeve for installing mechanical sleeve seals.

G. Underground, Exterior-Wall and Floor Penetrations: Install cast-iron pipe sleeves. Size sleeves to allow for 1-inch (25-mm) annular clear space between pathway or cable and sleeve for installing sleeve-seal system.

3.2 SLEEVE-SEAL-SYSTEM INSTALLATION

A. Install sleeve-seal systems in sleeves in exterior concrete walls and slabs-on-grade at pathway entries into building.

B. Install type and number of sealing elements recommended by manufacturer for pathway or cable material and size. Position pathway or cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pathway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

3.3 SLEEVE-SEAL-FITTING INSTALLATION

A. Install sleeve-seal fittings in new walls and slabs as they are constructed.

B. Assemble fitting components of length to be flush with both surfaces of concrete slabs and walls. Position waterstop flange to be centered in concrete slab or wall.

C. Secure nailing flanges to concrete forms.

D. Using grout, seal the space around outside of sleeve-seal fittings.

END OF SECTION 270544
SECTION 271500 – TELECOMMUNICATIONS CABLING

PART 1 - GENERAL

1.1 SCOPE OF WORK

A. General

1. Provide engineering, labor, materials, apparatus, tools, equipment, and transportation as required to make a complete working telecommunication cabling system installation as specified and indicated.

2. Provide a complete telecommunications infrastructure cabling system including:
   a. Support systems in the DCR and Telecommunication Rooms,
   b. Inside plant UTP station cabling, terminations, and outlets.
   c. Fiber Optic Cable
   d. CCTV Coaxial Cable
   e. Cable identification tags and system labeling.
   f. Conduits and boxes.
   g. Telecommunications grounding system.
   h. Submittals.
   i. Testing.
   j. As-built Documents.
   k. Warranty.

B. Related Sections

1. Section 16720 / 27 01 00: Telecommunications Cable Testing.

1.2 REFERENCES

A. Conform to the following:

1. FCC Regulations:
   b. Part 68 – Connection of Terminal Equipment to the Telephone Network


3. National, State, Local and any other binding building and fire codes.


8. NECA/BICSI 568-2006 Installing Commercial Building Telecommunications Cabling.

1.3 SYSTEM DESCRIPTION

A. General
1. The telecommunication cabling encompasses the office’s communications infrastructure, and horizontal cabling systems.

B. MDF and IDF Rooms
1. Provide LAN equipment racks and modular patch panels in LAN rack to support the cable terminations.

C. Horizontal Distribution
1. Provide horizontal cabling from the MDF and IDF Rooms to wall mounted outlets and the modular workstations. Provide each outlet with two Category 6 cables and RJ54 Jacks (Port A jack blue, Port B jack gray).

1.4 SUBMITTALS

A. Refer to Section 16010 / 26 05 00 for additional submittal requirements

B. Submit detailed drawings of the MDF and IDFs if the proposed installation layout differs from the construction documents. Minimum scale: 1/4" = 1'-0". Revised telecommunication equipment layouts must be approved prior to release of order for equipment and prior to installation.

C. Submit the following information for review and approval prior to start of construction.
1. Catalog information for all cables and connectors indicating conformance with NEC, UL, TIA/EIA listings, certifications and specifications.
2. Catalog information for all support equipment and systems, e.g. cable tray, patch panels, etc., showing proof of conformance with relevant NEC, UL, & TIA/EIA listings, certifications and specifications.
3. Catalog information for cable identification tags.

D. Submit the following information for review and approval at the completion of construction:
1. Test reports.
2. As-built drawings.
3. O & M manuals.

1.5 QUALITY ASSURANCE

A. General
1. Install complete system in a neat, high quality manner acceptable to the Contracting Officer and in conformance with applicable codes and data standards.

2. Provide new materials of current manufacturer, of highest grade, and without defects of any kind.

3. Only products and applications listed in this Division may be used on the project.

1.6 PRODUCT DELIVERY AND HANDLING

A. Delivery

1. Do not deliver telecommunication cabling system components to the site until protected space is available.

2. Replace and return damaged equipment to manufacturer at no cost to Owner.

B. Handling

1. Handle in accordance with manufacturer's written instructions.

2. Prevent component damage, breakage, denting and scoring. Do not install damaged equipment.

1.7 WARRANTY

A. General

1. Manufacturers of the major system components shall maintain a replacement parts department and provide testing equipment when needed. A complete parts department shall be located close enough to the job site area to supply replacement parts within a 6 hour period.

2. Contractor warrants that all installed hardware in their contract will be, under normal use and service, free from defects and faulty workmanship. The warranty period shall be 12 months from the date of acceptance for Category 6 Cabling Solutions. During this time, the entire system shall be kept in operating condition at no additional material or labor costs to the Owner.

3. The manufacturer warrants that all installed system components (cable, connectors, etc.) will, under normal use and service, comply with ANSI/TIA/EIA-568 performance specifications for a period of 15 years from the date of acceptance. Any replacements required to comply shall be provided at no additional material or labor costs to the Owner regardless of the structured cabling system specified and the standard manufacturer warranty. The contractor will be held responsible for making up any deficiencies in the manufacturers warranty and may be required by the Owner to post a performance bond for the entire 15 year period in order to comply with these specifications.
PART 2 - PRODUCTS

2.1 GENERAL

A. Provide a continuous single cable, homogeneous in nature for every cable run. Splices are not permitted.

2.2 CABLES

A. Horizontal Category 6 Unshielded Twisted Pair (UTP) Cable

1. Provide cable suitable for indoor installation.
2. Provide cable with 4 twisted pairs of insulated copper conductors per cable, 24 AWG solid copper, fully insulated with retardant low-smoke thermoplastic material, plenum NEC, CMP rated and UL listed as such.
5. Provide cable with blue and gray jacket.
6. Manufacturer
   a. AMP: Category 6 UTP cable
   b. Belden: Datatwist 2400
   c. Berk-Tek: LANmark-6
   d. Commscope: Media 6 cable
   e. Mohawk: 6 LAN cable
   f. Superior Essex: Series 77

B. Fiber Optic Cable

1. Optical fiber backbone cabling system shall provide interconnections between communications equipment rooms, main terminal space, and entrance facilities in the telecommunications cabling system structure. Cabling system consists of backbone cables, intermediate and main cross-connects, mechanical terminations, and patch cords or jumpers used for backbone-to-backbone cross-connection.
2. Single mode, 9/125-micrometer, 12 fibers, single loose tube, optical fiber cable.
3. Maximum Attenuation: 0.5 dB/km at 1310 nm; 0.5 dB/km at 1550 nm.
4. Jacket:
   a. Jacket Color: Yellow
   b. Cable cordage jacket, fiber, unit, and group color shall be according to TIA-598-D.
   c. Imprinted with fiber count, fiber type, and aggregate length at regular intervals not to exceed 40 inches (1000 mm).
5. Comply with TIA-492CAAA for detailed specifications.
7. Comply with ICEA S-104-696 for mechanical properties.
8. Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 444, UL 1651, and NFPA 70 for the following types:
   a. Type requirements in subparagraphs below are minimum requirements and may need to be revised to suit Project. Types OFC, OFCR, OFCG, and OFCP are conductive optical-fiber cables that might have application in industrial settings. Retain options if "permitted substitutions," as defined in NFPA 70, are appropriate for this Project.
   b. Plenum Rated, Nonconductive: Type OFNP, complying with NFPA 262; Type OFNP in listed plenum communications raceway; or Type OFN, Type OFNG, Type OFNP, or Type OFNR in metallic conduit.
   c. Riser Rated, Nonconductive: Type OFNP, or Type OFNR in metallic conduit installed per NFPA 70, Article 300.22, "Wiring in Ducts, Plenums, and Other Air-Handling Spaces."

C. CATV Coax Cable
1. RG-6/U: UL Type CMP.
   a. No. 18 AWG, solid, copper-covered steel conductor.
   b. Plenum rated.
   c. Gas-injected, foam-PE insulation.
   d. Shielded with 100 percent aluminum tape and [40] [60] percent aluminum braid.
   e. Double shielded with 100 percent aluminum foil shield, 60 percent aluminum braided inner shield, and 40 percent aluminum braided outer shield.
   f. Jacketed with PVC or PE.
   g. Suitable for indoor installations.

D. HDMI Cable:
1. HDMI 2.0
2. Plenum Rated

2.3 LAN EQUIPMENT RACK

A. Provide LAN equipment racks from one manufacturer.

B. Provide LAN equipment racks conforming to TIA/EIA standards with the following features and characteristics and accessories:
1. 19-inch wide, 84" high, two-post and four-post, as indicated, high strength aluminum construction, EIA – 310-D.
2. Loading capacity: 1,000 pounds (455 kg) for the two-post rack; and 1,400 pounds (635 kg) for the four-post rack.
3. 19" rack mounting rails with TIA/EIA hole pattern.
   a. Round punched holes for the two-post vertical rails.
   b. Square punched holes for the four-post vertical rails.
4. Floor mounting hardware.
5. Equipment mounting hardware: 20 sets for each rack.
6. Vertical cable management with front and rear access.
7. Horizontal cable management, top and bottom.
8. Equipment shelves: None.
10. Baked-polyester powder coat finish, black.
11. Manufacturers (four-post rack)
    a. Chatsworth CPI: Model 15254-703
    b. Hoffman: Model E4DRS19FM45U
    c. Hubbell Premise: Model SF841929
    d. Panduit: Model R4PCN
12. Manufacturers (two-post rack)
    a. Chatsworth CPI: Model 48353-703
    b. Hoffman: Model EDR19FM45U
    c. Hubbell Premise: Model HPW84RR19
    d. Panduit: Model R2P

2.4 PATCH PANELS

   A. Horizontal Cabling Patch Panel
      1. One-piece steel construction, modular or punch-down type, suitable for rack
         mounting, with factory-applied black baked enamel finish, with devices, junction
         fittings and other matching accessories as required for a complete Category 6 system
         and per UL 1863.

2.5 CONNECTORS

   A. Category 6 Modular Connectors
      1. 8 position modular connector, Category 6 certified, universal label coded for T568A
         and/or T568B wiring schemes.
      2. Manufacturer
         a. AMP: SL Series, white.
         b. Panduit: Mini-Com TX6 Series, white.
         c. Or as approved.
B. Fiber Optic Cable Connecting Hardware:
   1. Comply with Optical Fiber Connector Intermateability Standards (FOCIS) specifications of TIA-604-10-B for Type LC connectors.
   2. Quick-connect, simplex and duplex, Type LC connectors. Insertion loss not more than 0.25 dB.

C. Coax Connectors
   1. Type F Connectors

D. HDMI Connectors
   1. HDMI Type A Connector

2.6 DATA OUTLETS

A. Provide outlet box, minimum 53-mm (2-1/8 inches) deep and faceplate with one connection port for wall mounted applications.

B. Provide white colored faceplates for wall mounted applications.

C. Provide faceplates that match the color of the modular furniture for furniture mounted applications.

D. Faceplate Manufacturer
   1. Wall Mounted: Ortronics faceplate, or as approved.
   2. Furniture Mounted: AMP SL Series 1-1375006-1 furniture faceplate with OEI adapter plate or Ortronics OR-42100054 plate and OR-40700073 bezel. Or provide Leviton #49910-HG2 suitable for Herman Miller furniture.

E. Wall Phones
   1. Provide a stainless-steel keystone wall mount telephone plate with Category 6 jack as specified.

2.7 CABLE MANAGEMENT AND SUPPORT

A. Wire Mesh Cable Tray
   1. Manufacturers
      a. GS Metals: Flex Tray
      b. B-line: Wire Basket
      c. Cablofil: EZ Tray
   2. Provide welded steel wire mesh cable tray with a 50-mm (2-inch) by 100-mm (4-inch) mesh size and a minimum wire diameter of 0.197-inches.
   3. Provide cable tray dimensions of 50-mm (2-inches) usable load depth by 300-mm (12-
inches) wide.
4. Construct units with rounded edges and smooth surfaces, hot-dipped galvanized after fabrication.
5. Provide connector assemblies, clamp assemblies, connector plates, etc as needed for a complete installation.

B. J-Hook Cable Support System
1. Provide J-hooks rated to support Category 6 cable and optical fiber cable, mounted 1500-mm (5-feet) on-center for support of horizontal cabling. Do not exceed 40 percent fill ratio.
2. Provide J-hooks with galvanized steel construction and 90 degree rolled safety edges.
3. Provide latched retainers to contain cables within the hook area.
4. Provide J-hooks with a static load capacity of 30 pounds per hook and fastener hole that accepts 6-mm (1/4-inch) bolts.
5. Manufacturer
   a. ERICO: CADDY Cablecat
   b. B-Line: Cable Hook System

2.8 LABELS
A. Horizontal Cables
1. Provide self-laminating adhesive labels, machine printable with a laser printer suitable for cable diameters installed.
2. Printable Area: 50-mm (2-inch) by 12-mm (1/2-inch).
4. Manufacturer:
   a. Panduit #PLL-40-Y3-1, white.

B. Faceplates
1. Provide faceplate labels for all outlet faceplates, machine printable with a laser printer.
3. Manufacturer:
   a. Panduit #CPPLF-5, white.

C. Outlets and Patch Panel
1. Provide labels for data cable termination locations, machine printable with a laser printer.
3. Manufacturer:
   a. Panduit #PLL-22-PO-1W white.
2.9 MISCELLANEOUS COMPONENTS

A. Velcro Cable Ties
   1. Provide Velcro plenum rated cable ties, in the same color as the cable to which it is being applied, 18-mm (¾-inch) with a minimum 50-mm (2-inch) overlap.
   2. Manufacturers:
      a. Panduit HLSP Series (Plenum rated)

PART 3 - EXECUTION

3.1 GENERAL

A. Install work in a neat, high quality manner and conform to applicable federal, state and local codes.

B. Repair or replace work completed by others that is defaced or destroyed.

C. Install cables in a manner to protect the cable from physical interference or damage.

D. Do not exceed manufacturer's minimum allowance for bend radius of the cable.

E. Do not exceed manufacturer's maximum allowance for pulling tension on cable.

F. Ground all racks and other such components per manufacturer's requirements.

3.2 INSTALLATION

A. Horizontal Cable
   1. Terminate cables with T568A or T568B wiring configuration. All terminations must be the same wiring configuration.
   2. Terminate data cable in accordance to manufacturer's instructions and TIA/EIA-568 standard installation practices.
   3. Support station cables at 1500-mm (5-feet) on-center using J-hook cable hangers.
   4. Do not exceed 90 meters (300-feet) in length from the termination at the user's faceplate to the termination at the DCR room.
   5. Enter LAN rack from the top.
   6. Provide a minimum of 150-mm (six-inches) of slack sheathed cable behind each station outlet faceplate. Coil the slack cable inside the junction box or raceway as per the cabling manufacturer's installation standards.
   7. Route data cables in cable tray in the MDF and IDF's and from cable tray to the LAN rack and terminate with specified jack into patch panel. Do not support cables to the outside of the cable tray.
   8. Coil any excess cable in the MDF and IDF's in an extended loop or figure-8 in the cable tray.
9. Route cables a minimum of 150-mm (6-inches) away from power sources to reduce interference from EMI.

10. Install cables with sufficient bending radius so as not to break or kink, shear or damage binders, or to interfere with transmission in any way.


12. Route cable homeruns, parallel and perpendicular to building structure allowing for bending radius, and along corridors for ease of access. Do not route cables through an adjacent space if a corridor borders at least one wall of the room.

13. Provide permanent machine generated labels on each end of the cable no more than 100-mm (4-inches) from the edge of the cable jacket.

14. Terminate cables in patch panels with Category 6 modular connectors.

B. LAN Equipment Racks
   1. Install rack in a secure manner per manufacturer’s recommendations and as indicated.
      a. Install seismic restraints for LAN racks in accordance with manufacturer’s recommendations for seismic zones 3 and 4 or as required by local building code.

C. Patch Panels
   1. Install Category 6 patch panels into LAN equipment rack.

D. Outlets and Connectors
   1. Provide station outlets with connectors.
   2. Provide permanent machine generated clear laminated labels on the front of each faceplate or surface box.

E. Installation of Cable Tray
   1. Install cable tray as indicated; in accordance with recognized industry practices, to ensure that the cable tray equipment complies with requirements of NEC, and applicable portions of NFPA 70B and NECA’s “Standards of Installation” pertaining to general electrical installation practices.
   2. Coordinate installation with other work as necessary to properly interface with other work.
   3. Provide sufficient space around cable tray to permit access for installing and maintaining cables.

3.3 RECORDS

A. Labeling
   1. Label the telecommunications system components in conformance with TIA/EIA-606 Administration Standards, including, but are not limited to, the following:
      a. Cables (both ends)
2. Permanently mark cable ends with machine-generated or stenciled (not handwritten) wrap-around labels with a self-laminating feature.

3. Permanently mark components, such as racks and patch panels, with machine-generated labels.

B. Records

1. Conform to TIA/EIA-606 Administration Standards containing as a minimum, the information as outlined in Table of Summary of Record Elements of TIA/EIA-606.

C. Label Format

1. Provide labels as shown on the drawings and in the Cable Labeling Schedule.

3.4 PROJECT CLOSE-OUT

A. Submit prior to final acceptance of System:

1. Test results  
   a. Provide test results as specified in Section 16720 / 27 0100.

2. Manuals for testing, operation and training including:
   a. 11"x17" prints of record drawings as described above.
   b. Manufacturer's original catalog information sheets for each component provided under this Section.
   c. Provide manuals in a white, 3-ring binder with front cover and spine clear pockets for insertion of the manual name and project information. Manual shall be indexed with individual dividers.

END OF SECTION 271500
SECTION 010100 - SUMMARY OF WORK

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY OF WORK

A. Project Name: Interior Renovations and Alterations to the Monmouth County Seaview Building

B. Project Location: 2407 NJ Route 66, Ocean Township, NJ, Block 141, Lot 1.02.

C. Project Description: Scope of work includes but is not limited to:

1. Removal and replacement of existing sanitary sewer lift station pump, including new and lateral patching of disturbed paving areas.
2. Removal and replacement of existing built-up roof with a new cold applied modified bitumen roof membrane.
3. Fit out of vacant space in the building to accommodate juvenile probation and child support.
4. Removal of existing partitions, flooring, and acoustical ceilings at the existing adult probation area and social services and the installation of new partitions and finishes to accommodate new layout.
5. Removal of non-functioning roof top units (RTU’s).
6. Servicing of existing RTU’s and installation of new RTU’s in areas of work.
7. Alterations to existing electrical service and fire detection and suppression systems to accommodate new occupancy.

D. This Section Includes the following:

1. Legal removal of existing materials indicated to be removed.
2. Installation of new materials as specified.

1.3 INTENT OF THE SPECIFICATIONS

A. The intent of these specifications is to describe the materials and methods of construction required for the performance of the work. In general, it is intended that the Contract Documents shall delineate the detailed extent of the work.

B. Before preparing and submitting a bid, it is mandatory that each bidder visit the site to determine the extent of the work. Each bidder shall fully inform itself prior to bidding as to existing conditions and limitations under which this work will be performed and shall include in its bid a sum to cover the cost of all items necessary to perform the work as set forth in the Contract Documents.

1. Protect all existing construction. Damage to existing construction or equipment shall be restored to the satisfaction of the Architect at no additional cost to the Owner.
2. Contractor shall be advised that the Contract for this work shall be awarded by the County of Monmouth after receipt of bids. If said bids are within budgeted amounts, the contract
work shall commence on or about August 1, 2019 and all work at Phase I shall be completed no later than June 1, 2020. The following milestone calendar dates shall apply w/liquidated damages from Notice of Award (NOA) – 7 to 8 weeks from receipt of bids:

1) Submittals/Shop Drawing Review & Approval – 45 days (45 days from NOA)
2) Phase I: Renovate Vacant Areas of Building, complete all other work noted on Phase I Phasing Plan & TCO issued – (not later than June 1, 2020)
3) Phase I: County relocates Adult Probation into temporary space in Renovated Phase I area – (46 calendar days duration, no work by contractor)
4) Phase II: Renovate vacated Adult Probation Area & TCO issued – (105 calendar days from date Owner has completely vacated work area)
5) Phase IIa: County vacates Phase IIa areas – (21 calendar days duration no work by contractor)
6) Phase IIa: Complete renovations at Social Service Suite and Sheriff’s Suite and C.O. issued – (80 calendar days duration from date Owner has completely vacated work area)

3. The following work schedule shall be strictly adhered to. Failure to do so shall be cause to immediately terminate the Agreement between Owner and Contractor. It shall be understood by all parties if work is to be performed on weekends and holidays, the Contractor can perform said work only if approved by the Owner before hand.

1) Working hours on Monday through Friday shall be 7:30 A.M. to 4:00 P.M.
2) On holidays, Saturdays and Sundays working hours shall be 9:00 A.M. to 3:00 P.M. (as approved by the Owner)

Note: Contractor shall verify local ordinances and adjust the above hours accordingly as to exact start and stoppage times allowed.

4. Contractor is advised that any & all work activities that impact the building occupants (excessive noise, dust, odors, safety issue) are to be performed after 4PM. These activities include but are not limited to; cutting of concrete floor slabs, modifications to roof steel, removal & replacement of roof membrane, installation of RTU’s.

5. Contractor shall upon completion of the day's work inspect and clean any debris and dust from spaces located in the area of work. Contractor shall provide all necessary precaution to protect existing building and contents during the removal and installation process. The Contractor shall be responsible to remove and replace any item or finishes damaged during the execution of the Work.

6. The contractor shall report any discrepancies between the documents and field conditions to the architect ten (10) days prior to submission of a proposal so that the architect may clarify the discrepancy. Failure to report any discrepancies will nullify any extra cost, once a contract has been awarded.

C. AWARD OF CONTRACT

1. It is the intention of the County of Monmouth to award this contract as soon as possible after receipt of the proposals.
2. Contractor’s use of the site shall not affect the safety of the building occupants and visitors. It will be the responsibility of the contractor to properly protect the site, and its materials and equipment. Further, no exit ways from the existing building shall be closed to impede the safe exiting of staff and the public from the building.
D. CONTRACTS

1. The specifications contain forms of proposal for a single overall contract including all the work necessary to provide the County of Monmouth with a Certificate of Occupancy for all work delineated in Section 1.2 of The Summary of Work.

E. KNOWLEDGE OF CONTRACT REQUIREMENTS

1. The contractor and his subcontractors, sub-subcontractors and materialmen shall consult in detail the general conditions, supplementary conditions, all division and sections of the specification, all drawings and all addenda for instructions and requirements pertaining to the work and shall provide all labor, materials, equipment and services necessary to furnish, install and complete the work in strict conformance with all provisions thereof.

2. The contractor will be held to have examined the site of the work prior to submitting its proposal and informed it, its subcontractors, sub-subcontractors and materialmen of all existing conditions affecting the execution of the work.

3. The contractor will be held to have examined the contract documents, and modifications thereto, as they may affect subdivisions of the work and informed it, its subcontractors, sub-subcontractors and materialmen of all conditions thereof affecting the execution of the work.

4. The scope of work for the contract is not necessarily limited to the description of each section of the specifications. Include all minor items not expressly indicated in the contract documents, or as might be found necessary as a result of field conditions, in order to complete the work as it is intended, without any gaps between the various subdivisions of work of the contractors and their subcontractors.

5. The contractor will be held to be thoroughly familiar with all conditions affecting labor in the neighborhood of the project including, but not limited to, Unions, incentive pay, procurement, living and commuting conditions and to have informed its subcontractor and sub-subcontractors thereof.

F. CONTRACT DOCUMENTS INFORMATION

1. The contract documents are prepared in accordance with available information as to existing conditions and locations. If, during construction, conditions are revealed at variance with the contract documents, notify the Architect immediately so that supplementary instructions may be issued.

2. The specifications determine the kinds and methods of installation of the various materials, the drawings establish the quantities, dimensions and details of materials, the schedules on the drawings give the location, type and extent of the material.

3. Should the drawings, specifications or schedules disagree in themselves or with either or both of the others, the better quality or greater quantity of work or materials shall be performed and provided, unless otherwise directed in writing by the Architect.

4. Dimensions given on the drawings govern scale measurements and large-scale drawings govern small-scale drawings, except as to anything omitted unless such omission is expressly noted on the larger scale drawings.

5. Whenever a material, article or piece of equipment is referred to in the singular number in the contract documents, it shall be the same as referring to it in the plural. As many such materials, articles or pieces of equipment shall be provided as are required to complete the work.

G. Contractor Use of Premises: Limit use of the premises to construction activities in areas indicated; allow for Owner occupancy and use by the public.
1. Confine operations to areas within Contract limits indicated. Portions of the site beyond areas in which construction operations are indicated are not to be disturbed.

2. Keep driveways and entrances clear at all times. Do not use these areas for parking or storage of materials. Schedule deliveries to minimize requirements for storage of materials.

H. Use of the Existing Building: Maintain the existing building in a weather tight condition throughout construction. Repair damage caused by construction operations. Take precautions necessary to protect the building and occupants during the construction period.

I. Full Owner Occupancy: The Owner will occupy the site and existing building during construction. Cooperate with the Owner to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with the Owner's operations.

J. Partial Owner Occupancy: The Owner reserves the right to occupy and place and install equipment in completed areas prior to Substantial Completion provided such occupancy does not interfere with completion of the Work. Placing of equipment and partial occupancy shall not constitute acceptance of the total Work.

1. A Certificate of Substantial Completion will be executed for each portion of the Work occupied prior to Owner occupancy.

2. Obtain a Certificate of Occupancy from local building officials prior to Owner occupancy.

K. It shall be understood that the working hours for this project shall be between the hours indicated above. All interior spaces affected by the work shall be swept clean daily and restored to its original condition at the end of each working day.

PART 2 – PRODUCTS (NOT APPLICABLE)

PART 3 – EXECUTION (NOT APPLICABLE)

END OF SECTION 010100
ADDENDUM NO 1 - JULY 5, 2019

INTERIOR RENOVATIONS & ALTERATIONS TO THE MONMOUTH COUNTY SEAVIEW BUILDING
297 ROUTE 965
OCEAN, NJ

ROOF PLAN & DETAILS

A-600
**NOTES:**

Fabricate and install components in accordance with project specifications and SMACNA requirements and standards.
Designed for screening small to mid-sized items for weapons, explosives, drugs and other contraband, the single-source, multi-energy 5333 X-ray inspection system is fast and easy to operate. Ideal for screening hand carried items such as purses, briefcases, backpacks, strollers, small parcels and more, the compact 5333 is a great choice for small or limited spaces. The system’s low profile, bottom-up generator design makes fine lines appear much sharper and larger on-screen.

- Rapidly images full mailbags and long or tall items
- Fits in elevators, narrow halls and tight spaces
- Patented guided conveyor belt never needs adjusting
- Built on the industry’s most stable and flexible operating system

APPLICATIONS:
- Passenger, Staff and Visitor Checkpoint Inspection
- Corporate, Government and Private Security
- Critical Infrastructure Security
- Mail Screening
## 5333 SPECIFICATIONS

### PHYSICAL DETAILS
- **Tunnel Size:** 53.0 x 53.0 cm
- **Dimensions:**
  - 125.4 x 72.1 x 111.4 cm
  - 49.4 x 28.4 x 43.6 in. (L x W x H)
- **Weight:**
  - 236 kg (520 lbs.) uncrated
  - 313 kg (690 lbs.) crated
- **Construction:** Unibody heavy gauge epoxy painted steel construction with stainless steel and aluminum trim and accessories; non-marking casters
- **Temperature:**
  - Operating: 0° to 40°C (32° to 104°F)
  - Storage: -20° to 60°C (-4° to 140°F)
- **Humidity:** 20% to 95%, non-condensing
- **Power Consumption:**
  - < 0.7 kVA 100, 120, 200, 220, 240, 250 volts
  - AC ±10%, < 7 amps 100, 120 volts AC ±10%, < 3.5 amps 200, 220, 240, 250 volt; all at 50 or 60 Hz

### X-RAY GENERATOR
- **X-ray Tube Head:** Self-contained with sealed oil bath cooling
- **High Voltage Rating:** 100 kV, operating at 90 kV
- **Duty Cycle:** 100%
- **Beam Orientation:** Diagona (80° beam divergence)
- **Dose Per Exam:** 0.1 mR (~1 μSv)

### INSPECTION CAPABILITIES
- **Material Penetration:** 10–11 mm (0.39 – 0.43 in.) steel w/100 kV
  - 28–29 mm (1.10–1.14 in.) steel w/160 kV
- **Contrast Sensitivity:** Over 2 million color tones standard
- **Resolution:** 40 AWG wire
- **Processing:**
  - 32-bit adaptive image processing with minimum 1 Gbytes+ memory; 2.2GHz+ dual core processor; video processing using next generation graphical processing unit architecture with 550MHz+ GPU clock, 512Mbyte+ video memory and 32+ stream processing cores
- **Conveyor Speed:**
  - 24.0 cm (9.4 in.) per second
  - 14.6 m (48 ft.) per minute
- **Pulling Weight:** 150 kg (331 lbs.)
- **Film Safety:** Guaranteed for high-speed film up to ISO 1600 (33 DIN)

### DETECTORS
- High-speed, ultra-sensitive photodiode detector array; L-shaped for 100% object screening

### VIDEO
- 17" color LCD monitor, 1280 x 1024 video card

### STANDARD FEATURES
- autoSoft operating system
- Full-size operator control panel (OCP) with touchpad navigation
- autoTracking guided conveyor belt system
- Reversible conveyor direction
- High/low density stripping
- Organic/inorganic stripping
- Color; reverse B/W Imaging
- Interactive help screens
- 128x Smart Zoom
- Adjustable zoom preview window
- D-SCAN
- Dark and light enhance
- RealClear
- autoDensAlert
- autoOutline
- autoSensing
- autoScale
- autoCal
- auto/image recall (10 images)
- Z-SCAN
- Save screen to USB

### OPTIONS
- 160 kV generator, operating at 140 kV
- Loading or exit rollerbeds
- Tunnel extensions
- Conveyor extensions
- Loading or exit 18" parcel slide
- Tropical humidity kit
- DVD drive
- autoMatAlert¹
- autoZ display
- Image archiving
- Threat image projection (TIP)
- Built-in training
- Level 1, 2 and 3 networking
- User management
- STI Viewer software for archived image analysis
- Locking metal OCP cover
- Variable height OCP mount
- Dual and larger monitors
- Monitor platform
- Locking monitor garage
- Laser printer
- Console desk
- KV, mA meter
- Uninterruptible power supply
- Optical X-ray on/off sensor
- Footpad
- Item counter

¹ Not available as an option with 100 kV configuration.

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**NOTE:** Non-marking casters. Dimensions are in centimeters.

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