

PROJECT MANUAL

For the

JAMES F. BYRNES HIGH SCHOOL PHASE II DEMOLITION

For

District Five Schools of Spartanburg County
Duncan, South Carolina

GMP SET

McMillan Pazdan Smith

Spartanburg, South Carolina

MPS Project # 020420.00

January 31, 2022

TABLE OF CONTENTS

DIVISION 00 - PROCUREMENT AND CONTRACTING REQUIREMENTS

00 00 03	A201-2017 GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION
00 01 01	PROJECT TITLE PAGE
00 01 07	SEALS PAGE
00 01 15	LIST OF DRAWINGS
00 21 13	INSTRUCTION TO BIDDERS
00 26 00	PROCUREMENT SUBSTITUTION PROCEDURES
00 31 19	EXISTING CONDITION INFORMATION
00 31 26	EXISTING HAZARDOUS MATERIAL INFORMATION
	BYRNES HS PHASE II DEMO ACM REPORT – Crossroads July 27, 2021
	BYRNES HS PHASE II DEMO ACM REPORT – Crossroads February 2, 2022
00 31 32	GEOTECHNICAL DATA
	REPORT OF GEOTECHNICAL EXPLORATION – S&ME September 19, 2014
00 43 73	PROPOSED SCHEDULE OF VALUES FORM
00 60 00	PROJECT FORMS
00 60 01	SUPPLEMENTARY CONDITIONS

SPECIFICATIONS GROUP *General Requirements Subgroup*

DIVISION 01 - GENERAL REQUIREMENTS

01 10 00	SUMMARY
01 21 00	ALLOWANCES
01 22 00	UNIT PRICES
01 25 00	SUBSTITUTION PROCEDURES
01 26 00	CONTRACT MODIFICATION PROCEDURES
01 29 00	PAYMENT PROCEDURES
01 31 00	PROJECT MANAGEMENT AND COORDINATION
01 32 00	CONSTRUCTION PROGRESS DOCUMENTATION
01 32 33	PHOTOGRAPHIC DOCUMENTATION
01 33 00	SUBMITTAL PROCEDURES
01 35 16	ALTERATION PROJECT PROCEDURES
01 40 00	QUALITY REQUIREMENTS
01 42 00	REFERENCES
01 45 35	SCDHEC CONSTRUCTION INSPECTIONS
01 50 00	TEMPORARY FACILITIES AND CONTROLS
01 57 23	TEMPORARY STORMWATER POLLUTION CONTROL
01 58 13	TEMPORARY PROJECT SIGNAGE
01 60 00	PRODUCT REQUIREMENTS
01 73 00	EXECUTION
01 74 19	CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL
01 77 00	CLOSEOUT PROCEDURES
01 78 23	OPERATION AND MAINTENANCE DATA
01 78 39	PROJECT RECORD DOCUMENTS

DIVISION 02	- EXISTING CONDITIONS
02 41 16	STRUCTURE DEMOLITION
02 41 19	SELECTIVE DEMOLITION
DIVISION 05	- MASONRY
05 40 00	COLD-FORMED METAL FRAMING
DIVISION 06	- WOOD, PLASTICS, AND COMPOSITES
06 10 53	MISCELLANEOUS ROUGH CARPENTRY
06 16 00	SHEATHING
DIVISION 07	- THERMAL AND MOISTURE PROTECTION
07 21 19	FOAMED-IN-PLACE INSULATION
07 54 23	THERMOPLASTIC-POLOLEFIN (TPO) ROOFING
07 62 00	SHEET METAL FLASHING AND TRIM
07 84 13	PENETRATION FIRESTOPPING
07 92 00	JOINT SEALANTS
DIVISION 09	- FINISHES
09 29 00	GYPSUM BOARD
09 51 23	ACOUSTICAL TILE CEILINGS
09 65 13	RESILIENT BASE AND ACCESSORIES
09 65 19	RESILIENT TILE FLOORING
DIVISION 23	- EXTERIOR IMPROVEMENTS
23 00 01	HEATING, VENTILATING AND AIR CONDITIONING
DIVISION 31	- EARTHWORK
31 05 23	CONCRETE
31 20 00	EARTHWORK
31 25 00	ENVIROMENTAL PROTECTION
DIVISION 32	- EXISTING CONDITIONS
32 12 16	HOT-MIX ASHALT PAVING
32 31 13	CHAIN LINK FENCES AND GATES
32 92 00	GRASSING
32 92 01	TEMPORARY GRASS
DIVISION 33	- UTILITIES
33 31 00	SANITARY SEWER
33 41 00	STORM UTILITY DRAINAGE PIPING

END OF TABLE OF CONTENTS

AIA® Document A201® – 2017

General Conditions of the Contract for Construction

for the following PROJECT:

(Name and location or address)

James F. Byrnes High School Phase II Demolition
150 E. Main Street
Duncan, South Carolina 29334

THE OWNER:

(Name, legal status and address)

District Five Schools of Spartanburg County
100 N. Danzler Road
Duncan, SC 29334
864-949-2350

THE ARCHITECT:

(Name, legal status and address)

McMillan Pazdan Smith Architecture
127 Dunbar Street
Spartanburg, SC 29306
864-585-5678

TABLE OF ARTICLES

1	GENERAL PROVISIONS
2	OWNER
3	CONTRACTOR
4	ARCHITECT
5	SUBCONTRACTORS
6	CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS
7	CHANGES IN THE WORK
8	TIME
9	PAYMENTS AND COMPLETION
10	PROTECTION OF PERSONS AND PROPERTY
11	INSURANCE AND BONDS
12	UNCOVERING AND CORRECTION OF WORK
13	MISCELLANEOUS PROVISIONS

ADDITIONS AND DELETIONS:

The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed. A vertical line in the left margin of this document indicates where the author has added necessary information and where the author has added to or deleted from the original AIA text.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

For guidance in modifying this document to include supplementary conditions, see AIA Document A503™, Guide for Supplementary Conditions.

Init.

14 **TERMINATION OR SUSPENSION OF THE CONTRACT**

15 **CLAIMS AND DISPUTES**

Init.

AIA Document A201® – 2017. Copyright © 1911, 1915, 1918, 1925, 1937, 1951, 1958, 1961, 1963, 1966, 1970, 1976, 1987, 1997, 2007 and 2017 by The American Institute of Architects. All rights reserved. The "American Institute of Architects," "AIA," the AIA Logo, "A201," and "AIA Contract Documents" are registered trademarks and may not be used without permission. This document was produced by AIA software at 15:26:20 ET on 02/01/2022 under Order No.3104236402 which expires on 01/09/2023, is not for resale, is licensed for one-time use only, and may only be used in accordance with the AIA Contract Documents® Terms of Service. To report copyright violations, e-mail copyright@aia.org.
User Notes:

INDEX

(Topics and numbers in bold are Section headings.)

Acceptance of Nonconforming Work

9.6.6, 9.9.3, **12.3**

Acceptance of Work

9.6.6, 9.8.2, 9.9.3, 9.10.1, 9.10.3, 12.3

Access to Work

3.16, 6.2.1, 12.1

Accident Prevention

10

Acts and Omissions

3.2, 3.3.2, 3.12.8, 3.18, 4.2.3, 8.3.1, 9.5.1, 10.2.5,

10.2.8, 13.3.2, 14.1, 15.1.2, 15.2

Addenda

1.1.1

Additional Costs, Claims for

3.7.4, 3.7.5, 10.3.2, 15.1.5

Additional Inspections and Testing

9.4.2, 9.8.3, 12.2.1, **13.4**

Additional Time, Claims for

3.2.4, 3.7.4, 3.7.5, 3.10.2, 8.3.2, **15.1.6**

Administration of the Contract

3.1.3, **4.2**, 9.4, 9.5

Advertisement or Invitation to Bid

1.1.1

Aesthetic Effect

4.2.13

Allowances

3.8

Applications for Payment

4.2.5, 7.3.9, 9.2, **9.3**, 9.4, 9.5.1, 9.5.4, 9.6.3, 9.7, 9.10

Approvals

2.1.1, 2.3.1, 2.5, 3.1.3, 3.10.2, 3.12.8, 3.12.9,

3.12.10.1, 4.2.7, 9.3.2, 13.4.1

Arbitration

8.3.1, 15.3.2, **15.4**

ARCHITECT

4

Architect, Definition of

4.1.1

Architect, Extent of Authority

2.5, 3.12.7, 4.1.2, 4.2, 5.2, 6.3, 7.1.2, 7.3.4, 7.4, 9.2,
9.3.1, 9.4, 9.5, 9.6.3, 9.8, 9.10.1, 9.10.3, 12.1, 12.2.1,
13.4.1, 13.4.2, 14.2.2, 14.2.4, 15.1.4, 15.2.1

Architect, Limitations of Authority and Responsibility

2.1.1, 3.12.4, 3.12.8, 3.12.10, 4.1.2, 4.2.1, 4.2.2, 4.2.3,
4.2.6, 4.2.7, 4.2.10, 4.2.12, 4.2.13, 5.2.1, 7.4, 9.4.2,
9.5.4, 9.6.4, 15.1.4, 15.2

Architect's Additional Services and Expenses

2.5, 12.2.1, 13.4.2, 13.4.3, 14.2.4

Architect's Administration of the Contract

3.1.3, 3.7.4, 15.2, 9.4.1, 9.5

Architect's Approvals

2.5, 3.1.3, 3.5, 3.10.2, 4.2.7

Architect's Authority to Reject Work

3.5, 4.2.6, 12.1.2, 12.2.1

Architect's Copyright

1.1.7, 1.5

Architect's Decisions

3.7.4, 4.2.6, 4.2.7, 4.2.11, 4.2.12, 4.2.13, 4.2.14, 6.3,
7.3.4, 7.3.9, 8.1.3, 8.3.1, 9.2, 9.4.1, 9.5, 9.8.4, 9.9.1,
13.4.2, 15.2

Architect's Inspections

3.7.4, 4.2.2, 4.2.9, 9.4.2, 9.8.3, 9.9.2, 9.10.1, 13.4

Architect's Instructions

3.2.4, 3.3.1, 4.2.6, 4.2.7, 13.4.2

Architect's Interpretations

4.2.11, 4.2.12

Architect's Project Representative

4.2.10

Architect's Relationship with Contractor

1.1.2, 1.5, 2.3.3, 3.1.3, 3.2.2, 3.2.3, 3.2.4, 3.3.1, 3.4.2,
3.5, 3.7.4, 3.7.5, 3.9.2, 3.9.3, 3.10, 3.11, 3.12, 3.16,
3.18, 4.1.2, 4.2, 5.2, 6.2.2, 7, 8.3.1, 9.2, 9.3, 9.4, 9.5,
9.7, 9.8, 9.9, 10.2.6, 10.3, 11.3, 12, 13.3.2, 13.4, 15.2

Architect's Relationship with Subcontractors

1.1.2, 4.2.3, 4.2.4, 4.2.6, 9.6.3, 9.6.4, 11.3

Architect's Representations

9.4.2, 9.5.1, 9.10.1

Architect's Site Visits

3.7.4, 4.2.2, 4.2.9, 9.4.2, 9.5.1, 9.9.2, 9.10.1, 13.4

Asbestos

10.3.1

Attorneys' Fees

3.18.1, 9.6.8, 9.10.2, 10.3.3

Award of Separate Contracts

6.1.1, 6.1.2

Award of Subcontracts and Other Contracts for Portions of the Work

5.2

Basic Definitions

1.1

Bidding Requirements

1.1.1

Binding Dispute Resolution

8.3.1, 9.7, 11.5, 13.1, 15.1.2, 15.1.3, 15.2.1, 15.2.5,
15.2.6.1, 15.3.1, 15.3.2, 15.3.3, 15.4.1

Bonds, Lien

7.3.4.4, 9.6.8, 9.10.2, 9.10.3

Bonds, Performance, and Payment

7.3.4.4, 9.6.7, 9.10.3, **11.1.2**, 11.1.3, **11.5**

Building Information Models Use and Reliance

1.8

Building Permit

3.7.1

Capitalization

1.3

Certificate of Substantial Completion

9.8.3, 9.8.4, 9.8.5

Certificates for Payment

4.2.1, 4.2.5, 4.2.9, 9.3.3, **9.4**, 9.5, 9.6.1, 9.6.6, 9.7, 9.10.1, 9.10.3, 14.1.1.3, 14.2.4, 15.1.4

Certificates of Inspection, Testing or Approval
13.4.4

Certificates of Insurance
9.10.2

Change Orders

1.1.1, 3.4.2, 3.7.4, 3.8.2.3, 3.11, 3.12.8, 4.2.8, 5.2.3, 7.1.2, 7.1.3, **7.2**, 7.3.2, 7.3.7, 7.3.9, 7.3.10, 8.3.1, 9.3.1.1, 9.10.3, 10.3.2, 11.2, 11.5, 12.1.2

Change Orders, Definition of
7.2.1

CHANGES IN THE WORK

2.2.2, 3.11, 4.2.8, **7**, 7.2.1, 7.3.1, 7.4, 8.3.1, 9.3.1.1, 11.5

Claims, Definition of
15.1.1

Claims, Notice of
1.6.2, 15.1.3

CLAIMS AND DISPUTES

3.2.4, 6.1.1, 6.3, 7.3.9, 9.3.3, 9.10.4, 10.3.3, **15**, 15.4
Claims and Timely Assertion of Claims
15.4.1

Claims for Additional Cost

3.2.4, 3.3.1, 3.7.4, 7.3.9, 9.5.2, 10.2.5, 10.3.2, **15.1.5**

Claims for Additional Time

3.2.4, 3.3.1, 3.7.4, 6.1.1, 8.3.2, 9.5.2, 10.3.2, **15.1.6**

Concealed or Unknown Conditions, Claims for

3.7.4

Claims for Damages
3.2.4, 3.18, 8.3.3, 9.5.1, 9.6.7, 10.2.5, 10.3.3, 11.3, 11.3.2, 14.2.4, 15.1.7

Claims Subject to Arbitration
15.4.1

Cleaning Up

3.15, 6.3
Commencement of the Work, Conditions Relating to
2.2.1, 3.2.2, 3.4.1, 3.7.1, 3.10.1, 3.12.6, 5.2.1, 5.2.3, 6.2.2, 8.1.2, 8.2.2, 8.3.1, 11.1, 11.2, **15.1.5**

Commencement of the Work, Definition of
8.1.2

Communications

3.9.1, **4.2.4**
Completion, Conditions Relating to
3.4.1, 3.11, 3.15, 4.2.2, 4.2.9, 8.2, 9.4.2, 9.8, 9.9.1, 9.10, 12.2, 14.1.2, 15.1.2

COMPLETION, PAYMENTS AND

9
Completion, Substantial
3.10.1, 4.2.9, 8.1.1, 8.1.3, 8.2.3, 9.4.2, 9.8, 9.9.1, 9.10.3, 12.2, 15.1.2

Compliance with Laws
2.3.2, 3.2.3, 3.6, 3.7, 3.12.10, 3.13, 9.6.4, 10.2.2, 13.1, 13.3, 13.4.1, 13.4.2, 13.5, 14.1.1, 14.2.1.3, 15.2.8, 15.4.2, 15.4.3

Concealed or Unknown Conditions
3.7.4, 4.2.8, 8.3.1, 10.3

Conditions of the Contract
1.1.1, 6.1.1, 6.1.4

Consent, Written
3.4.2, 3.14.2, 4.1.2, 9.8.5, 9.9.1, 9.10.2, 9.10.3, 13.2, 15.4.4.2

Consolidation or Joinder

15.4.4

CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

1.1.4, **6**

Construction Change Directive, Definition of
7.3.1

Construction Change Directives

1.1.1, 3.4.2, 3.11, 3.12.8, 4.2.8, 7.1.1, 7.1.2, 7.1.3, **7.3**, 9.3.1.1

Construction Schedules, Contractor's
3.10, 3.11, 3.12.1, 3.12.2, 6.1.3, 15.1.6.2

Contingent Assignment of Subcontracts
5.4, 14.2.2.2

Continuing Contract Performance

15.1.4
Contract, Definition of
1.1.2

CONTRACT, TERMINATION OR SUSPENSION OF THE

5.4.1.1, 5.4.2, 11.5, **14**
Contract Administration
3.1.3, 4, 9.4, 9.5

Contract Award and Execution, Conditions Relating to
3.7.1, 3.10, 5.2, 6.1

Contract Documents, Copies Furnished and Use of
1.5.2, 2.3.6, 5.3

Contract Documents, Definition of
1.1.1

Contract Sum

2.2.2, 2.2.4, 3.7.4, 3.7.5, 3.8, 3.10.2, 5.2.3, 7.3, 7.4, **9.1**, 9.2, 9.4.2, 9.5.1.4, 9.6.7, 9.7, 10.3.2, 11.5, 12.1.2, 12.3, 14.2.4, 14.3.2, 15.1.4.2, **15.1.5**, **15.2.5**

Contract Sum, Definition of
9.1

Contract Time
1.1.4, 2.2.1, 2.2.2, 3.7.4, 3.7.5, 3.10.2, 5.2.3, 6.1.5, 7.2.1.3, 7.3.1, 7.3.5, 7.3.6, 7, 7.3.10, 7.4, 8.1.1, 8.2.1, 8.2.3, 8.3.1, 9.5.1, 9.7, 10.3.2, 12.1.1, 12.1.2, 14.3.2, 15.1.4.2, 15.1.6.1, 15.2.5

Contract Time, Definition of
8.1.1

CONTRACTOR

3
Contractor, Definition of
3.1, **6.1.2**

Contractor's Construction and Submittal Schedules

3.10, 3.12.1, 3.12.2, 4.2.3, 6.1.3, 15.1.6.2

Contractor's Employees
2.2.4, 3.3.2, 3.4.3, 3.8.1, 3.9, 3.18.2, 4.2.3, 4.2.6, 10.2, 10.3, 11.3, 14.1, 14.2.1.1

Contractor's Liability Insurance
11.1
Contractor's Relationship with Separate Contractors and Owner's Forces
3.12.5, 3.14.2, 4.2.4, 6, 11.3, 12.2.4
Contractor's Relationship with Subcontractors
1.2.2, 2.2.4, 3.3.2, 3.18.1, 3.18.2, 4.2.4, 5, 9.6.2, 9.6.7, 9.10.2, 11.2, 11.3, 11.4
Contractor's Relationship with the Architect
1.1.2, 1.5, 2.3.3, 3.1.3, 3.2.2, 3.2.3, 3.2.4, 3.3.1, 3.4.2, 3.5.1, 3.7.4, 3.10, 3.11, 3.12, 3.16, 3.18, 4.2, 5.2, 6.2.2, 7, 8.3.1, 9.2, 9.3, 9.4, 9.5, 9.7, 9.8, 9.9, 10.2.6, 10.3, 11.3, 12, 13.4, 15.1.3, 15.2.1
Contractor's Representations
3.2.1, 3.2.2, 3.5, 3.12.6, 6.2.2, 8.2.1, 9.3.3, 9.8.2
Contractor's Responsibility for Those Performing the Work
3.3.2, 3.18, 5.3, 6.1.3, 6.2, 9.5.1, 10.2.8
Contractor's Review of Contract Documents
3.2
Contractor's Right to Stop the Work
2.2.2, 9.7
Contractor's Right to Terminate the Contract
14.1
Contractor's Submittals
3.10, 3.11, 3.12, 4.2.7, 5.2.1, 5.2.3, 9.2, 9.3, 9.8.2, 9.8.3, 9.9.1, 9.10.2, 9.10.3
Contractor's Superintendent
3.9, 10.2.6
Contractor's Supervision and Construction Procedures
1.2.2, 3.3, 3.4, 3.12.10, 4.2.2, 4.2.7, 6.1.3, 6.2.4, 7.1.3, 7.3.4, 7.3.6, 8.2, 10, 12, 14, 15.1.4
Coordination and Correlation
1.2, 3.2.1, 3.3.1, 3.10, 3.12.6, 6.1.3, 6.2.1
Copies Furnished of Drawings and Specifications
1.5, 2.3.6, 3.11
Copyrights
1.5, **3.17**
Correction of Work
2.5, 3.7.3, 9.4.2, 9.8.2, 9.8.3, 9.9.1, 12.1.2, **12.2**, 12.3, 15.1.3.1, 15.1.3.2, 15.2.1
Correlation and Intent of the Contract Documents
1.2
Cost, Definition of
7.3.4
Costs
2.5, 3.2.4, 3.7.3, 3.8.2, 3.15.2, 5.4.2, 6.1.1, 6.2.3, 7.3.3.3, 7.3.4, 7.3.8, 7.3.9, 9.10.2, 10.3.2, 10.3.6, 11.2, 12.1.2, 12.2.1, 12.2.4, 13.4, 14
Cutting and Patching
3.14, 6.2.5

Damage to Construction of Owner or Separate Contractors
3.14.2, 6.2.4, 10.2.1.2, 10.2.5, 10.4, 12.2.4
Damage to the Work
3.14.2, 9.9.1, 10.2.1.2, 10.2.5, 10.4, 12.2.4
Damages, Claims for
3.2.4, 3.18, 6.1.1, 8.3.3, 9.5.1, 9.6.7, 10.3.3, 11.3.2, 11.3, 14.2.4, 15.1.7
Damages for Delay
6.2.3, 8.3.3, 9.5.1.6, 9.7, 10.3.2, 14.3.2
Date of Commencement of the Work, Definition of
8.1.2
Date of Substantial Completion, Definition of
8.1.3
Day, Definition of
8.1.4
Decisions of the Architect
3.7.4, 4.2.6, 4.2.7, 4.2.11, 4.2.12, 4.2.13, 6.3, 7.3.4, 7.3.9, 8.1.3, 8.3.1, 9.2, 9.4, 9.5.1, 9.8.4, 9.9.1, 13.4.2, 14.2.2, 14.2.4, 15.1, 15.2
Decisions to Withhold Certification
9.4.1, **9.5**, 9.7, 14.1.1.3
Defective or Nonconforming Work, Acceptance, Rejection and Correction of
2.5, 3.5, 4.2.6, 6.2.3, 9.5.1, 9.5.3, 9.6.6, 9.8.2, 9.9.3, 9.10.4, 12.2.1
Definitions
1.1, 2.1.1, 3.1.1, 3.5, 3.12.1, 3.12.2, 3.12.3, 4.1.1, 5.1, 6.1.2, 7.2.1, 7.3.1, 8.1, 9.1, 9.8.1, 15.1.1
Delays and Extensions of Time
3.2, **3.7.4**, 5.2.3, 7.2.1, 7.3.1, **7.4**, **8.3**, 9.5.1, **9.7**, 10.3.2, **10.4**, 14.3.2, **15.1.6**, 15.2.5
Digital Data Use and Transmission
1.7
Disputes
6.3, 7.3.9, 15.1, 15.2
Documents and Samples at the Site
3.11
Drawings, Definition of
1.1.5
Drawings and Specifications, Use and Ownership of
3.11
Effective Date of Insurance
8.2.2
Emergencies
10.4, 14.1.1.2, **15.1.5**
Employees, Contractor's
3.3.2, 3.4.3, 3.8.1, 3.9, 3.18.2, 4.2.3, 4.2.6, 10.2, 10.3.3, 11.3, 14.1, 14.2.1.1
Equipment, Labor, or Materials
1.1.3, 1.1.6, 3.4, 3.5, 3.8.2, 3.8.3, 3.12, 3.13, 3.15.1, 4.2.6, 4.2.7, 5.2.1, 6.2.1, 7.3.4, 9.3.2, 9.3.3, 9.5.1.3, 9.10.2, 10.2.1, 10.2.4, 14.2.1.1, 14.2.1.2
Execution and Progress of the Work
1.1.3, 1.2.1, 1.2.2, 2.3.4, 2.3.6, 3.1, 3.3.1, 3.4.1, 3.7.1, 3.10.1, 3.12, 3.14, 4.2, 6.2.2, 7.1.3, 7.3.6, 8.2, 9.5.1, 9.9.1, 10.2, 10.3, 12.1, 12.2, 14.2, 14.3.1, 15.1.4

Extensions of Time
3.2.4, 3.7.4, 5.2.3, 7.2.1, 7.3, 7.4, 9.5.1, 9.7, 10.3.2, 10.4, 14.3, 15.1.6, **15.2.5**

Failure of Payment
9.5.1.3, **9.7**, 9.10.2, 13.5, 14.1.1.3, 14.2.1.2

Faulty Work
(See Defective or Nonconforming Work)

Final Completion and Final Payment
4.2.1, 4.2.9, 9.8.2, **9.10**, 12.3, 14.2.4, 14.4.3

Financial Arrangements, Owner's
2.2.1, 13.2.2, 14.1.1.4

GENERAL PROVISIONS

1

Governing Law

13.1

Guarantees (See Warranty)

Hazardous Materials and Substances
10.2.4, **10.3**

Identification of Subcontractors and Suppliers
5.2.1

Indemnification
3.17, **3.18**, 9.6.8, 9.10.2, 10.3.3, 11.3

Information and Services Required of the Owner
2.1.2, **2.2**, 2.3, 3.2.2, 3.12.10.1, 6.1.3, 6.1.4, 6.2.5, 9.6.1, 9.9.2, 9.10.3, 10.3.3, 11.2, 13.4.1, 13.4.2, 14.1.1.4, 14.1.4, 15.1.4

Initial Decision
15.2

Initial Decision Maker, Definition of
1.1.8

Initial Decision Maker, Decisions
14.2.4, 15.1.4.2, 15.2.1, 15.2.2, 15.2.3, 15.2.4, 15.2.5

Initial Decision Maker, Extent of Authority
14.2.4, 15.1.4.2, 15.2.1, 15.2.2, 15.2.3, 15.2.4, 15.2.5

Injury or Damage to Person or Property
10.2.8, 10.4

Inspections
3.1.3, 3.3.3, 3.7.1, 4.2.2, 4.2.6, 4.2.9, 9.4.2, 9.8.3, 9.9.2, 9.10.1, 12.2.1, 13.4

Instructions to Bidders
1.1.1

Instructions to the Contractor
3.2.4, 3.3.1, 3.8.1, 5.2.1, 7, 8.2.2, 12, 13.4.2

Instruments of Service, Definition of
1.1.7

Insurance
6.1.1, 7.3.4, 8.2.2, 9.3.2, 9.8.4, 9.9.1, 9.10.2, 10.2.5, **11**

Insurance, Notice of Cancellation or Expiration
11.1.4, 11.2.3

Insurance, Contractor's Liability
11.1

Insurance, Effective Date of
8.2.2, 14.4.2

Insurance, Owner's Liability
11.2

Insurance, Property
10.2.5, 11.2, 11.4, 11.5

Insurance, Stored Materials
9.3.2

INSURANCE AND BONDS
11

Insurance Companies, Consent to Partial Occupancy
9.9.1

Insured loss, Adjustment and Settlement of
11.5

Intent of the Contract Documents
1.2.1, 4.2.7, 4.2.12, 4.2.13

Interest
13.5

Interpretation
1.1.8, 1.2.3, **1.4**, 4.1.1, 5.1, 6.1.2, 15.1.1

Interpretations, Written
4.2.11, 4.2.12

Judgment on Final Award
15.4.2

Labor and Materials, Equipment
1.1.3, 1.1.6, **3.4**, 3.5, 3.8.2, 3.8.3, 3.12, 3.13, 3.15.1, 5.2.1, 6.2.1, 7.3.4, 9.3.2, 9.3.3, 9.5.1.3, 9.10.2, 10.2.1, 10.2.4, 14.2.1.1, 14.2.1.2

Labor Disputes
8.3.1

Laws and Regulations
1.5, 2.3.2, 3.2.3, 3.2.4, 3.6, 3.7, 3.12.10, 3.13, 9.6.4, 9.9.1, 10.2.2, 13.1, 13.3.1, 13.4.2, 13.5, 14, 15.2.8, 15.4

Liens
2.1.2, 9.3.1, 9.3.3, 9.6.8, 9.10.2, 9.10.4, 15.2.8

Limitations, Statutes of
12.2.5, 15.1.2, 15.4.1.1

Limitations of Liability
3.2.2, 3.5, 3.12.10, 3.12.10.1, 3.17, 3.18.1, 4.2.6, 4.2.7, 6.2.2, 9.4.2, 9.6.4, 9.6.7, 9.6.8, 10.2.5, 10.3.3, 11.3, 12.2.5, 13.3.1

Limitations of Time
2.1.2, 2.2, 2.5, 3.2.2, 3.10, 3.11, 3.12.5, 3.15.1, 4.2.7, 5.2, 5.3, 5.4.1, 6.2.4, 7.3, 7.4, 8.2, 9.2, 9.3.1, 9.3.3, 9.4.1, 9.5, 9.6, 9.7, 9.8, 9.9, 9.10, 12.2, 13.4, 14, 15, 15.1.2, 15.1.3, 15.1.5

Materials, Hazardous
10.2.4, **10.3**

Materials, Labor, Equipment and
1.1.3, 1.1.6, 3.4.1, 3.5, 3.8.2, 3.8.3, 3.12, 3.13, 3.15.1, 5.2.1, 6.2.1, 7.3.4, 9.3.2, 9.3.3, 9.5.1.3, 9.10.2, 10.2.1.2, 10.2.4, 14.2.1.1, 14.2.1.2

Means, Methods, Techniques, Sequences and Procedures of Construction
3.3.1, 3.12.10, 4.2.2, 4.2.7, 9.4.2

Mechanic's Lien
2.1.2, 9.3.1, 9.3.3, 9.6.8, 9.10.2, 9.10.4, 15.2.8

Mediation
8.3.1, 15.1.3.2, 15.2.1, 15.2.5, 15.2.6, **15.3**, 15.4.1, 15.4.1.1

Minor Changes in the Work
1.1.1, 3.4.2, 3.12.8, 4.2.8, 7.1, **7.4**

MISCELLANEOUS PROVISIONS

13

Modifications, Definition of

1.1.1

Modifications to the Contract

1.1.1, 1.1.2, 2.5, 3.11, 4.1.2, 4.2.1, 5.2.3, 7, 8.3.1, 9.7, 10.3.2

Mutual Responsibility

6.2

Nonconforming Work, Acceptance of

9.6.6, 9.9.3, 12.3

Nonconforming Work, Rejection and Correction of
2.4, 2.5, 3.5, 4.2.6, 6.2.4, 9.5.1, 9.8.2, 9.9.3, 9.10.4, 12.2

Notice

1.6, 1.6.1, 1.6.2, 2.1.2, 2.2.2., 2.2.3, 2.2.4, 2.5, 3.2.4, 3.3.1, 3.7.4, 3.7.5, 3.9.2, 3.12.9, 3.12.10, 5.2.1, 7.4, 8.2.2, 9.6.8, 9.7, 9.10.1, 10.2.8, 10.3.2, 11.5, 12.2.2.1, 13.4.1, 13.4.2, 14.1, 14.2.2, 14.4.2, 15.1.3, 15.1.5, 15.1.6, 15.4.1

Notice of Cancellation or Expiration of Insurance

11.1.4, 11.2.3

Notice of Claims

1.6.2, 2.1.2, 3.7.4, 9.6.8, 10.2.8, 15.1.3, 15.1.5, 15.1.6, 15.2.8, 15.3.2, 15.4.1

Notice of Testing and Inspections

13.4.1, 13.4.2

Observations, Contractor's

3.2, 3.7.4

Occupancy

2.3.1, 9.6.6, 9.8

Orders, Written

1.1.1, 2.4, 3.9.2, 7, 8.2.2, 11.5, 12.1, 12.2.2.1, 13.4.2, 14.3.1

OWNER

2

Owner, Definition of

2.1.1

Owner, Evidence of Financial Arrangements

2.2, 13.2.2, 14.1.1.4

Owner, Information and Services Required of the

2.1.2, 2.2, 2.3, 3.2.2, 3.12.10, 6.1.3, 6.1.4, 6.2.5, 9.3.2, 9.6.1, 9.6.4, 9.9.2, 9.10.3, 10.3.3, 11.2, 13.4.1, 13.4.2, 14.1.1.4, 14.1.4, 15.1.4

Owner's Authority

1.5, 2.1.1, 2.3.32.4, 2.5, 3.4.2, 3.8.1, 3.12.10, 3.14.2, 4.1.2, 4.2.4, 4.2.9, 5.2.1, 5.2.4, 5.4.1, 6.1, 6.3, 7.2.1, 7.3.1, 8.2.2, 8.3.1, 9.3.2, 9.5.1, 9.6.4, 9.9.1, 9.10.2, 10.3.2, 11.4, 11.5, 12.2.2, 12.3, 13.2.2, 14.3, 14.4, 15.2.7

Owner's Insurance

11.2

Owner's Relationship with Subcontractors

1.1.2, 5.2, 5.3, 5.4, 9.6.4, 9.10.2, 14.2.2

Owner's Right to Carry Out the Work

2.5, 14.2.2

Owner's Right to Clean Up

6.3

Owner's Right to Perform Construction and to Award Separate Contracts

6.1

Owner's Right to Stop the Work

2.4

Owner's Right to Suspend the Work

14.3

Owner's Right to Terminate the Contract

14.2, 14.4

Ownership and Use of Drawings, Specifications and Other Instruments of Service

1.1.1, 1.1.6, 1.1.7, 1.5, 2.3.6, 3.2.2, 3.11, 3.17, 4.2.12, 5.3

Partial Occupancy or Use

9.6.6, 9.9

Patching, Cutting and

3.14, 6.2.5

Patents

3.17

Payment, Applications for

4.2.5, 7.3.9, 9.2, 9.3, 9.4, 9.5, 9.6.3, 9.7, 9.8.5, 9.10.1, 14.2.3, 14.2.4, 14.4.3

Payment, Certificates for

4.2.5, 4.2.9, 9.3.3, 9.4, 9.5, 9.6.1, 9.6.6, 9.7, 9.10.1, 9.10.3, 14.1.1.3, 14.2.4

Payment, Failure of

9.5.1.3, 9.7, 9.10.2, 13.5, 14.1.1.3, 14.2.1.2

Payment, Final

4.2.1, 4.2.9, 9.10, 12.3, 14.2.4, 14.4.3

Payment Bond, Performance Bond and

7.3.4.4, 9.6.7, 9.10.3, 11.1.2

Payments, Progress

9.3, 9.6, 9.8.5, 9.10.3, 14.2.3, 15.1.4

PAYMENTS AND COMPLETION

9

Payments to Subcontractors

5.4.2, 9.5.1.3, 9.6.2, 9.6.3, 9.6.4, 9.6.7, 14.2.1.2

PCB

10.3.1

Performance Bond and Payment Bond

7.3.4.4, 9.6.7, 9.10.3, 11.1.2

Permits, Fees, Notices and Compliance with Laws

2.3.1, 3.7, 3.13, 7.3.4.4, 10.2.2

PERSONS AND PROPERTY, PROTECTION OF

10

Polychlorinated Biphenyl

10.3.1

Product Data, Definition of

3.12.2

Product Data and Samples, Shop Drawings

3.11, 3.12, 4.2.7

Progress and Completion

4.2.2, 8.2, 9.8, 9.9.1, 14.1.4, 15.1.4

Progress Payments

9.3, 9.6, 9.8.5, 9.10.3, 14.2.3, 15.1.4

Project, Definition of
1.1.4
Project Representatives
4.2.10
Property Insurance
10.2.5, **11.2**
Proposal Requirements
1.1.1
PROTECTION OF PERSONS AND PROPERTY
10
Regulations and Laws
1.5, 2.3.2, 3.2.3, 3.6, 3.7, 3.12.10, 3.13, 9.6.4, 9.9.1,
10.2.2, 13.1, 13.3, 13.4.1, 13.4.2, 13.5, 14, 15.2.8, 15.4
Rejection of Work
4.2.6, 12.2.1
Releases and Waivers of Liens
9.3.1, 9.10.2
Representations
3.2.1, 3.5, 3.12.6, 8.2.1, 9.3.3, 9.4.2, 9.5.1, 9.10.1
Representatives
2.1.1, 3.1.1, 3.9, 4.1.1, 4.2.10, 13.2.1
Responsibility for Those Performing the Work
3.3.2, 3.18, 4.2.2, 4.2.3, 5.3, 6.1.3, 6.2, 6.3, 9.5.1, 10
Retainage
9.3.1, 9.6.2, 9.8.5, 9.9.1, 9.10.2, 9.10.3
Review of Contract Documents and Field
Conditions by Contractor
3.2, 3.12.7, 6.1.3
Review of Contractor's Submittals by Owner and
Architect
3.10.1, 3.10.2, 3.11, 3.12, 4.2, 5.2, 6.1.3, 9.2, 9.8.2
Review of Shop Drawings, Product Data and Samples
by Contractor
3.12
Rights and Remedies
1.1.2, 2.4, 2.5, 3.5, 3.7.4, 3.15.2, 4.2.6, 5.3, 5.4, 6.1,
6.3, 7.3.1, 8.3, 9.5.1, 9.7, 10.2.5, 10.3, 12.2.1, 12.2.2,
12.2.4, **13.3**, 14, 15.4
Royalties, Patents and Copyrights
3.17
Rules and Notices for Arbitration
15.4.1
Safety of Persons and Property
10.2, 10.4
Safety Precautions and Programs
3.3.1, 4.2.2, 4.2.7, 5.3, **10.1**, 10.2, 10.4
Samples, Definition of
3.12.3
Samples, Shop Drawings, Product Data and
3.11, **3.12**, 4.2.7
Samples at the Site, Documents and
3.11
Schedule of Values
9.2, 9.3.1
Schedules, Construction
3.10, 3.12.1, 3.12.2, 6.1.3, 15.1.6.2

Separate Contracts and Contractors
1.1.4, 3.12.5, 3.14.2, 4.2.4, 4.2.7, 6, 8.3.1, 12.1.2
Separate Contractors, Definition of
6.1.1
Shop Drawings, Definition of
3.12.1
Shop Drawings, Product Data and Samples
3.11, **3.12**, 4.2.7
Site, Use of
3.13, 6.1.1, 6.2.1
Site Inspections
3.2.2, 3.3.3, 3.7.1, 3.7.4, 4.2, 9.9.2, 9.4.2, 9.10.1, 13.4
Site Visits, Architect's
3.7.4, 4.2.2, 4.2.9, 9.4.2, 9.5.1, 9.9.2, 9.10.1, 13.4
Special Inspections and Testing
4.2.6, 12.2.1, 13.4
Specifications, Definition of
1.1.6
Specifications
1.1.1, **1.1.6**, 1.2.2, 1.5, 3.12.10, 3.17, 4.2.14
Statute of Limitations
15.1.2, 15.4.1.1
Stopping the Work
2.2.2, 2.4, 9.7, 10.3, 14.1
Stored Materials
6.2.1, 9.3.2, 10.2.1.2, 10.2.4
Subcontractor, Definition of
5.1.1
SUBCONTRACTORS
5
Subcontractors, Work by
1.2.2, 3.3.2, 3.12.1, 3.18, 4.2.3, 5.2.3, 5.3, 5.4, 9.3.1.2,
9.6.7
Subcontractual Relations
5.3, 5.4, 9.3.1.2, 9.6, 9.10, 10.2.1, 14.1, 14.2.1
Submittals
3.10, 3.11, 3.12, 4.2.7, 5.2.1, 5.2.3, 7.3.4, 9.2, 9.3, 9.8,
9.9.1, 9.10.2, 9.10.3
Submittal Schedule
3.10.2, 3.12.5, 4.2.7
Subrogation, Waivers of
6.1.1, **11.3**
Substances, Hazardous
10.3
Substantial Completion
4.2.9, 8.1.1, 8.1.3, 8.2.3, 9.4.2, **9.8**, 9.9.1, 9.10.3, 12.2,
15.1.2
Substantial Completion, Definition of
9.8.1
Substitution of Subcontractors
5.2.3, 5.2.4
Substitution of Architect
2.3.3
Substitutions of Materials
3.4.2, 3.5, 7.3.8
Sub-subcontractor, Definition of
5.1.2

Subsurface Conditions
3.7.4

Successors and Assigns
13.2

Superintendent
3.9, 10.2.6

Supervision and Construction Procedures
1.2.2, **3.3**, 3.4, 3.12.10, 4.2.2, 4.2.7, 6.1.3, 6.2.4, 7.1.3, 7.3.4, 8.2, 8.3.1, 9.4.2, 10, 12, 14, 15.1.4

Suppliers
1.5, 3.12.1, 4.2.4, 4.2.6, 5.2.1, 9.3, 9.4.2, 9.5.4, 9.6, 9.10.5, 14.2.1

Surety
5.4.1.2, 9.6.8, 9.8.5, 9.10.2, 9.10.3, 11.1.2, 14.2.2, 15.2.7

Surety, Consent of
9.8.5, 9.10.2, 9.10.3

Surveys
1.1.7, 2.3.4

Suspension by the Owner for Convenience
14.3

Suspension of the Work
3.7.5, 5.4.2, 14.3

Suspension or Termination of the Contract
5.4.1.1, 14

Taxes
3.6, 3.8.2.1, 7.3.4.4

Termination by the Contractor
14.1, 15.1.7

Termination by the Owner for Cause
5.4.1.1, **14.2**, 15.1.7

Termination by the Owner for Convenience
14.4

Termination of the Architect
2.3.3

Termination of the Contractor Employment
14.2.2

TERMINATION OR SUSPENSION OF THE CONTRACT

14

Tests and Inspections

3.1.3, 3.3.3, 3.7.1, 4.2.2, 4.2.6, 4.2.9, 9.4.2, 9.8.3, 9.9.2, 9.10.1, 10.3.2, 12.2.1, **13.4**

TIME

8

Time, Delays and Extensions of

3.2.4, 3.7.4, 5.2.3, 7.2.1, 7.3.1, 7.4, **8.3**, 9.5.1, 9.7, 10.3.2, 10.4, 14.3.2, 15.1.6, 15.2.5

Time Limits

2.1.2, 2.2, 2.5, 3.2.2, 3.10, 3.11, 3.12.5, 3.15.1, 4.2, 5.2, 5.3, 5.4, 6.2.4, 7.3, 7.4, 8.2, 9.2, 9.3.1, 9.3.3, 9.4.1, 9.5, 9.6, 9.7, 9.8, 9.9, 9.10, 12.2, 13.4, 14, 15.1.2, 15.1.3, 15.4

Time Limits on Claims

3.7.4, 10.2.8, 15.1.2, 15.1.3

Title to Work

9.3.2, 9.3.3

UNCOVERING AND CORRECTION OF WORK

12

Uncovering of Work

12.1

Unforeseen Conditions, Concealed or Unknown

3.7.4, 8.3.1, 10.3

Unit Prices

7.3.3.2, 9.1.2

Use of Documents

1.1.1, 1.5, 2.3.6, 3.12.6, 5.3

Use of Site

3.13, 6.1.1, 6.2.1

Values, Schedule of

9.2, 9.3.1

Waiver of Claims by the Architect

13.3.2

Waiver of Claims by the Contractor

9.10.5, 13.3.2, **15.1.7**

Waiver of Claims by the Owner

9.9.3, 9.10.3, 9.10.4, 12.2.2.1, 13.3.2, 14.2.4, **15.1.7**

Waiver of Consequential Damages

14.2.4, 15.1.7

Waiver of Liens

9.3, 9.10.2, 9.10.4

Waivers of Subrogation

6.1.1, **11.3**

Warranty

3.5, 4.2.9, 9.3.3, 9.8.4, 9.9.1, 9.10.2, 9.10.4, 12.2.2, 15.1.2

Weather Delays

8.3, 15.1.6.2

Work, Definition of

1.1.3

Written Consent

1.5.2, 3.4.2, 3.7.4, 3.12.8, 3.14.2, 4.1.2, 9.3.2, 9.10.3, 13.2, 13.3.2, 15.4.4.2

Written Interpretations

4.2.11, 4.2.12

Written Orders

1.1.1, 2.4, 3.9, 7, 8.2.2, 12.1, 12.2, 13.4.2, 14.3.1

ARTICLE 1 GENERAL PROVISIONS

§ 1.1 Basic Definitions

§ 1.1.1 The Contract Documents

The Contract Documents are enumerated in the Agreement between the Owner and Contractor (hereinafter the Agreement) and consist of the Agreement, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, Addenda issued prior to execution of the Contract, other documents listed in the Agreement, and Modifications issued after execution of the Contract. A Modification is (1) a written amendment to the Contract signed by both parties, (2) a Change Order, (3) a Construction Change Directive, or (4) a written order for a minor change in the Work issued by the Architect. Unless specifically enumerated in the Agreement, the Contract Documents do not include the advertisement or invitation to bid, Instructions to Bidders, sample forms, other information furnished by the Owner in anticipation of receiving bids or proposals, the Contractor's bid or proposal, or portions of Addenda relating to bidding or proposal requirements.

§ 1.1.2 The Contract

The Contract Documents form the Contract for Construction. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. The Contract may be amended or modified only by a Modification. The Contract Documents shall not be construed to create a contractual relationship of any kind (1) between the Contractor and the Architect or the Architect's consultants, (2) between the Owner and a Subcontractor or a Sub-subcontractor, (3) between the Owner and the Architect or the Architect's consultants, or (4) between any persons or entities other than the Owner and the Contractor. The Architect shall, however, be entitled to performance and enforcement of obligations under the Contract intended to facilitate performance of the Architect's duties.

§ 1.1.3 The Work

The term "Work" means the construction and services required by the Contract Documents, whether completed or partially completed, and includes all other labor, materials, equipment, and services provided or to be provided by the Contractor to fulfill the Contractor's obligations. The Work may constitute the whole or a part of the Project.

§ 1.1.4 The Project

The Project is the total construction of which the Work performed under the Contract Documents may be the whole or a part and which may include construction by the Owner and by Separate Contractors.

§ 1.1.5 The Drawings

The Drawings are the graphic and pictorial portions of the Contract Documents showing the design, location and dimensions of the Work, generally including plans, elevations, sections, details, schedules, and diagrams.

§ 1.1.6 The Specifications

The Specifications are that portion of the Contract Documents consisting of the written requirements for materials, equipment, systems, standards and workmanship for the Work, and performance of related services.

§ 1.1.7 Instruments of Service

Instruments of Service are representations, in any medium of expression now known or later developed, of the tangible and intangible creative work performed by the Architect and the Architect's consultants under their respective professional services agreements. Instruments of Service may include, without limitation, studies, surveys, models, sketches, drawings, specifications, and other similar materials.

§ 1.1.8 Initial Decision Maker

The Initial Decision Maker is the person identified in the Agreement to render initial decisions on Claims in accordance with Section 15.2. The Initial Decision Maker shall not show partiality to the Owner or Contractor and shall not be liable for results of interpretations or decisions rendered in good faith.

§ 1.2 Correlation and Intent of the Contract Documents

§ 1.2.1 The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all; performance by the Contractor shall be required only to the extent consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the indicated results.

§ 1.2.1.1 The invalidity of any provision of the Contract Documents shall not invalidate the Contract or its remaining provisions. If it is determined that any provision of the Contract Documents violates any law, or is otherwise invalid or unenforceable, then that provision shall be revised to the extent necessary to make that provision legal and enforceable. In such case the Contract Documents shall be construed, to the fullest extent permitted by law, to give effect to the parties' intentions and purposes in executing the Contract.

§ 1.2.2 Organization of the Specifications into divisions, sections and articles, and arrangement of Drawings shall not control the Contractor in dividing the Work among Subcontractors or in establishing the extent of Work to be performed by any trade.

§ 1.2.3 Unless otherwise stated in the Contract Documents, words that have well-known technical or construction industry meanings are used in the Contract Documents in accordance with such recognized meanings.

§ 1.3 Capitalization

Terms capitalized in these General Conditions include those that are (1) specifically defined, (2) the titles of numbered articles, or (3) the titles of other documents published by the American Institute of Architects.

§ 1.4 Interpretation

In the interest of brevity the Contract Documents frequently omit modifying words such as "all" and "any" and articles such as "the" and "an," but the fact that a modifier or an article is absent from one statement and appears in another is not intended to affect the interpretation of either statement.

§ 1.5 Ownership and Use of Drawings, Specifications, and Other Instruments of Service

§ 1.5.1 The Architect and the Architect's consultants shall be deemed the authors and owners of their respective Instruments of Service, including the Drawings and Specifications, and retain all common law, statutory, and other reserved rights in their Instruments of Service, including copyrights. The Contractor, Subcontractors, Sub-subcontractors, and suppliers shall not own or claim a copyright in the Instruments of Service. Submittal or distribution to meet official regulatory requirements or for other purposes in connection with the Project is not to be construed as publication in derogation of the Architect's or Architect's consultants' reserved rights.

§ 1.5.2 The Contractor, Subcontractors, Sub-subcontractors, and suppliers are authorized to use and reproduce the Instruments of Service provided to them, subject to any protocols established pursuant to Sections 1.7 and 1.8, solely and exclusively for execution of the Work. All copies made under this authorization shall bear the copyright notice, if any, shown on the Instruments of Service. The Contractor, Subcontractors, Sub-subcontractors, and suppliers may not use the Instruments of Service on other projects or for additions to the Project outside the scope of the Work without the specific written consent of the Owner, Architect, and the Architect's consultants.

§ 1.6 Notice

§ 1.6.1 Except as otherwise provided in Section 1.6.2, where the Contract Documents require one party to notify or give notice to the other party, such notice shall be provided in writing to the designated representative of the party to whom the notice is addressed and shall be deemed to have been duly served if delivered in person, by mail, by courier, or by electronic transmission if a method for electronic transmission is set forth in the Agreement.

§ 1.6.2 Notice of Claims as provided in Section 15.1.3 shall be provided in writing and shall be deemed to have been duly served only if delivered to the designated representative of the party to whom the notice is addressed by certified or registered mail, or by courier providing proof of delivery.

§ 1.7 Digital Data Use and Transmission

The parties shall agree upon protocols governing the transmission and use of Instruments of Service or any other information or documentation in digital form. The parties will use AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, to establish the protocols for the development, use, transmission, and exchange of digital data.

§ 1.8 Building Information Models Use and Reliance

Any use of, or reliance on, all or a portion of a building information model without agreement to protocols governing the use of, and reliance on, the information contained in the model and without having those protocols set forth in AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, and the requisite AIA Document

G202™–2013, Project Building Information Modeling Protocol Form, shall be at the using or relying party's sole risk and without liability to the other party and its contractors or consultants, the authors of, or contributors to, the building information model, and each of their agents and employees.

ARTICLE 2 OWNER

§ 2.1 General

§ 2.1.1 The Owner is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Owner shall designate in writing a representative who shall have express authority to bind the Owner with respect to all matters requiring the Owner's approval or authorization. Except as otherwise provided in Section 4.2.1, the Architect does not have such authority. The term "Owner" means the Owner or the Owner's authorized representative.

§ 2.1.2 The Owner shall furnish to the Contractor, within fifteen days after receipt of a written request, information necessary and relevant for the Contractor to evaluate, give notice of, or enforce mechanic's lien rights. Such information shall include a correct statement of the record legal title to the property on which the Project is located, usually referred to as the site, and the Owner's interest therein.

§ 2.2 Evidence of the Owner's Financial Arrangements

§ 2.2.1 Prior to commencement of the Work and upon written request by the Contractor, the Owner shall furnish to the Contractor reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract. The Contractor shall have no obligation to commence the Work until the Owner provides such evidence. If commencement of the Work is delayed under this Section 2.2.1, the Contract Time shall be extended appropriately.

§ 2.2.2 Following commencement of the Work and upon written request by the Contractor, the Owner shall furnish to the Contractor reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract only if (1) the Owner fails to make payments to the Contractor as the Contract Documents require; (2) the Contractor identifies in writing a reasonable concern regarding the Owner's ability to make payment when due; or (3) a change in the Work materially changes the Contract Sum. If the Owner fails to provide such evidence, as required, within fourteen days of the Contractor's request, the Contractor may immediately stop the Work and, in that event, shall notify the Owner that the Work has stopped. However, if the request is made because a change in the Work materially changes the Contract Sum under (3) above, the Contractor may immediately stop only that portion of the Work affected by the change until reasonable evidence is provided. If the Work is stopped under this Section 2.2.2, the Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shutdown, delay and start-up, plus interest as provided in the Contract Documents.

§ 2.2.3 After the Owner furnishes evidence of financial arrangements under this Section 2.2, the Owner shall not materially vary such financial arrangements without prior notice to the Contractor.

§ 2.2.4 Where the Owner has designated information furnished under this Section 2.2 as "confidential," the Contractor shall keep the information confidential and shall not disclose it to any other person. However, the Contractor may disclose "confidential" information, after seven (7) days' notice to the Owner, where disclosure is required by law, including a subpoena or other form of compulsory legal process issued by a court or governmental entity, or by court or arbitrator(s) order. The Contractor may also disclose "confidential" information to its employees, consultants, sureties, Subcontractors and their employees, Sub-subcontractors, and others who need to know the content of such information solely and exclusively for the Project and who agree to maintain the confidentiality of such information.

§ 2.3 Information and Services Required of the Owner

§ 2.3.1 Except for permits and fees that are the responsibility of the Contractor under the Contract Documents, including those required under Section 3.7.1, the Owner shall secure and pay for necessary approvals, easements, assessments and charges required for construction, use or occupancy of permanent structures or for permanent changes in existing facilities.

§ 2.3.2 The Owner shall retain an architect lawfully licensed to practice architecture, or an entity lawfully practicing architecture, in the jurisdiction where the Project is located. That person or entity is identified as the Architect in the Agreement and is referred to throughout the Contract Documents as if singular in number.

§ 2.3.3 If the employment of the Architect terminates, the Owner shall employ a successor to whom the Contractor has no reasonable objection and whose status under the Contract Documents shall be that of the Architect.

§ 2.3.4 The Owner shall furnish surveys describing physical characteristics, legal limitations and utility locations for the site of the Project, and a legal description of the site. The Contractor shall be entitled to rely on the accuracy of information furnished by the Owner but shall exercise proper precautions relating to the safe performance of the Work.

§ 2.3.5 The Owner shall furnish information or services required of the Owner by the Contract Documents with reasonable promptness. The Owner shall also furnish any other information or services under the Owner's control and relevant to the Contractor's performance of the Work with reasonable promptness after receiving the Contractor's written request for such information or services.

§ 2.3.6 Unless otherwise provided in the Contract Documents, the Owner shall furnish to the Contractor one copy of the Contract Documents for purposes of making reproductions pursuant to Section 1.5.2.

§ 2.4 Owner's Right to Stop the Work

If the Contractor fails to correct Work that is not in accordance with the requirements of the Contract Documents as required by Section 12.2 or repeatedly fails to carry out Work in accordance with the Contract Documents, the Owner may issue a written order to the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity, except to the extent required by Section 6.1.3.

§ 2.5 Owner's Right to Carry Out the Work

If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a ten-day period after receipt of notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may, without prejudice to other remedies the Owner may have, correct such default or neglect. Such action by the Owner and amounts charged to the Contractor are both subject to prior approval of the Architect and the Architect may, pursuant to Section 9.5.1, withhold or nullify a Certificate for Payment in whole or in part, to the extent reasonably necessary to reimburse the Owner for the reasonable cost of correcting such deficiencies, including Owner's expenses and compensation for the Architect's additional services made necessary by such default, neglect, or failure. If current and future payments are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner. If the Contractor disagrees with the actions of the Owner or the Architect, or the amounts claimed as costs to the Owner, the Contractor may file a Claim pursuant to Article 15.

ARTICLE 3 CONTRACTOR

§ 3.1 General

§ 3.1.1 The Contractor is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Contractor shall be lawfully licensed, if required in the jurisdiction where the Project is located. The Contractor shall designate in writing a representative who shall have express authority to bind the Contractor with respect to all matters under this Contract. The term "Contractor" means the Contractor or the Contractor's authorized representative.

§ 3.1.2 The Contractor shall perform the Work in accordance with the Contract Documents.

§ 3.1.3 The Contractor shall not be relieved of its obligations to perform the Work in accordance with the Contract Documents either by activities or duties of the Architect in the Architect's administration of the Contract, or by tests, inspections or approvals required or performed by persons or entities other than the Contractor.

§ 3.2 Review of Contract Documents and Field Conditions by Contractor

§ 3.2.1 Execution of the Contract by the Contractor is a representation that the Contractor has visited the site, become generally familiar with local conditions under which the Work is to be performed, and correlated personal observations with requirements of the Contract Documents.

§ 3.2.2 Because the Contract Documents are complementary, the Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to Section 2.3.4, shall take field measurements of any existing conditions related to that portion of the Work, and shall observe any conditions at the site affecting it. These obligations are for the purpose of facilitating coordination and construction by the Contractor and are not for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; however, the Contractor shall promptly report to the Architect any errors, inconsistencies or omissions discovered by or made known to the Contractor as a request for information in such form as the Architect may require. It is recognized that the Contractor's review is made in the Contractor's capacity as a contractor and not as a licensed design professional, unless otherwise specifically provided in the Contract Documents.

§ 3.2.3 The Contractor is not required to ascertain that the Contract Documents are in accordance with applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, but the Contractor shall promptly report to the Architect any nonconformity discovered by or made known to the Contractor as a request for information in such form as the Architect may require.

§ 3.2.4 If the Contractor believes that additional cost or time is involved because of clarifications or instructions the Architect issues in response to the Contractor's notices or requests for information pursuant to Sections 3.2.2 or 3.2.3, the Contractor shall submit Claims as provided in Article 15. If the Contractor fails to perform the obligations of Sections 3.2.2 or 3.2.3, the Contractor shall pay such costs and damages to the Owner, subject to Section 15.1.7, as would have been avoided if the Contractor had performed such obligations. If the Contractor performs those obligations, the Contractor shall not be liable to the Owner or Architect for damages resulting from errors, inconsistencies or omissions in the Contract Documents, for differences between field measurements or conditions and the Contract Documents, or for nonconformities of the Contract Documents to applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities.

§ 3.3 Supervision and Construction Procedures

§ 3.3.1 The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for, and have control over, construction means, methods, techniques, sequences, and procedures, and for coordinating all portions of the Work under the Contract. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences, or procedures, the Contractor shall evaluate the jobsite safety thereof and shall be solely responsible for the jobsite safety of such means, methods, techniques, sequences, or procedures. If the Contractor determines that such means, methods, techniques, sequences or procedures may not be safe, the Contractor shall give timely notice to the Owner and Architect, and shall propose alternative means, methods, techniques, sequences, or procedures. The Architect shall evaluate the proposed alternative solely for conformance with the design intent for the completed construction. Unless the Architect objects to the Contractor's proposed alternative, the Contractor shall perform the Work using its alternative means, methods, techniques, sequences, or procedures.

§ 3.3.2 The Contractor shall be responsible to the Owner for acts and omissions of the Contractor's employees, Subcontractors and their agents and employees, and other persons or entities performing portions of the Work for, or on behalf of, the Contractor or any of its Subcontractors.

§ 3.3.3 The Contractor shall be responsible for inspection of portions of Work already performed to determine that such portions are in proper condition to receive subsequent Work.

§ 3.4 Labor and Materials

§ 3.4.1 Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services necessary for proper execution and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work.

§ 3.4.2 Except in the case of minor changes in the Work approved by the Architect in accordance with Section 3.12.8 or ordered by the Architect in accordance with Section 7.4, the Contractor may make substitutions only with the consent of the Owner, after evaluation by the Architect and in accordance with a Change Order or Construction Change Directive.

§ 3.4.3 The Contractor shall enforce strict discipline and good order among the Contractor's employees and other persons carrying out the Work. The Contractor shall not permit employment of unfit persons or persons not properly skilled in tasks assigned to them.

§ 3.5 Warranty

§ 3.5.1 The Contractor warrants to the Owner and Architect that materials and equipment furnished under the Contract will be of good quality and new unless the Contract Documents require or permit otherwise. The Contractor further warrants that the Work will conform to the requirements of the Contract Documents and will be free from defects, except for those inherent in the quality of the Work the Contract Documents require or permit. Work, materials, or equipment not conforming to these requirements may be considered defective. The Contractor's warranty excludes remedy for damage or defect caused by abuse, alterations to the Work not executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear and normal usage. If required by the Architect, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

§ 3.5.2 All material, equipment, or other special warranties required by the Contract Documents shall be issued in the name of the Owner, or shall be transferable to the Owner, and shall commence in accordance with Section 9.8.4.

§ 3.6 Taxes

The Contractor shall pay sales, consumer, use and similar taxes for the Work provided by the Contractor that are legally enacted when bids are received or negotiations concluded, whether or not yet effective or merely scheduled to go into effect.

§ 3.7 Permits, Fees, Notices and Compliance with Laws

§ 3.7.1 Unless otherwise provided in the Contract Documents, the Contractor shall secure and pay for the building permit as well as for other permits, fees, licenses, and inspections by government agencies necessary for proper execution and completion of the Work that are customarily secured after execution of the Contract and legally required at the time bids are received or negotiations concluded.

§ 3.7.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities applicable to performance of the Work.

§ 3.7.3 If the Contractor performs Work knowing it to be contrary to applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, the Contractor shall assume appropriate responsibility for such Work and shall bear the costs attributable to correction.

§ 3.7.4 Concealed or Unknown Conditions

If the Contractor encounters conditions at the site that are (1) subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents or (2) unknown physical conditions of an unusual nature that differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, the Contractor shall promptly provide notice to the Owner and the Architect before conditions are disturbed and in no event later than 14 days after first observance of the conditions. The Architect will promptly investigate such conditions and, if the Architect determines that they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will recommend that an equitable adjustment be made in the Contract Sum or Contract Time, or both. If the Architect determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Architect shall promptly notify the Owner and Contractor, stating the reasons. If either party disputes the Architect's determination or recommendation, that party may submit a Claim as provided in Article 15.

§ 3.7.5 If, in the course of the Work, the Contractor encounters human remains or recognizes the existence of burial markers, archaeological sites or wetlands not indicated in the Contract Documents, the Contractor shall immediately suspend any operations that would affect them and shall notify the Owner and Architect. Upon receipt of such notice, the Owner shall promptly take any action necessary to obtain governmental authorization required to resume the operations. The Contractor shall continue to suspend such operations until otherwise instructed by the Owner but shall continue with all other operations that do not affect those remains or features. Requests for adjustments in the Contract Sum and Contract Time arising from the existence of such remains or features may be made as provided in Article 15.

§ 3.8 Allowances

§ 3.8.1 The Contractor shall include in the Contract Sum all allowances stated in the Contract Documents. Items covered by allowances shall be supplied for such amounts and by such persons or entities as the Owner may direct, but the Contractor shall not be required to employ persons or entities to whom the Contractor has reasonable objection.

§ 3.8.2 Unless otherwise provided in the Contract Documents,

- .1 allowances shall cover the cost to the Contractor of materials and equipment delivered at the site and all required taxes, less applicable trade discounts;
- .2 Contractor's costs for unloading and handling at the site, labor, installation costs, overhead, profit, and other expenses contemplated for stated allowance amounts shall be included in the Contract Sum but not in the allowances; and
- .3 whenever costs are more than or less than allowances, the Contract Sum shall be adjusted accordingly by Change Order. The amount of the Change Order shall reflect (1) the difference between actual costs and the allowances under Section 3.8.2.1 and (2) changes in Contractor's costs under Section 3.8.2.2.

§ 3.8.3 Materials and equipment under an allowance shall be selected by the Owner with reasonable promptness.

§ 3.9 Superintendent

§ 3.9.1 The Contractor shall employ a competent superintendent and necessary assistants who shall be in attendance at the Project site during performance of the Work. The superintendent shall represent the Contractor, and communications given to the superintendent shall be as binding as if given to the Contractor.

§ 3.9.2 The Contractor, as soon as practicable after award of the Contract, shall notify the Owner and Architect of the name and qualifications of a proposed superintendent. Within 14 days of receipt of the information, the Architect may notify the Contractor, stating whether the Owner or the Architect (1) has reasonable objection to the proposed superintendent or (2) requires additional time for review. Failure of the Architect to provide notice within the 14-day period shall constitute notice of no reasonable objection.

§ 3.9.3 The Contractor shall not employ a proposed superintendent to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not change the superintendent without the Owner's consent, which shall not unreasonably be withheld or delayed.

§ 3.10 Contractor's Construction and Submittal Schedules

§ 3.10.1 The Contractor, promptly after being awarded the Contract, shall submit for the Owner's and Architect's information a Contractor's construction schedule for the Work. The schedule shall contain detail appropriate for the Project, including (1) the date of commencement of the Work, interim schedule milestone dates, and the date of Substantial Completion; (2) an apportionment of the Work by construction activity; and (3) the time required for completion of each portion of the Work. The schedule shall provide for the orderly progression of the Work to completion and shall not exceed time limits current under the Contract Documents. The schedule shall be revised at appropriate intervals as required by the conditions of the Work and Project.

§ 3.10.2 The Contractor, promptly after being awarded the Contract and thereafter as necessary to maintain a current submittal schedule, shall submit a submittal schedule for the Architect's approval. The Architect's approval shall not be unreasonably delayed or withheld. The submittal schedule shall (1) be coordinated with the Contractor's construction schedule, and (2) allow the Architect reasonable time to review submittals. If the Contractor fails to submit a submittal schedule, or fails to provide submittals in accordance with the approved submittal schedule, the Contractor shall not be entitled to any increase in Contract Sum or extension of Contract Time based on the time required for review of submittals.

§ 3.10.3 The Contractor shall perform the Work in general accordance with the most recent schedules submitted to the Owner and Architect.

§ 3.11 Documents and Samples at the Site

The Contractor shall make available, at the Project site, the Contract Documents, including Change Orders, Construction Change Directives, and other Modifications, in good order and marked currently to indicate field changes and selections made during construction, and the approved Shop Drawings, Product Data, Samples, and similar required submittals. These shall be in electronic form or paper copy, available to the Architect and Owner, and

delivered to the Architect for submittal to the Owner upon completion of the Work as a record of the Work as constructed.

§ 3.12 Shop Drawings, Product Data and Samples

§ 3.12.1 Shop Drawings are drawings, diagrams, schedules, and other data specially prepared for the Work by the Contractor or a Subcontractor, Sub-subcontractor, manufacturer, supplier, or distributor to illustrate some portion of the Work.

§ 3.12.2 Product Data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams, and other information furnished by the Contractor to illustrate materials or equipment for some portion of the Work.

§ 3.12.3 Samples are physical examples that illustrate materials, equipment, or workmanship, and establish standards by which the Work will be judged.

§ 3.12.4 Shop Drawings, Product Data, Samples, and similar submittals are not Contract Documents. Their purpose is to demonstrate how the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents for those portions of the Work for which the Contract Documents require submittals. Review by the Architect is subject to the limitations of Section 4.2.7. Informational submittals upon which the Architect is not expected to take responsive action may be so identified in the Contract Documents. Submittals that are not required by the Contract Documents may be returned by the Architect without action.

§ 3.12.5 The Contractor shall review for compliance with the Contract Documents, approve, and submit to the Architect, Shop Drawings, Product Data, Samples, and similar submittals required by the Contract Documents, in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of the Owner or of Separate Contractors.

§ 3.12.6 By submitting Shop Drawings, Product Data, Samples, and similar submittals, the Contractor represents to the Owner and Architect that the Contractor has (1) reviewed and approved them, (2) determined and verified materials, field measurements and field construction criteria related thereto, or will do so, and (3) checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.

§ 3.12.7 The Contractor shall perform no portion of the Work for which the Contract Documents require submittal and review of Shop Drawings, Product Data, Samples, or similar submittals, until the respective submittal has been approved by the Architect.

§ 3.12.8 The Work shall be in accordance with approved submittals except that the Contractor shall not be relieved of responsibility for deviations from the requirements of the Contract Documents by the Architect's approval of Shop Drawings, Product Data, Samples, or similar submittals, unless the Contractor has specifically notified the Architect of such deviation at the time of submittal and (1) the Architect has given written approval to the specific deviation as a minor change in the Work, or (2) a Change Order or Construction Change Directive has been issued authorizing the deviation. The Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples, or similar submittals, by the Architect's approval thereof.

§ 3.12.9 The Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, Product Data, Samples, or similar submittals, to revisions other than those requested by the Architect on previous submittals. In the absence of such notice, the Architect's approval of a resubmission shall not apply to such revisions.

§ 3.12.10 The Contractor shall not be required to provide professional services that constitute the practice of architecture or engineering unless such services are specifically required by the Contract Documents for a portion of the Work or unless the Contractor needs to provide such services in order to carry out the Contractor's responsibilities for construction means, methods, techniques, sequences, and procedures. The Contractor shall not be required to provide professional services in violation of applicable law.

§ 3.12.10.1 If professional design services or certifications by a design professional related to systems, materials, or equipment are specifically required of the Contractor by the Contract Documents, the Owner and the Architect will

specify all performance and design criteria that such services must satisfy. The Contractor shall be entitled to rely upon the adequacy and accuracy of the performance and design criteria provided in the Contract Documents. The Contractor shall cause such services or certifications to be provided by an appropriately licensed design professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings, and other submittals prepared by such professional. Shop Drawings, and other submittals related to the Work, designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to the Architect. The Owner and the Architect shall be entitled to rely upon the adequacy and accuracy of the services, certifications, and approvals performed or provided by such design professionals, provided the Owner and Architect have specified to the Contractor the performance and design criteria that such services must satisfy. Pursuant to this Section 3.12.10, the Architect will review and approve or take other appropriate action on submittals only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents.

§ 3.12.10.2 If the Contract Documents require the Contractor's design professional to certify that the Work has been performed in accordance with the design criteria, the Contractor shall furnish such certifications to the Architect at the time and in the form specified by the Architect.

§ 3.13 Use of Site

The Contractor shall confine operations at the site to areas permitted by applicable laws, statutes, ordinances, codes, rules and regulations, lawful orders of public authorities, and the Contract Documents and shall not unreasonably encumber the site with materials or equipment.

§ 3.14 Cutting and Patching

§ 3.14.1 The Contractor shall be responsible for cutting, fitting, or patching required to complete the Work or to make its parts fit together properly. All areas requiring cutting, fitting, or patching shall be restored to the condition existing prior to the cutting, fitting, or patching, unless otherwise required by the Contract Documents.

§ 3.14.2 The Contractor shall not damage or endanger a portion of the Work or fully or partially completed construction of the Owner or Separate Contractors by cutting, patching, or otherwise altering such construction, or by excavation. The Contractor shall not cut or otherwise alter construction by the Owner or a Separate Contractor except with written consent of the Owner and of the Separate Contractor. Consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold, from the Owner or a Separate Contractor, its consent to cutting or otherwise altering the Work.

§ 3.15 Cleaning Up

§ 3.15.1 The Contractor shall keep the premises and surrounding area free from accumulation of waste materials and rubbish caused by operations under the Contract. At completion of the Work, the Contractor shall remove waste materials, rubbish, the Contractor's tools, construction equipment, machinery, and surplus materials from and about the Project.

§ 3.15.2 If the Contractor fails to clean up as provided in the Contract Documents, the Owner may do so and the Owner shall be entitled to reimbursement from the Contractor.

§ 3.16 Access to Work

The Contractor shall provide the Owner and Architect with access to the Work in preparation and progress wherever located.

§ 3.17 Royalties, Patents and Copyrights

The Contractor shall pay all royalties and license fees. The Contractor shall defend suits or claims for infringement of copyrights and patent rights and shall hold the Owner and Architect harmless from loss on account thereof, but shall not be responsible for defense or loss when a particular design, process, or product of a particular manufacturer or manufacturers is required by the Contract Documents, or where the copyright violations are contained in Drawings, Specifications, or other documents prepared by the Owner or Architect. However, if an infringement of a copyright or patent is discovered by, or made known to, the Contractor, the Contractor shall be responsible for the loss unless the information is promptly furnished to the Architect.

§ 3.18 Indemnification

§ 3.18.1 To the fullest extent permitted by law, the Contractor shall indemnify and hold harmless the Owner, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses, and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work, provided that such claim, damage, loss, or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), but only to the extent caused by the negligent acts or omissions of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss, or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity that would otherwise exist as to a party or person described in this Section 3.18.

§ 3.18.2 In claims against any person or entity indemnified under this Section 3.18 by an employee of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, the indemnification obligation under Section 3.18.1 shall not be limited by a limitation on amount or type of damages, compensation, or benefits payable by or for the Contractor or a Subcontractor under workers' compensation acts, disability benefit acts, or other employee benefit acts.

ARTICLE 4 ARCHITECT

§ 4.1 General

§ 4.1.1 The Architect is the person or entity retained by the Owner pursuant to Section 2.3.2 and identified as such in the Agreement.

§ 4.1.2 Duties, responsibilities, and limitations of authority of the Architect as set forth in the Contract Documents shall not be restricted, modified, or extended without written consent of the Owner, Contractor, and Architect. Consent shall not be unreasonably withheld.

§ 4.2 Administration of the Contract

§ 4.2.1 The Architect will provide administration of the Contract as described in the Contract Documents and will be an Owner's representative during construction until the date the Architect issues the final Certificate for Payment. The Architect will have authority to act on behalf of the Owner only to the extent provided in the Contract Documents.

§ 4.2.2 The Architect will visit the site at intervals appropriate to the stage of construction, or as otherwise agreed with the Owner, to become generally familiar with the progress and quality of the portion of the Work completed, and to determine in general if the Work observed is being performed in a manner indicating that the Work, when fully completed, will be in accordance with the Contract Documents. However, the Architect will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. The Architect will not have control over, charge of, or responsibility for the construction means, methods, techniques, sequences or procedures, or for the safety precautions and programs in connection with the Work, since these are solely the Contractor's rights and responsibilities under the Contract Documents.

§ 4.2.3 On the basis of the site visits, the Architect will keep the Owner reasonably informed about the progress and quality of the portion of the Work completed, and promptly report to the Owner (1) known deviations from the Contract Documents, (2) known deviations from the most recent construction schedule submitted by the Contractor, and (3) defects and deficiencies observed in the Work. The Architect will not be responsible for the Contractor's failure to perform the Work in accordance with the requirements of the Contract Documents. The Architect will not have control over or charge of, and will not be responsible for acts or omissions of, the Contractor, Subcontractors, or their agents or employees, or any other persons or entities performing portions of the Work.

§ 4.2.4 Communications

The Owner and Contractor shall include the Architect in all communications that relate to or affect the Architect's services or professional responsibilities. The Owner shall promptly notify the Architect of the substance of any direct communications between the Owner and the Contractor otherwise relating to the Project. Communications by and with the Architect's consultants shall be through the Architect. Communications by and with Subcontractors and suppliers shall be through the Contractor. Communications by and with Separate Contractors shall be through the Owner. The Contract Documents may specify other communication protocols.

§ 4.2.5 Based on the Architect's evaluations of the Contractor's Applications for Payment, the Architect will review and certify the amounts due the Contractor and will issue Certificates for Payment in such amounts.

§ 4.2.6 The Architect has authority to reject Work that does not conform to the Contract Documents. Whenever the Architect considers it necessary or advisable, the Architect will have authority to require inspection or testing of the Work in accordance with Sections 13.4.2 and 13.4.3, whether or not the Work is fabricated, installed or completed. However, neither this authority of the Architect nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect to the Contractor, Subcontractors, suppliers, their agents or employees, or other persons or entities performing portions of the Work.

§ 4.2.7 The Architect will review and approve, or take other appropriate action upon, the Contractor's submittals such as Shop Drawings, Product Data, and Samples, but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Architect's action will be taken in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness while allowing sufficient time in the Architect's professional judgment to permit adequate review. Review of such submittals is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the Contractor as required by the Contract Documents. The Architect's review of the Contractor's submittals shall not relieve the Contractor of the obligations under Sections 3.3, 3.5, and 3.12. The Architect's review shall not constitute approval of safety precautions or of any construction means, methods, techniques, sequences, or procedures. The Architect's approval of a specific item shall not indicate approval of an assembly of which the item is a component.

§ 4.2.8 The Architect will prepare Change Orders and Construction Change Directives, and may order minor changes in the Work as provided in Section 7.4. The Architect will investigate and make determinations and recommendations regarding concealed and unknown conditions as provided in Section 3.7.4.

§ 4.2.9 The Architect will conduct inspections to determine the date or dates of Substantial Completion and the date of final completion; issue Certificates of Substantial Completion pursuant to Section 9.8; receive and forward to the Owner, for the Owner's review and records, written warranties and related documents required by the Contract and assembled by the Contractor pursuant to Section 9.10; and issue a final Certificate for Payment pursuant to Section 9.10.

§ 4.2.10 If the Owner and Architect agree, the Architect will provide one or more Project representatives to assist in carrying out the Architect's responsibilities at the site. The Owner shall notify the Contractor of any change in the duties, responsibilities and limitations of authority of the Project representatives.

§ 4.2.11 The Architect will interpret and decide matters concerning performance under, and requirements of, the Contract Documents on written request of either the Owner or Contractor. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness.

§ 4.2.12 Interpretations and decisions of the Architect will be consistent with the intent of, and reasonably inferable from, the Contract Documents and will be in writing or in the form of drawings. When making such interpretations and decisions, the Architect will endeavor to secure faithful performance by both Owner and Contractor, will not show partiality to either, and will not be liable for results of interpretations or decisions rendered in good faith.

§ 4.2.13 The Architect's decisions on matters relating to aesthetic effect will be final if consistent with the intent expressed in the Contract Documents.

§ 4.2.14 The Architect will review and respond to requests for information about the Contract Documents. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness. If appropriate, the Architect will prepare and issue supplemental Drawings and Specifications in response to the requests for information.

ARTICLE 5 SUBCONTRACTORS

§ 5.1 Definitions

§ 5.1.1 A Subcontractor is a person or entity who has a direct contract with the Contractor to perform a portion of the Work at the site. The term "Subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Subcontractor or an authorized representative of the Subcontractor. The term "Subcontractor" does not include a Separate Contractor or the subcontractors of a Separate Contractor.

§ 5.1.2 A Sub-subcontractor is a person or entity who has a direct or indirect contract with a Subcontractor to perform a portion of the Work at the site. The term "Sub-subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Sub-subcontractor or an authorized representative of the Sub-subcontractor.

§ 5.2 Award of Subcontracts and Other Contracts for Portions of the Work

§ 5.2.1 Unless otherwise stated in the Contract Documents, the Contractor, as soon as practicable after award of the Contract, shall notify the Owner and Architect of the persons or entities proposed for each principal portion of the Work, including those who are to furnish materials or equipment fabricated to a special design. Within 14 days of receipt of the information, the Architect may notify the Contractor whether the Owner or the Architect (1) has reasonable objection to any such proposed person or entity or (2) requires additional time for review. Failure of the Architect to provide notice within the 14-day period shall constitute notice of no reasonable objection.

§ 5.2.2 The Contractor shall not contract with a proposed person or entity to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not be required to contract with anyone to whom the Contractor has made reasonable objection.

§ 5.2.3 If the Owner or Architect has reasonable objection to a person or entity proposed by the Contractor, the Contractor shall propose another to whom the Owner or Architect has no reasonable objection. If the proposed but rejected Subcontractor was reasonably capable of performing the Work, the Contract Sum and Contract Time shall be increased or decreased by the difference, if any, occasioned by such change, and an appropriate Change Order shall be issued before commencement of the substitute Subcontractor's Work. However, no increase in the Contract Sum or Contract Time shall be allowed for such change unless the Contractor has acted promptly and responsively in submitting names as required.

§ 5.2.4 The Contractor shall not substitute a Subcontractor, person, or entity for one previously selected if the Owner or Architect makes reasonable objection to such substitution.

§ 5.3 Subcontractual Relations

By appropriate written agreement, the Contractor shall require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities, including the responsibility for safety of the Subcontractor's Work that the Contractor, by these Contract Documents, assumes toward the Owner and Architect. Each subcontract agreement shall preserve and protect the rights of the Owner and Architect under the Contract Documents with respect to the Work to be performed by the Subcontractor so that subcontracting thereof will not prejudice such rights, and shall allow to the Subcontractor, unless specifically provided otherwise in the subcontract agreement, the benefit of all rights, remedies, and redress against the Contractor that the Contractor, by the Contract Documents, has against the Owner. Where appropriate, the Contractor shall require each Subcontractor to enter into similar agreements with Sub-subcontractors. The Contractor shall make available to each proposed Subcontractor, prior to the execution of the subcontract agreement, copies of the Contract Documents to which the Subcontractor will be bound, and, upon written request of the Subcontractor, identify to the Subcontractor terms and conditions of the proposed subcontract agreement that may be at variance with the Contract Documents. Subcontractors will similarly make copies of applicable portions of such documents available to their respective proposed Sub-subcontractors.

§ 5.4 Contingent Assignment of Subcontracts

§ 5.4.1 Each subcontract agreement for a portion of the Work is assigned by the Contractor to the Owner, provided that

- .1 assignment is effective only after termination of the Contract by the Owner for cause pursuant to Section 14.2 and only for those subcontract agreements that the Owner accepts by notifying the Subcontractor and Contractor; and
- .2 assignment is subject to the prior rights of the surety, if any, obligated under bond relating to the Contract.

When the Owner accepts the assignment of a subcontract agreement, the Owner assumes the Contractor's rights and obligations under the subcontract.

§ 5.4.2 Upon such assignment, if the Work has been suspended for more than 30 days, the Subcontractor's compensation shall be equitably adjusted for increases in cost resulting from the suspension.

§ 5.4.3 Upon assignment to the Owner under this Section 5.4, the Owner may further assign the subcontract to a successor contractor or other entity. If the Owner assigns the subcontract to a successor contractor or other entity, the Owner shall nevertheless remain legally responsible for all of the successor contractor's obligations under the subcontract.

ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

§ 6.1 Owner's Right to Perform Construction and to Award Separate Contracts

§ 6.1.1 The term "Separate Contractor(s)" shall mean other contractors retained by the Owner under separate agreements. The Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, and with Separate Contractors retained under Conditions of the Contract substantially similar to those of this Contract, including those provisions of the Conditions of the Contract related to insurance and waiver of subrogation.

§ 6.1.2 When separate contracts are awarded for different portions of the Project or other construction or operations on the site, the term "Contractor" in the Contract Documents in each case shall mean the Contractor who executes each separate Owner-Contractor Agreement.

§ 6.1.3 The Owner shall provide for coordination of the activities of the Owner's own forces and of each Separate Contractor with the Work of the Contractor, who shall cooperate with them. The Contractor shall participate with any Separate Contractors and the Owner in reviewing their construction schedules. The Contractor shall make any revisions to its construction schedule deemed necessary after a joint review and mutual agreement. The construction schedules shall then constitute the schedules to be used by the Contractor, Separate Contractors, and the Owner until subsequently revised.

§ 6.1.4 Unless otherwise provided in the Contract Documents, when the Owner performs construction or operations related to the Project with the Owner's own forces or with Separate Contractors, the Owner or its Separate Contractors shall have the same obligations and rights that the Contractor has under the Conditions of the Contract, including, without excluding others, those stated in Article 3, this Article 6, and Articles 10, 11, and 12.

§ 6.2 Mutual Responsibility

§ 6.2.1 The Contractor shall afford the Owner and Separate Contractors reasonable opportunity for introduction and storage of their materials and equipment and performance of their activities, and shall connect and coordinate the Contractor's construction and operations with theirs as required by the Contract Documents.

§ 6.2.2 If part of the Contractor's Work depends for proper execution or results upon construction or operations by the Owner or a Separate Contractor, the Contractor shall, prior to proceeding with that portion of the Work, promptly notify the Architect of apparent discrepancies or defects in the construction or operations by the Owner or Separate Contractor that would render it unsuitable for proper execution and results of the Contractor's Work. Failure of the Contractor to notify the Architect of apparent discrepancies or defects prior to proceeding with the Work shall constitute an acknowledgment that the Owner's or Separate Contractor's completed or partially completed construction is fit and proper to receive the Contractor's Work. The Contractor shall not be responsible for discrepancies or defects in the construction or operations by the Owner or Separate Contractor that are not apparent.

§ 6.2.3 The Contractor shall reimburse the Owner for costs the Owner incurs that are payable to a Separate Contractor because of the Contractor's delays, improperly timed activities or defective construction. The Owner shall be responsible to the Contractor for costs the Contractor incurs because of a Separate Contractor's delays, improperly timed activities, damage to the Work or defective construction.

§ 6.2.4 The Contractor shall promptly remedy damage that the Contractor wrongfully causes to completed or partially completed construction or to property of the Owner or Separate Contractor as provided in Section 10.2.5.

§ 6.2.5 The Owner and each Separate Contractor shall have the same responsibilities for cutting and patching as are described for the Contractor in Section 3.14.

§ 6.3 Owner's Right to Clean Up

If a dispute arises among the Contractor, Separate Contractors, and the Owner as to the responsibility under their respective contracts for maintaining the premises and surrounding area free from waste materials and rubbish, the Owner may clean up and the Architect will allocate the cost among those responsible.

ARTICLE 7 CHANGES IN THE WORK

§ 7.1 General

§ 7.1.1 Changes in the Work may be accomplished after execution of the Contract, and without invalidating the Contract, by Change Order, Construction Change Directive or order for a minor change in the Work, subject to the limitations stated in this Article 7 and elsewhere in the Contract Documents.

§ 7.1.2 A Change Order shall be based upon agreement among the Owner, Contractor, and Architect. A Construction Change Directive requires agreement by the Owner and Architect and may or may not be agreed to by the Contractor. An order for a minor change in the Work may be issued by the Architect alone.

§ 7.1.3 Changes in the Work shall be performed under applicable provisions of the Contract Documents. The Contractor shall proceed promptly with changes in the Work, unless otherwise provided in the Change Order, Construction Change Directive, or order for a minor change in the Work.

§ 7.2 Change Orders

§ 7.2.1 A Change Order is a written instrument prepared by the Architect and signed by the Owner, Contractor, and Architect stating their agreement upon all of the following:

- .1 The change in the Work;
- .2 The amount of the adjustment, if any, in the Contract Sum; and
- .3 The extent of the adjustment, if any, in the Contract Time.

§ 7.3 Construction Change Directives

§ 7.3.1 A Construction Change Directive is a written order prepared by the Architect and signed by the Owner and Architect, directing a change in the Work prior to agreement on adjustment, if any, in the Contract Sum or Contract Time, or both. The Owner may by Construction Change Directive, without invalidating the Contract, order changes in the Work within the general scope of the Contract consisting of additions, deletions, or other revisions, the Contract Sum and Contract Time being adjusted accordingly.

§ 7.3.2 A Construction Change Directive shall be used in the absence of total agreement on the terms of a Change Order.

§ 7.3.3 If the Construction Change Directive provides for an adjustment to the Contract Sum, the adjustment shall be based on one of the following methods:

- .1 Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;
- .2 Unit prices stated in the Contract Documents or subsequently agreed upon;
- .3 Cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee; or
- .4 As provided in Section 7.3.4.

§ 7.3.4 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the Architect shall determine the adjustment on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, an amount for overhead and profit as set forth in the Agreement, or if no such amount is set forth in the Agreement, a reasonable amount. In such case, and also under Section 7.3.3.3, the Contractor shall keep and present, in such form as the Architect may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this Section 7.3.4 shall be limited to the following:

- .1 Costs of labor, including applicable payroll taxes, fringe benefits required by agreement or custom, workers' compensation insurance, and other employee costs approved by the Architect;
- .2 Costs of materials, supplies, and equipment, including cost of transportation, whether incorporated or consumed;
- .3 Rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others;
- .4 Costs of premiums for all bonds and insurance, permit fees, and sales, use, or similar taxes, directly related to the change; and
- .5 Costs of supervision and field office personnel directly attributable to the change.

§ 7.3.5 If the Contractor disagrees with the adjustment in the Contract Time, the Contractor may make a Claim in accordance with applicable provisions of Article 15.

§ 7.3.6 Upon receipt of a Construction Change Directive, the Contractor shall promptly proceed with the change in the Work involved and advise the Architect of the Contractor's agreement or disagreement with the method, if any, provided in the Construction Change Directive for determining the proposed adjustment in the Contract Sum or Contract Time.

§ 7.3.7 A Construction Change Directive signed by the Contractor indicates the Contractor's agreement therewith, including adjustment in Contract Sum and Contract Time or the method for determining them. Such agreement shall be effective immediately and shall be recorded as a Change Order.

§ 7.3.8 The amount of credit to be allowed by the Contractor to the Owner for a deletion or change that results in a net decrease in the Contract Sum shall be actual net cost as confirmed by the Architect. When both additions and credits covering related Work or substitutions are involved in a change, the allowance for overhead and profit shall be figured on the basis of net increase, if any, with respect to that change.

§ 7.3.9 Pending final determination of the total cost of a Construction Change Directive to the Owner, the Contractor may request payment for Work completed under the Construction Change Directive in Applications for Payment. The Architect will make an interim determination for purposes of monthly certification for payment for those costs and certify for payment the amount that the Architect determines, in the Architect's professional judgment, to be reasonably justified. The Architect's interim determination of cost shall adjust the Contract Sum on the same basis as a Change Order, subject to the right of either party to disagree and assert a Claim in accordance with Article 15.

§ 7.3.10 When the Owner and Contractor agree with a determination made by the Architect concerning the adjustments in the Contract Sum and Contract Time, or otherwise reach agreement upon the adjustments, such agreement shall be effective immediately and the Architect will prepare a Change Order. Change Orders may be issued for all or any part of a Construction Change Directive.

§ 7.4 Minor Changes in the Work

The Architect may order minor changes in the Work that are consistent with the intent of the Contract Documents and do not involve an adjustment in the Contract Sum or an extension of the Contract Time. The Architect's order for minor changes shall be in writing. If the Contractor believes that the proposed minor change in the Work will affect the Contract Sum or Contract Time, the Contractor shall notify the Architect and shall not proceed to implement the change in the Work. If the Contractor performs the Work set forth in the Architect's order for a minor change without prior notice to the Architect that such change will affect the Contract Sum or Contract Time, the Contractor waives any adjustment to the Contract Sum or extension of the Contract Time.

ARTICLE 8 TIME

§ 8.1 Definitions

§ 8.1.1 Unless otherwise provided, Contract Time is the period of time, including authorized adjustments, allotted in the Contract Documents for Substantial Completion of the Work.

§ 8.1.2 The date of commencement of the Work is the date established in the Agreement.

§ 8.1.3 The date of Substantial Completion is the date certified by the Architect in accordance with Section 9.8.

§ 8.1.4 The term "day" as used in the Contract Documents shall mean calendar day unless otherwise specifically defined.

§ 8.2 Progress and Completion

§ 8.2.1 Time limits stated in the Contract Documents are of the essence of the Contract. By executing the Agreement, the Contractor confirms that the Contract Time is a reasonable period for performing the Work.

§ 8.2.2 The Contractor shall not knowingly, except by agreement or instruction of the Owner in writing, commence the Work prior to the effective date of insurance required to be furnished by the Contractor and Owner.

§ 8.2.3 The Contractor shall proceed expeditiously with adequate forces and shall achieve Substantial Completion within the Contract Time.

§ 8.3 Delays and Extensions of Time

§ 8.3.1 If the Contractor is delayed at any time in the commencement or progress of the Work by (1) an act or neglect of the Owner or Architect, of an employee of either, or of a Separate Contractor; (2) by changes ordered in the Work; (3) by labor disputes, fire, unusual delay in deliveries, unavoidable casualties, adverse weather conditions documented in accordance with Section 15.1.6.2, or other causes beyond the Contractor's control; (4) by delay authorized by the Owner pending mediation and binding dispute resolution; or (5) by other causes that the Contractor asserts, and the Architect determines, justify delay, then the Contract Time shall be extended for such reasonable time as the Architect may determine.

§ 8.3.2 Claims relating to time shall be made in accordance with applicable provisions of Article 15.

§ 8.3.3 This Section 8.3 does not preclude recovery of damages for delay by either party under other provisions of the Contract Documents.

ARTICLE 9 PAYMENTS AND COMPLETION

§ 9.1 Contract Sum

§ 9.1.1 The Contract Sum is stated in the Agreement and, including authorized adjustments, is the total amount payable by the Owner to the Contractor for performance of the Work under the Contract Documents.

§ 9.1.2 If unit prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are materially changed so that application of such unit prices to the actual quantities causes substantial inequity to the Owner or Contractor, the applicable unit prices shall be equitably adjusted.

§ 9.2 Schedule of Values

Where the Contract is based on a stipulated sum or Guaranteed Maximum Price, the Contractor shall submit a schedule of values to the Architect before the first Application for Payment, allocating the entire Contract Sum to the various portions of the Work. The schedule of values shall be prepared in the form, and supported by the data to substantiate its accuracy, required by the Architect. This schedule, unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's Applications for Payment. Any changes to the schedule of values shall be submitted to the Architect and supported by such data to substantiate its accuracy as the Architect may require, and unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's subsequent Applications for Payment.

§ 9.3 Applications for Payment

§ 9.3.1 At least ten days before the date established for each progress payment, the Contractor shall submit to the Architect an itemized Application for Payment prepared in accordance with the schedule of values, if required under Section 9.2, for completed portions of the Work. The application shall be notarized, if required, and supported by all data substantiating the Contractor's right to payment that the Owner or Architect require, such as copies of requisitions, and releases and waivers of liens from Subcontractors and suppliers, and shall reflect retainage if provided for in the Contract Documents.

§ 9.3.1.1 As provided in Section 7.3.9, such applications may include requests for payment on account of changes in the Work that have been properly authorized by Construction Change Directives, or by interim determinations of the Architect, but not yet included in Change Orders.

§ 9.3.1.2 Applications for Payment shall not include requests for payment for portions of the Work for which the Contractor does not intend to pay a Subcontractor or supplier, unless such Work has been performed by others whom the Contractor intends to pay.

§ 9.3.2 Unless otherwise provided in the Contract Documents, payments shall be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work. If approved in advance by the Owner, payment may similarly be made for materials and equipment suitably stored off the site at a location agreed upon in writing. Payment for materials and equipment stored on or off the site shall be conditioned upon compliance by the Contractor with procedures satisfactory to the Owner to establish the Owner's title to such materials and equipment or otherwise protect the Owner's interest, and shall include the costs of applicable insurance, storage, and transportation to the site, for such materials and equipment stored off the site.

§ 9.3.3 The Contractor warrants that title to all Work covered by an Application for Payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submittal of an Application for Payment all Work for which Certificates for Payment have been previously issued and payments received from the Owner shall, to the best of the Contractor's knowledge, information, and belief, be free and clear of liens, claims, security interests, or encumbrances, in favor of the Contractor, Subcontractors, suppliers, or other persons or entities that provided labor, materials, and equipment relating to the Work.

§ 9.4 Certificates for Payment

§ 9.4.1 The Architect will, within seven days after receipt of the Contractor's Application for Payment, either (1) issue to the Owner a Certificate for Payment in the full amount of the Application for Payment, with a copy to the Contractor; or (2) issue to the Owner a Certificate for Payment for such amount as the Architect determines is properly due, and notify the Contractor and Owner of the Architect's reasons for withholding certification in part as provided in Section 9.5.1; or (3) withhold certification of the entire Application for Payment, and notify the Contractor and Owner of the Architect's reason for withholding certification in whole as provided in Section 9.5.1.

§ 9.4.2 The issuance of a Certificate for Payment will constitute a representation by the Architect to the Owner, based on the Architect's evaluation of the Work and the data in the Application for Payment, that, to the best of the Architect's knowledge, information, and belief, the Work has progressed to the point indicated, the quality of the Work is in accordance with the Contract Documents, and that the Contractor is entitled to payment in the amount certified. The foregoing representations are subject to an evaluation of the Work for conformance with the Contract Documents upon Substantial Completion, to results of subsequent tests and inspections, to correction of minor deviations from the Contract Documents prior to completion, and to specific qualifications expressed by the Architect. However, the issuance of a Certificate for Payment will not be a representation that the Architect has (1) made exhaustive or continuous on-site inspections to check the quality or quantity of the Work; (2) reviewed construction means, methods, techniques, sequences, or procedures; (3) reviewed copies of requisitions received from Subcontractors and suppliers and other data requested by the Owner to substantiate the Contractor's right to payment; or (4) made examination to ascertain how or for what purpose the Contractor has used money previously paid on account of the Contract Sum.

§ 9.5 Decisions to Withhold Certification

§ 9.5.1 The Architect may withhold a Certificate for Payment in whole or in part, to the extent reasonably necessary to protect the Owner, if in the Architect's opinion the representations to the Owner required by Section 9.4.2 cannot be made. If the Architect is unable to certify payment in the amount of the Application, the Architect will notify the Contractor and Owner as provided in Section 9.4.1. If the Contractor and Architect cannot agree on a revised amount, the Architect will promptly issue a Certificate for Payment for the amount for which the Architect is able to make such representations to the Owner. The Architect may also withhold a Certificate for Payment or, because of subsequently discovered evidence, may nullify the whole or a part of a Certificate for Payment previously issued, to such extent as may be necessary in the Architect's opinion to protect the Owner from loss for which the Contractor is responsible, including loss resulting from acts and omissions described in Section 3.3.2, because of

- .1 defective Work not remedied;
- .2 third party claims filed or reasonable evidence indicating probable filing of such claims, unless security acceptable to the Owner is provided by the Contractor;
- .3 failure of the Contractor to make payments properly to Subcontractors or suppliers for labor, materials or equipment;

- .4 reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
- .5 damage to the Owner or a Separate Contractor;
- .6 reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay; or
- .7 repeated failure to carry out the Work in accordance with the Contract Documents.

§ 9.5.2 When either party disputes the Architect's decision regarding a Certificate for Payment under Section 9.5.1, in whole or in part, that party may submit a Claim in accordance with Article 15.

§ 9.5.3 When the reasons for withholding certification are removed, certification will be made for amounts previously withheld.

§ 9.5.4 If the Architect withholds certification for payment under Section 9.5.1.3, the Owner may, at its sole option, issue joint checks to the Contractor and to any Subcontractor or supplier to whom the Contractor failed to make payment for Work properly performed or material or equipment suitably delivered. If the Owner makes payments by joint check, the Owner shall notify the Architect and the Contractor shall reflect such payment on its next Application for Payment.

§ 9.6 Progress Payments

§ 9.6.1 After the Architect has issued a Certificate for Payment, the Owner shall make payment in the manner and within the time provided in the Contract Documents, and shall so notify the Architect.

§ 9.6.2 The Contractor shall pay each Subcontractor, no later than seven days after receipt of payment from the Owner, the amount to which the Subcontractor is entitled, reflecting percentages actually retained from payments to the Contractor on account of the Subcontractor's portion of the Work. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to Sub-subcontractors in a similar manner.

§ 9.6.3 The Architect will, on request, furnish to a Subcontractor, if practicable, information regarding percentages of completion or amounts applied for by the Contractor and action taken thereon by the Architect and Owner on account of portions of the Work done by such Subcontractor.

§ 9.6.4 The Owner has the right to request written evidence from the Contractor that the Contractor has properly paid Subcontractors and suppliers amounts paid by the Owner to the Contractor for subcontracted Work. If the Contractor fails to furnish such evidence within seven days, the Owner shall have the right to contact Subcontractors and suppliers to ascertain whether they have been properly paid. Neither the Owner nor Architect shall have an obligation to pay, or to see to the payment of money to, a Subcontractor or supplier, except as may otherwise be required by law.

§ 9.6.5 The Contractor's payments to suppliers shall be treated in a manner similar to that provided in Sections 9.6.2, 9.6.3 and 9.6.4.

§ 9.6.6 A Certificate for Payment, a progress payment, or partial or entire use or occupancy of the Project by the Owner shall not constitute acceptance of Work not in accordance with the Contract Documents.

§ 9.6.7 Unless the Contractor provides the Owner with a payment bond in the full penal sum of the Contract Sum, payments received by the Contractor for Work properly performed by Subcontractors or provided by suppliers shall be held by the Contractor for those Subcontractors or suppliers who performed Work or furnished materials, or both, under contract with the Contractor for which payment was made by the Owner. Nothing contained herein shall require money to be placed in a separate account and not commingled with money of the Contractor, create any fiduciary liability or tort liability on the part of the Contractor for breach of trust, or entitle any person or entity to an award of punitive damages against the Contractor for breach of the requirements of this provision.

§ 9.6.8 Provided the Owner has fulfilled its payment obligations under the Contract Documents, the Contractor shall defend and indemnify the Owner from all loss, liability, damage or expense, including reasonable attorney's fees and litigation expenses, arising out of any lien claim or other claim for payment by any Subcontractor or supplier of any tier. Upon receipt of notice of a lien claim or other claim for payment, the Owner shall notify the Contractor. If approved by the applicable court, when required, the Contractor may substitute a surety bond for the property against which the lien or other claim for payment has been asserted.

§ 9.7 Failure of Payment

If the Architect does not issue a Certificate for Payment, through no fault of the Contractor, within seven days after receipt of the Contractor's Application for Payment, or if the Owner does not pay the Contractor within seven days after the date established in the Contract Documents, the amount certified by the Architect or awarded by binding dispute resolution, then the Contractor may, upon seven additional days' notice to the Owner and Architect, stop the Work until payment of the amount owing has been received. The Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shutdown, delay and start-up, plus interest as provided for in the Contract Documents.

§ 9.8 Substantial Completion

§ 9.8.1 Substantial Completion is the stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use.

§ 9.8.2 When the Contractor considers that the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Contractor shall prepare and submit to the Architect a comprehensive list of items to be completed or corrected prior to final payment. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

§ 9.8.3 Upon receipt of the Contractor's list, the Architect will make an inspection to determine whether the Work or designated portion thereof is substantially complete. If the Architect's inspection discloses any item, whether or not included on the Contractor's list, which is not sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work or designated portion thereof for its intended use, the Contractor shall, before issuance of the Certificate of Substantial Completion, complete or correct such item upon notification by the Architect. In such case, the Contractor shall then submit a request for another inspection by the Architect to determine Substantial Completion.

§ 9.8.4 When the Work or designated portion thereof is substantially complete, the Architect will prepare a Certificate of Substantial Completion that shall establish the date of Substantial Completion; establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance; and fix the time within which the Contractor shall finish all items on the list accompanying the Certificate. Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion.

§ 9.8.5 The Certificate of Substantial Completion shall be submitted to the Owner and Contractor for their written acceptance of responsibilities assigned to them in the Certificate. Upon such acceptance, and consent of surety if any, the Owner shall make payment of retainage applying to the Work or designated portion thereof. Such payment shall be adjusted for Work that is incomplete or not in accordance with the requirements of the Contract Documents.

§ 9.9 Partial Occupancy or Use

§ 9.9.1 The Owner may occupy or use any completed or partially completed portion of the Work at any stage when such portion is designated by separate agreement with the Contractor, provided such occupancy or use is consented to by the insurer and authorized by public authorities having jurisdiction over the Project. Such partial occupancy or use may commence whether or not the portion is substantially complete, provided the Owner and Contractor have accepted in writing the responsibilities assigned to each of them for payments, retainage, if any, security, maintenance, heat, utilities, damage to the Work and insurance, and have agreed in writing concerning the period for correction of the Work and commencement of warranties required by the Contract Documents. When the Contractor considers a portion substantially complete, the Contractor shall prepare and submit a list to the Architect as provided under Section 9.8.2. Consent of the Contractor to partial occupancy or use shall not be unreasonably withheld. The stage of the progress of the Work shall be determined by written agreement between the Owner and Contractor or, if no agreement is reached, by decision of the Architect.

§ 9.9.2 Immediately prior to such partial occupancy or use, the Owner, Contractor, and Architect shall jointly inspect the area to be occupied or portion of the Work to be used in order to determine and record the condition of the Work.

§ 9.9.3 Unless otherwise agreed upon, partial occupancy or use of a portion or portions of the Work shall not constitute acceptance of Work not complying with the requirements of the Contract Documents.

§ 9.10 Final Completion and Final Payment

§ 9.10.1 Upon receipt of the Contractor's notice that the Work is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the Architect will promptly make such inspection. When the Architect finds the Work acceptable under the Contract Documents and the Contract fully performed, the Architect will promptly issue a final Certificate for Payment stating that to the best of the Architect's knowledge, information and belief, and on the basis of the Architect's on-site visits and inspections, the Work has been completed in accordance with the Contract Documents and that the entire balance found to be due the Contractor and noted in the final Certificate is due and payable. The Architect's final Certificate for Payment will constitute a further representation that conditions listed in Section 9.10.2 as precedent to the Contractor's being entitled to final payment have been fulfilled.

§ 9.10.2 Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Architect (1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied, (2) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect, (3) a written statement that the Contractor knows of no reason that the insurance will not be renewable to cover the period required by the Contract Documents, (4) consent of surety, if any, to final payment, (5) documentation of any special warranties, such as manufacturers' warranties or specific Subcontractor warranties, and (6) if required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts and releases and waivers of liens, claims, security interests, or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner. If a Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such lien, claim, security interest, or encumbrance. If a lien, claim, security interest, or encumbrance remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging the lien, claim, security interest, or encumbrance, including all costs and reasonable attorneys' fees.

§ 9.10.3 If, after Substantial Completion of the Work, final completion thereof is materially delayed through no fault of the Contractor or by issuance of Change Orders affecting final completion, and the Architect so confirms, the Owner shall, upon application by the Contractor and certification by the Architect, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed, corrected, and accepted. If the remaining balance for Work not fully completed or corrected is less than retainage stipulated in the Contract Documents, and if bonds have been furnished, the written consent of the surety to payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by the Contractor to the Architect prior to certification of such payment. Such payment shall be made under terms and conditions governing final payment, except that it shall not constitute a waiver of Claims.

§ 9.10.4 The making of final payment shall constitute a waiver of Claims by the Owner except those arising from

- .1 liens, Claims, security interests, or encumbrances arising out of the Contract and unsettled;
- .2 failure of the Work to comply with the requirements of the Contract Documents;
- .3 terms of special warranties required by the Contract Documents; or
- .4 audits performed by the Owner, if permitted by the Contract Documents, after final payment.

§ 9.10.5 Acceptance of final payment by the Contractor, a Subcontractor, or a supplier, shall constitute a waiver of claims by that payee except those previously made in writing and identified by that payee as unsettled at the time of final Application for Payment.

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

§ 10.1 Safety Precautions and Programs

The Contractor shall be responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the performance of the Contract.

§ 10.2 Safety of Persons and Property

§ 10.2.1 The Contractor shall take reasonable precautions for safety of, and shall provide reasonable protection to prevent damage, injury, or loss to

- .1 employees on the Work and other persons who may be affected thereby;
- .2 the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody, or control of the Contractor, a Subcontractor, or a Sub-subcontractor; and
- .3 other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures, and utilities not designated for removal, relocation, or replacement in the course of construction.

§ 10.2.2 The Contractor shall comply with, and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities, bearing on safety of persons or property or their protection from damage, injury, or loss.

§ 10.2.3 The Contractor shall implement, erect, and maintain, as required by existing conditions and performance of the Contract, reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards; promulgating safety regulations; and notifying the owners and users of adjacent sites and utilities of the safeguards.

§ 10.2.4 When use or storage of explosives or other hazardous materials or equipment, or unusual methods are necessary for execution of the Work, the Contractor shall exercise utmost care and carry on such activities under supervision of properly qualified personnel.

§ 10.2.5 The Contractor shall promptly remedy damage and loss (other than damage or loss insured under property insurance required by the Contract Documents) to property referred to in Sections 10.2.1.2 and 10.2.1.3 caused in whole or in part by the Contractor, a Subcontractor, a Sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible under Sections 10.2.1.2 and 10.2.1.3. The Contractor may make a Claim for the cost to remedy the damage or loss to the extent such damage or loss is attributable to acts or omissions of the Owner or Architect or anyone directly or indirectly employed by either of them, or by anyone for whose acts either of them may be liable, and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Section 3.18.

§ 10.2.6 The Contractor shall designate a responsible member of the Contractor's organization at the site whose duty shall be the prevention of accidents. This person shall be the Contractor's superintendent unless otherwise designated by the Contractor in writing to the Owner and Architect.

§ 10.2.7 The Contractor shall not permit any part of the construction or site to be loaded so as to cause damage or create an unsafe condition.

§ 10.2.8 Injury or Damage to Person or Property

If either party suffers injury or damage to person or property because of an act or omission of the other party, or of others for whose acts such party is legally responsible, notice of the injury or damage, whether or not insured, shall be given to the other party within a reasonable time not exceeding 21 days after discovery. The notice shall provide sufficient detail to enable the other party to investigate the matter.

§ 10.3 Hazardous Materials and Substances

§ 10.3.1 The Contractor is responsible for compliance with any requirements included in the Contract Documents regarding hazardous materials or substances. If the Contractor encounters a hazardous material or substance not addressed in the Contract Documents and if reasonable precautions will be inadequate to prevent foreseeable bodily injury or death to persons resulting from a material or substance, including but not limited to asbestos or polychlorinated biphenyl (PCB), encountered on the site by the Contractor, the Contractor shall, upon recognizing the condition, immediately stop Work in the affected area and notify the Owner and Architect of the condition.

§ 10.3.2 Upon receipt of the Contractor's notice, the Owner shall obtain the services of a licensed laboratory to verify the presence or absence of the material or substance reported by the Contractor and, in the event such material or substance is found to be present, to cause it to be rendered harmless. Unless otherwise required by the Contract Documents, the Owner shall furnish in writing to the Contractor and Architect the names and qualifications of persons or entities who are to perform tests verifying the presence or absence of the material or substance or who are to perform the task of removal or safe containment of the material or substance. The Contractor and the Architect will

promptly reply to the Owner in writing stating whether or not either has reasonable objection to the persons or entities proposed by the Owner. If either the Contractor or Architect has an objection to a person or entity proposed by the Owner, the Owner shall propose another to whom the Contractor and the Architect have no reasonable objection. When the material or substance has been rendered harmless, Work in the affected area shall resume upon written agreement of the Owner and Contractor. By Change Order, the Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable additional costs of shutdown, delay, and start-up.

§ 10.3.3 To the fullest extent permitted by law, the Owner shall indemnify and hold harmless the Contractor, Subcontractors, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses, and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work in the affected area if in fact the material or substance presents the risk of bodily injury or death as described in Section 10.3.1 and has not been rendered harmless, provided that such claim, damage, loss, or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), except to the extent that such damage, loss, or expense is due to the fault or negligence of the party seeking indemnity.

§ 10.3.4 The Owner shall not be responsible under this Section 10.3 for hazardous materials or substances the Contractor brings to the site unless such materials or substances are required by the Contract Documents. The Owner shall be responsible for hazardous materials or substances required by the Contract Documents, except to the extent of the Contractor's fault or negligence in the use and handling of such materials or substances.

§ 10.3.5 The Contractor shall reimburse the Owner for the cost and expense the Owner incurs (1) for remediation of hazardous materials or substances the Contractor brings to the site and negligently handles, or (2) where the Contractor fails to perform its obligations under Section 10.3.1, except to the extent that the cost and expense are due to the Owner's fault or negligence.

§ 10.3.6 If, without negligence on the part of the Contractor, the Contractor is held liable by a government agency for the cost of remediation of a hazardous material or substance solely by reason of performing Work as required by the Contract Documents, the Owner shall reimburse the Contractor for all cost and expense thereby incurred.

§ 10.4 Emergencies

In an emergency affecting safety of persons or property, the Contractor shall act, at the Contractor's discretion, to prevent threatened damage, injury, or loss. Additional compensation or extension of time claimed by the Contractor on account of an emergency shall be determined as provided in Article 15 and Article 7.

ARTICLE 11 INSURANCE AND BONDS

§ 11.1 Contractor's Insurance and Bonds

§ 11.1.1 The Contractor shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in the Agreement or elsewhere in the Contract Documents. The Contractor shall purchase and maintain the required insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located. The Owner, Architect, and Architect's consultants shall be named as additional insureds under the Contractor's commercial general liability policy or as otherwise described in the Contract Documents.

§ 11.1.2 The Contractor shall provide surety bonds of the types, for such penal sums, and subject to such terms and conditions as required by the Contract Documents. The Contractor shall purchase and maintain the required bonds from a company or companies lawfully authorized to issue surety bonds in the jurisdiction where the Project is located.

§ 11.1.3 Upon the request of any person or entity appearing to be a potential beneficiary of bonds covering payment of obligations arising under the Contract, the Contractor shall promptly furnish a copy of the bonds or shall authorize a copy to be furnished.

§ 11.1.4 Notice of Cancellation or Expiration of Contractor's Required Insurance. Within three (3) business days of the date the Contractor becomes aware of an impending or actual cancellation or expiration of any insurance required by the Contract Documents, the Contractor shall provide notice to the Owner of such impending or actual cancellation or expiration. Upon receipt of notice from the Contractor, the Owner shall, unless the lapse in coverage arises from an act

or omission of the Owner, have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by the Contractor. The furnishing of notice by the Contractor shall not relieve the Contractor of any contractual obligation to provide any required coverage.

§ 11.2 Owner's Insurance

§ 11.2.1 The Owner shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in the Agreement or elsewhere in the Contract Documents. The Owner shall purchase and maintain the required insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located.

§ 11.2.2 **Failure to Purchase Required Property Insurance.** If the Owner fails to purchase and maintain the required property insurance, with all of the coverages and in the amounts described in the Agreement or elsewhere in the Contract Documents, the Owner shall inform the Contractor in writing prior to commencement of the Work. Upon receipt of notice from the Owner, the Contractor may delay commencement of the Work and may obtain insurance that will protect the interests of the Contractor, Subcontractors, and Sub-Subcontractors in the Work. When the failure to provide coverage has been cured or resolved, the Contract Sum and Contract Time shall be equitably adjusted. In the event the Owner fails to procure coverage, the Owner waives all rights against the Contractor, Subcontractors, and Sub-subcontractors to the extent the loss to the Owner would have been covered by the insurance to have been procured by the Owner. The cost of the insurance shall be charged to the Owner by a Change Order. If the Owner does not provide written notice, and the Contractor is damaged by the failure or neglect of the Owner to purchase or maintain the required insurance, the Owner shall reimburse the Contractor for all reasonable costs and damages attributable thereto.

§ 11.2.3 **Notice of Cancellation or Expiration of Owner's Required Property Insurance.** Within three (3) business days of the date the Owner becomes aware of an impending or actual cancellation or expiration of any property insurance required by the Contract Documents, the Owner shall provide notice to the Contractor of such impending or actual cancellation or expiration. Unless the lapse in coverage arises from an act or omission of the Contractor: (1) the Contractor, upon receipt of notice from the Owner, shall have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by either the Owner or the Contractor; (2) the Contract Time and Contract Sum shall be equitably adjusted; and (3) the Owner waives all rights against the Contractor, Subcontractors, and Sub-subcontractors to the extent any loss to the Owner would have been covered by the insurance had it not expired or been cancelled. If the Contractor purchases replacement coverage, the cost of the insurance shall be charged to the Owner by an appropriate Change Order. The furnishing of notice by the Owner shall not relieve the Owner of any contractual obligation to provide required insurance.

§ 11.3 Waivers of Subrogation

§ 11.3.1 The Owner and Contractor waive all rights against (1) each other and any of their subcontractors, sub-subcontractors, agents, and employees, each of the other; (2) the Architect and Architect's consultants; and (3) Separate Contractors, if any, and any of their subcontractors, sub-subcontractors, agents, and employees, for damages caused by fire, or other causes of loss, to the extent those losses are covered by property insurance required by the Agreement or other property insurance applicable to the Project, except such rights as they have to proceeds of such insurance. The Owner or Contractor, as appropriate, shall require similar written waivers in favor of the individuals and entities identified above from the Architect, Architect's consultants, Separate Contractors, subcontractors, and sub-subcontractors. The policies of insurance purchased and maintained by each person or entity agreeing to waive claims pursuant to this section 11.3.1 shall not prohibit this waiver of subrogation. This waiver of subrogation shall be effective as to a person or entity (1) even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, (2) even though that person or entity did not pay the insurance premium directly or indirectly, or (3) whether or not the person or entity had an insurable interest in the damaged property.

§ 11.3.2 If during the Project construction period the Owner insures properties, real or personal or both, at or adjacent to the site by property insurance under policies separate from those insuring the Project, or if after final payment property insurance is to be provided on the completed Project through a policy or policies other than those insuring the Project during the construction period, to the extent permissible by such policies, the Owner waives all rights in accordance with the terms of Section 11.3.1 for damages caused by fire or other causes of loss covered by this separate property insurance.

§ 11.4 Loss of Use, Business Interruption, and Delay in Completion Insurance

The Owner, at the Owner's option, may purchase and maintain insurance that will protect the Owner against loss of use of the Owner's property, or the inability to conduct normal operations, due to fire or other causes of loss. The Owner waives all rights of action against the Contractor and Architect for loss of use of the Owner's property, due to fire or other hazards however caused.

§11.5 Adjustment and Settlement of Insured Loss

§ 11.5.1 A loss insured under the property insurance required by the Agreement shall be adjusted by the Owner as fiduciary and made payable to the Owner as fiduciary for the insureds, as their interests may appear, subject to requirements of any applicable mortgagee clause and of Section 11.5.2. The Owner shall pay the Architect and Contractor their just shares of insurance proceeds received by the Owner, and by appropriate agreements the Architect and Contractor shall make payments to their consultants and Subcontractors in similar manner.

§ 11.5.2 Prior to settlement of an insured loss, the Owner shall notify the Contractor of the terms of the proposed settlement as well as the proposed allocation of the insurance proceeds. The Contractor shall have 14 days from receipt of notice to object to the proposed settlement or allocation of the proceeds. If the Contractor does not object, the Owner shall settle the loss and the Contractor shall be bound by the settlement and allocation. Upon receipt, the Owner shall deposit the insurance proceeds in a separate account and make the appropriate distributions. Thereafter, if no other agreement is made or the Owner does not terminate the Contract for convenience, the Owner and Contractor shall execute a Change Order for reconstruction of the damaged or destroyed Work in the amount allocated for that purpose. If the Contractor timely objects to either the terms of the proposed settlement or the allocation of the proceeds, the Owner may proceed to settle the insured loss, and any dispute between the Owner and Contractor arising out of the settlement or allocation of the proceeds shall be resolved pursuant to Article 15. Pending resolution of any dispute, the Owner may issue a Construction Change Directive for the reconstruction of the damaged or destroyed Work.

ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

§ 12.1 Uncovering of Work

§ 12.1.1 If a portion of the Work is covered contrary to the Architect's request or to requirements specifically expressed in the Contract Documents, it must, if requested in writing by the Architect, be uncovered for the Architect's examination and be replaced at the Contractor's expense without change in the Contract Time.

§ 12.1.2 If a portion of the Work has been covered that the Architect has not specifically requested to examine prior to its being covered, the Architect may request to see such Work and it shall be uncovered by the Contractor. If such Work is in accordance with the Contract Documents, the Contractor shall be entitled to an equitable adjustment to the Contract Sum and Contract Time as may be appropriate. If such Work is not in accordance with the Contract Documents, the costs of uncovering the Work, and the cost of correction, shall be at the Contractor's expense.

§ 12.2 Correction of Work

§ 12.2.1 Before Substantial Completion

The Contractor shall promptly correct Work rejected by the Architect or failing to conform to the requirements of the Contract Documents, discovered before Substantial Completion and whether or not fabricated, installed or completed. Costs of correcting such rejected Work, including additional testing and inspections, the cost of uncovering and replacement, and compensation for the Architect's services and expenses made necessary thereby, shall be at the Contractor's expense.

§ 12.2.2 After Substantial Completion

§ 12.2.2.1 In addition to the Contractor's obligations under Section 3.5, if, within one year after the date of Substantial Completion of the Work or designated portion thereof or after the date for commencement of warranties established under Section 9.9.1, or by terms of any applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of notice from the Owner to do so, unless the Owner has previously given the Contractor a written acceptance of such condition. The Owner shall give such notice promptly after discovery of the condition. During the one-year period for correction of Work, if the Owner fails to notify the Contractor and give the Contractor an opportunity to make the correction, the Owner waives the rights to require correction by the Contractor and to make a claim for breach of warranty. If the Contractor fails to correct nonconforming Work within a reasonable time during that period after receipt of notice from the Owner or Architect, the Owner may correct it in accordance with Section 2.5.

§ 12.2.2.2 The one-year period for correction of Work shall be extended with respect to portions of Work first performed after Substantial Completion by the period of time between Substantial Completion and the actual completion of that portion of the Work.

§ 12.2.2.3 The one-year period for correction of Work shall not be extended by corrective Work performed by the Contractor pursuant to this Section 12.2.

§ 12.2.3 The Contractor shall remove from the site portions of the Work that are not in accordance with the requirements of the Contract Documents and are neither corrected by the Contractor nor accepted by the Owner.

§ 12.2.4 The Contractor shall bear the cost of correcting destroyed or damaged construction of the Owner or Separate Contractors, whether completed or partially completed, caused by the Contractor's correction or removal of Work that is not in accordance with the requirements of the Contract Documents.

§ 12.2.5 Nothing contained in this Section 12.2 shall be construed to establish a period of limitation with respect to other obligations the Contractor has under the Contract Documents. Establishment of the one-year period for correction of Work as described in Section 12.2.2 relates only to the specific obligation of the Contractor to correct the Work, and has no relationship to the time within which the obligation to comply with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the Contractor's liability with respect to the Contractor's obligations other than specifically to correct the Work.

§ 12.3 Acceptance of Nonconforming Work

If the Owner prefers to accept Work that is not in accordance with the requirements of the Contract Documents, the Owner may do so instead of requiring its removal and correction, in which case the Contract Sum will be reduced as appropriate and equitable. Such adjustment shall be effected whether or not final payment has been made.

ARTICLE 13 MISCELLANEOUS PROVISIONS

§ 13.1 Governing Law

The Contract shall be governed by the law of the place where the Project is located, excluding that jurisdiction's choice of law rules. If the parties have selected arbitration as the method of binding dispute resolution, the Federal Arbitration Act shall govern Section 15.4.

§ 13.2 Successors and Assigns

§ 13.2.1 The Owner and Contractor respectively bind themselves, their partners, successors, assigns, and legal representatives to covenants, agreements, and obligations contained in the Contract Documents. Except as provided in Section 13.2.2, neither party to the Contract shall assign the Contract as a whole without written consent of the other. If either party attempts to make an assignment without such consent, that party shall nevertheless remain legally responsible for all obligations under the Contract.

§ 13.2.2 The Owner may, without consent of the Contractor, assign the Contract to a lender providing construction financing for the Project, if the lender assumes the Owner's rights and obligations under the Contract Documents. The Contractor shall execute all consents reasonably required to facilitate the assignment.

§ 13.3 Rights and Remedies

§ 13.3.1 Duties and obligations imposed by the Contract Documents and rights and remedies available thereunder shall be in addition to and not a limitation of duties, obligations, rights, and remedies otherwise imposed or available by law.

§ 13.3.2 No action or failure to act by the Owner, Architect, or Contractor shall constitute a waiver of a right or duty afforded them under the Contract, nor shall such action or failure to act constitute approval of or acquiescence in a breach thereunder, except as may be specifically agreed upon in writing.

§ 13.4 Tests and Inspections

§ 13.4.1 Tests, inspections, and approvals of portions of the Work shall be made as required by the Contract Documents and by applicable laws, statutes, ordinances, codes, rules, and regulations or lawful orders of public authorities. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections, and

approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections, and approvals. The Contractor shall give the Architect timely notice of when and where tests and inspections are to be made so that the Architect may be present for such procedures. The Owner shall bear costs of tests, inspections, or approvals that do not become requirements until after bids are received or negotiations concluded. The Owner shall directly arrange and pay for tests, inspections, or approvals where building codes or applicable laws or regulations so require.

§ 13.4.2 If the Architect, Owner, or public authorities having jurisdiction determine that portions of the Work require additional testing, inspection, or approval not included under Section 13.4.1, the Architect will, upon written authorization from the Owner, instruct the Contractor to make arrangements for such additional testing, inspection, or approval, by an entity acceptable to the Owner, and the Contractor shall give timely notice to the Architect of when and where tests and inspections are to be made so that the Architect may be present for such procedures. Such costs, except as provided in Section 13.4.3, shall be at the Owner's expense.

§ 13.4.3 If procedures for testing, inspection, or approval under Sections 13.4.1 and 13.4.2 reveal failure of the portions of the Work to comply with requirements established by the Contract Documents, all costs made necessary by such failure, including those of repeated procedures and compensation for the Architect's services and expenses, shall be at the Contractor's expense.

§ 13.4.4 Required certificates of testing, inspection, or approval shall, unless otherwise required by the Contract Documents, be secured by the Contractor and promptly delivered to the Architect.

§ 13.4.5 If the Architect is to observe tests, inspections, or approvals required by the Contract Documents, the Architect will do so promptly and, where practicable, at the normal place of testing.

§ 13.4.6 Tests or inspections conducted pursuant to the Contract Documents shall be made promptly to avoid unreasonable delay in the Work.

§ 13.5 Interest

Payments due and unpaid under the Contract Documents shall bear interest from the date payment is due at the rate the parties agree upon in writing or, in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

§ 14.1 Termination by the Contractor

§ 14.1.1 The Contractor may terminate the Contract if the Work is stopped for a period of 30 consecutive days through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, their agents or employees, or any other persons or entities performing portions of the Work, for any of the following reasons:

- .1 Issuance of an order of a court or other public authority having jurisdiction that requires all Work to be stopped;
- .2 An act of government, such as a declaration of national emergency, that requires all Work to be stopped;
- .3 Because the Architect has not issued a Certificate for Payment and has not notified the Contractor of the reason for withholding certification as provided in Section 9.4.1, or because the Owner has not made payment on a Certificate for Payment within the time stated in the Contract Documents; or
- .4 The Owner has failed to furnish to the Contractor reasonable evidence as required by Section 2.2.

§ 14.1.2 The Contractor may terminate the Contract if, through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, their agents or employees, or any other persons or entities performing portions of the Work, repeated suspensions, delays, or interruptions of the entire Work by the Owner as described in Section 14.3, constitute in the aggregate more than 100 percent of the total number of days scheduled for completion, or 120 days in any 365-day period, whichever is less.

§ 14.1.3 If one of the reasons described in Section 14.1.1 or 14.1.2 exists, the Contractor may, upon seven days' notice to the Owner and Architect, terminate the Contract and recover from the Owner payment for Work executed, as well as reasonable overhead and profit on Work not executed, and costs incurred by reason of such termination.

§ 14.1.4 If the Work is stopped for a period of 60 consecutive days through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, or their agents or employees or any other persons or entities performing portions of the Work because the Owner has repeatedly failed to fulfill the Owner's obligations under the Contract Documents with respect to matters important to the progress of the Work, the Contractor may, upon seven additional days' notice to the Owner and the Architect, terminate the Contract and recover from the Owner as provided in Section 14.1.3.

§ 14.2 Termination by the Owner for Cause

§ 14.2.1 The Owner may terminate the Contract if the Contractor

- .1 repeatedly refuses or fails to supply enough properly skilled workers or proper materials;
- .2 fails to make payment to Subcontractors or suppliers in accordance with the respective agreements between the Contractor and the Subcontractors or suppliers;
- .3 repeatedly disregards applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority; or
- .4 otherwise is guilty of substantial breach of a provision of the Contract Documents.

§ 14.2.2 When any of the reasons described in Section 14.2.1 exist, and upon certification by the Architect that sufficient cause exists to justify such action, the Owner may, without prejudice to any other rights or remedies of the Owner and after giving the Contractor and the Contractor's surety, if any, seven days' notice, terminate employment of the Contractor and may, subject to any prior rights of the surety:

- .1 Exclude the Contractor from the site and take possession of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;
- .2 Accept assignment of subcontracts pursuant to Section 5.4; and
- .3 Finish the Work by whatever reasonable method the Owner may deem expedient. Upon written request of the Contractor, the Owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work.

§ 14.2.3 When the Owner terminates the Contract for one of the reasons stated in Section 14.2.1, the Contractor shall not be entitled to receive further payment until the Work is finished.

§ 14.2.4 If the unpaid balance of the Contract Sum exceeds costs of finishing the Work, including compensation for the Architect's services and expenses made necessary thereby, and other damages incurred by the Owner and not expressly waived, such excess shall be paid to the Contractor. If such costs and damages exceed the unpaid balance, the Contractor shall pay the difference to the Owner. The amount to be paid to the Contractor or Owner, as the case may be, shall be certified by the Initial Decision Maker, upon application, and this obligation for payment shall survive termination of the Contract.

§ 14.3 Suspension by the Owner for Convenience

§ 14.3.1 The Owner may, without cause, order the Contractor in writing to suspend, delay or interrupt the Work, in whole or in part for such period of time as the Owner may determine.

§ 14.3.2 The Contract Sum and Contract Time shall be adjusted for increases in the cost and time caused by suspension, delay, or interruption under Section 14.3.1. Adjustment of the Contract Sum shall include profit. No adjustment shall be made to the extent

- .1 that performance is, was, or would have been, so suspended, delayed, or interrupted, by another cause for which the Contractor is responsible; or
- .2 that an equitable adjustment is made or denied under another provision of the Contract.

§ 14.4 Termination by the Owner for Convenience

§ 14.4.1 The Owner may, at any time, terminate the Contract for the Owner's convenience and without cause.

§ 14.4.2 Upon receipt of notice from the Owner of such termination for the Owner's convenience, the Contractor shall

- .1 cease operations as directed by the Owner in the notice;
- .2 take actions necessary, or that the Owner may direct, for the protection and preservation of the Work; and
- .3 except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

§ 14.4.3 In case of such termination for the Owner's convenience, the Owner shall pay the Contractor for Work properly executed; costs incurred by reason of the termination, including costs attributable to termination of Subcontracts; and the termination fee, if any, set forth in the Agreement.

ARTICLE 15 CLAIMS AND DISPUTES

§ 15.1 Claims

§ 15.1.1 Definition

A Claim is a demand or assertion by one of the parties seeking, as a matter of right, payment of money, a change in the Contract Time, or other relief with respect to the terms of the Contract. The term "Claim" also includes other disputes and matters in question between the Owner and Contractor arising out of or relating to the Contract. The responsibility to substantiate Claims shall rest with the party making the Claim. This Section 15.1.1 does not require the Owner to file a Claim in order to impose liquidated damages in accordance with the Contract Documents.

§ 15.1.2 Time Limits on Claims

The Owner and Contractor shall commence all Claims and causes of action against the other and arising out of or related to the Contract, whether in contract, tort, breach of warranty or otherwise, in accordance with the requirements of the binding dispute resolution method selected in the Agreement and within the period specified by applicable law, but in any case not more than 10 years after the date of Substantial Completion of the Work. The Owner and Contractor waive all Claims and causes of action not commenced in accordance with this Section 15.1.2.

§ 15.1.3 Notice of Claims

§ 15.1.3.1 Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered prior to expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated by notice to the other party and to the Initial Decision Maker with a copy sent to the Architect, if the Architect is not serving as the Initial Decision Maker. Claims by either party under this Section 15.1.3.1 shall be initiated within 21 days after occurrence of the event giving rise to such Claim or within 21 days after the claimant first recognizes the condition giving rise to the Claim, whichever is later.

§ 15.1.3.2 Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated by notice to the other party. In such event, no decision by the Initial Decision Maker is required.

§ 15.1.4 Continuing Contract Performance

§ 15.1.4.1 Pending final resolution of a Claim, except as otherwise agreed in writing or as provided in Section 9.7 and Article 14, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments in accordance with the Contract Documents.

§ 15.1.4.2 The Contract Sum and Contract Time shall be adjusted in accordance with the Initial Decision Maker's decision, subject to the right of either party to proceed in accordance with this Article 15. The Architect will issue Certificates for Payment in accordance with the decision of the Initial Decision Maker.

§ 15.1.5 Claims for Additional Cost

If the Contractor wishes to make a Claim for an increase in the Contract Sum, notice as provided in Section 15.1.3 shall be given before proceeding to execute the portion of the Work that is the subject of the Claim. Prior notice is not required for Claims relating to an emergency endangering life or property arising under Section 10.4.

§ 15.1.6 Claims for Additional Time

§ 15.1.6.1 If the Contractor wishes to make a Claim for an increase in the Contract Time, notice as provided in Section 15.1.3 shall be given. The Contractor's Claim shall include an estimate of cost and of probable effect of delay on progress of the Work. In the case of a continuing delay, only one Claim is necessary.

§ 15.1.6.2 If adverse weather conditions are the basis for a Claim for additional time, such Claim shall be documented by data substantiating that weather conditions were abnormal for the period of time, could not have been reasonably anticipated, and had an adverse effect on the scheduled construction.

§ 15.1.7 Waiver of Claims for Consequential Damages

The Contractor and Owner waive Claims against each other for consequential damages arising out of or relating to this Contract. This mutual waiver includes

- .1 damages incurred by the Owner for rental expenses, for losses of use, income, profit, financing, business and reputation, and for loss of management or employee productivity or of the services of such persons; and
- .2 damages incurred by the Contractor for principal office expenses including the compensation of personnel stationed there, for losses of financing, business and reputation, and for loss of profit, except anticipated profit arising directly from the Work.

This mutual waiver is applicable, without limitation, to all consequential damages due to either party's termination in accordance with Article 14. Nothing contained in this Section 15.1.7 shall be deemed to preclude assessment of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents.

§ 15.2 Initial Decision

§ 15.2.1 Claims, excluding those where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2 or arising under Sections 10.3, 10.4, and 11.5, shall be referred to the Initial Decision Maker for initial decision. The Architect will serve as the Initial Decision Maker, unless otherwise indicated in the Agreement. Except for those Claims excluded by this Section 15.2.1, an initial decision shall be required as a condition precedent to mediation of any Claim. If an initial decision has not been rendered within 30 days after the Claim has been referred to the Initial Decision Maker, the party asserting the Claim may demand mediation and binding dispute resolution without a decision having been rendered. Unless the Initial Decision Maker and all affected parties agree, the Initial Decision Maker will not decide disputes between the Contractor and persons or entities other than the Owner.

§ 15.2.2 The Initial Decision Maker will review Claims and within ten days of the receipt of a Claim take one or more of the following actions: (1) request additional supporting data from the claimant or a response with supporting data from the other party, (2) reject the Claim in whole or in part, (3) approve the Claim, (4) suggest a compromise, or (5) advise the parties that the Initial Decision Maker is unable to resolve the Claim if the Initial Decision Maker lacks sufficient information to evaluate the merits of the Claim or if the Initial Decision Maker concludes that, in the Initial Decision Maker's sole discretion, it would be inappropriate for the Initial Decision Maker to resolve the Claim.

§ 15.2.3 In evaluating Claims, the Initial Decision Maker may, but shall not be obligated to, consult with or seek information from either party or from persons with special knowledge or expertise who may assist the Initial Decision Maker in rendering a decision. The Initial Decision Maker may request the Owner to authorize retention of such persons at the Owner's expense.

§ 15.2.4 If the Initial Decision Maker requests a party to provide a response to a Claim or to furnish additional supporting data, such party shall respond, within ten days after receipt of the request, and shall either (1) provide a response on the requested supporting data, (2) advise the Initial Decision Maker when the response or supporting data will be furnished, or (3) advise the Initial Decision Maker that no supporting data will be furnished. Upon receipt of the response or supporting data, if any, the Initial Decision Maker will either reject or approve the Claim in whole or in part.

§ 15.2.5 The Initial Decision Maker will render an initial decision approving or rejecting the Claim, or indicating that the Initial Decision Maker is unable to resolve the Claim. This initial decision shall (1) be in writing; (2) state the reasons therefor; and (3) notify the parties and the Architect, if the Architect is not serving as the Initial Decision Maker, of any change in the Contract Sum or Contract Time or both. The initial decision shall be final and binding on the parties but subject to mediation and, if the parties fail to resolve their dispute through mediation, to binding dispute resolution.

§ 15.2.6 Either party may file for mediation of an initial decision at any time, subject to the terms of Section 15.2.6.1.

§ 15.2.6.1 Either party may, within 30 days from the date of receipt of an initial decision, demand in writing that the other party file for mediation. If such a demand is made and the party receiving the demand fails to file for mediation within 30 days after receipt thereof, then both parties waive their rights to mediate or pursue binding dispute resolution proceedings with respect to the initial decision.

§ 15.2.7 In the event of a Claim against the Contractor, the Owner may, but is not obligated to, notify the surety, if any, of the nature and amount of the Claim. If the Claim relates to a possibility of a Contractor's default, the Owner may, but is not obligated to, notify the surety and request the surety's assistance in resolving the controversy.

§ 15.2.8 If a Claim relates to or is the subject of a mechanic's lien, the party asserting such Claim may proceed in accordance with applicable law to comply with the lien notice or filing deadlines.

§ 15.3 Mediation

§ 15.3.1 Claims, disputes, or other matters in controversy arising out of or related to the Contract, except those waived as provided for in Sections 9.10.4, 9.10.5, and 15.1.7, shall be subject to mediation as a condition precedent to binding dispute resolution.

§ 15.3.2 The parties shall endeavor to resolve their Claims by mediation which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Mediation Procedures in effect on the date of the Agreement. A request for mediation shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the mediation. The request may be made concurrently with the filing of binding dispute resolution proceedings but, in such event, mediation shall proceed in advance of binding dispute resolution proceedings, which shall be stayed pending mediation for a period of 60 days from the date of filing, unless stayed for a longer period by agreement of the parties or court order. If an arbitration is stayed pursuant to this Section 15.3.2, the parties may nonetheless proceed to the selection of the arbitrator(s) and agree upon a schedule for later proceedings.

§ 15.3.3 Either party may, within 30 days from the date that mediation has been concluded without resolution of the dispute or 60 days after mediation has been demanded without resolution of the dispute, demand in writing that the other party file for binding dispute resolution. If such a demand is made and the party receiving the demand fails to file for binding dispute resolution within 60 days after receipt thereof, then both parties waive their rights to binding dispute resolution proceedings with respect to the initial decision.

§ 15.3.4 The parties shall share the mediator's fee and any filing fees equally. The mediation shall be held in the place where the Project is located, unless another location is mutually agreed upon. Agreements reached in mediation shall be enforceable as settlement agreements in any court having jurisdiction thereof.

§ 15.4 Arbitration

§ 15.4.1 If the parties have selected arbitration as the method for binding dispute resolution in the Agreement, any Claim subject to, but not resolved by, mediation shall be subject to arbitration which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Arbitration Rules in effect on the date of the Agreement. The Arbitration shall be conducted in the place where the Project is located, unless another location is mutually agreed upon. A demand for arbitration shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the arbitration. The party filing a notice of demand for arbitration must assert in the demand all Claims then known to that party on which arbitration is permitted to be demanded.

§ 15.4.1.1 A demand for arbitration shall be made no earlier than concurrently with the filing of a request for mediation, but in no event shall it be made after the date when the institution of legal or equitable proceedings based on the Claim would be barred by the applicable statute of limitations. For statute of limitations purposes, receipt of a written demand for arbitration by the person or entity administering the arbitration shall constitute the institution of legal or equitable proceedings based on the Claim.

§ 15.4.2 The award rendered by the arbitrator or arbitrators shall be final, and judgment may be entered upon it in accordance with applicable law in any court having jurisdiction thereof.

§ 15.4.3 The foregoing agreement to arbitrate and other agreements to arbitrate with an additional person or entity duly consented to by parties to the Agreement, shall be specifically enforceable under applicable law in any court having jurisdiction thereof.

§ 15.4.4 Consolidation or Joinder

§ 15.4.4.1 Subject to the rules of the American Arbitration Association or other applicable arbitration rules, either party may consolidate an arbitration conducted under this Agreement with any other arbitration to which it is a party provided that (1) the arbitration agreement governing the other arbitration permits consolidation, (2) the arbitrations to be consolidated substantially involve common questions of law or fact, and (3) the arbitrations employ materially similar procedural rules and methods for selecting arbitrator(s).

§ 15.4.4.2 Subject to the rules of the American Arbitration Association or other applicable arbitration rules, either party may include by joinder persons or entities substantially involved in a common question of law or fact whose presence is required if complete relief is to be accorded in arbitration, provided that the party sought to be joined consents in writing to such joinder. Consent to arbitration involving an additional person or entity shall not constitute consent to arbitration of any claim, dispute or other matter in question not described in the written consent.

§ 15.4.4.3 The Owner and Contractor grant to any person or entity made a party to an arbitration conducted under this Section 15.4, whether by joinder or consolidation, the same rights of joinder and consolidation as those of the Owner and Contractor under this Agreement.

DOCUMENT 00 01 01 - PROJECT TITLE PAGE

1.1 PROJECT MANUAL VOLUME 1

- A. James F Byrnes High School Phase II Demolition .
- B. SCSD5.
- C. Architect Project No. 021252 020420 .
- D. Michael Chewning, EdD, AIA.
- E. 127 Dunbar Street .
- F. Spartanburg, SC 29306 .
- G. Phone: (864) 585-5678 .
- H. Fax: (864) 542-9451 .
- I. Website: mcmillanpazdansmith.com .
- J. Issued: 01/31/22 .
- K. Copyright 01/31/22 McMillan Pazdan Smith . All rights reserved.

END OF DOCUMENT 00 01 01

DOCUMENT 00 01 07 - SEALS PAGE

1.1 DESIGN PROFESSIONALS OF RECORD

A. Architect:

1. Michael Chewning, EdD, AIA.

B. Civil Engineer:

1. Trey Blackwood, PE.

C. Structural Engineer:

1. Paul G. Gurley, PE .

D. Fire-Protection Engineer:

1. Warren Maddox, PE .

E. Plumbing Engineer:

1. Shane Bulman, PE .

F. HVAC Engineer:

1. Shane Bulman, PE .

G. Electrical Engineer:

1. James Joye, PE .

END OF DOCUMENT 00 01 07

DOCUMENT 00 01 15 - LIST OF DRAWING SHEETS

1.1 LIST OF DRAWINGS

- A. Drawings: Drawings consist of the Contract Drawings and other drawings listed on the Table of Contents page of the separately bound drawing set titled James F. Byrnes HS Phase 2 Demolition , dated 01/31/2022 , as modified by subsequent Addenda and Contract modifications.

END OF DOCUMENT 00 01 15

DOCUMENT 00 21 13 - INSTRUCTIONS TO BIDDERS

1.1 INSTRUCTIONS TO BIDDERS

- A. AIA Document A701, "Instructions to Bidders," is hereby incorporated into the Procurement and Contracting Requirements by reference.

END OF DOCUMENT 00 21 13

DOCUMENT 00 26 00 - PROCUREMENT SUBSTITUTION PROCEDURES

1.1 DEFINITIONS

- A. Procurement Substitution Requests: Requests for changes in products, materials, equipment, and methods of construction from those indicated in the Procurement and Contracting Documents, submitted prior to receipt of bids.
- B. Substitution Requests: Requests for changes in products, materials, equipment, and methods of construction from those indicated in the Contract Documents, submitted following Contract award. See Section 01 25 00 "Substitution Procedures" for conditions under which Substitution requests will be considered following Contract award.

1.2 QUALITY ASSURANCE

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

1.3 PROCUREMENT SUBSTITUTIONS

- A. Procurement Substitutions, General: By submitting a bid, the Bidder represents that its bid is based on materials and equipment described in the Procurement and Contracting Documents, including Addenda. Bidders are encouraged to request approval of qualifying substitute materials and equipment when the Specifications Sections list materials and equipment by product or manufacturer name.
- B. Procurement Substitution Requests will be received and considered by Owner when the following conditions are satisfied, as determined by Architect; otherwise requests will be returned without action:
 - 1. Extensive revisions to the Contract Documents are not required.
 - 2. Proposed changes are in keeping with the general intent of the Contract Documents, including the level of quality of the Work represented by the requirements therein.
 - 3. The request is fully documented and properly submitted.

1.4 SUBMITTALS

- A. Procurement Substitution Request: Submit to Architect . Procurement Substitution Request must be made in writing by prime contract Bidder only in compliance with the following requirements:

SECTION 00 26 00 - PROCUREMENT SUBSTITUTION PROCEDURES

1. Requests for substitution of materials and equipment will be considered if received no later than 10 days prior to date of bid opening.
 2. Submittal Format: Submit Procurement Substitution Request, using CSI Substitution Request Form 1.5C.
 - a. Identify the product or the fabrication or installation method to be replaced in each request. Include related Specifications Sections and drawing numbers.
 - b. Provide complete documentation on both the product specified and the proposed substitute, including the following information as appropriate:
 - 1) Point-by-point comparison of specified and proposed substitute product data, fabrication drawings, and installation procedures.
 - 2) Copies of current, independent third-party test data of salient product or system characteristics.
 - 3) Samples where applicable or when requested by Architect.
 - 4) Detailed comparison of significant qualities of the proposed substitute with those of the Work specified. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
 - 5) Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
 - 6) Research reports, where applicable, evidencing compliance with building code in effect for Project, from ICC-ES .
 - 7) Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by Owner and separate contractors, which will become necessary to accommodate the proposed substitute.
 - c. Provide certification by manufacturer that the substitute proposed is equal to or superior to that required by the Procurement and Contracting Documents, and that its in-place performance will be equal to or superior to the product or equipment specified in the application indicated.
 - d. Bidder, in submitting the Procurement Substitution Request, waives the right to additional payment or an extension of Contract Time because of the failure of the substitute to perform as represented in the Procurement Substitution Request.
- B. Architect's Action:
1. Architect may request additional information or documentation necessary for evaluation of the Procurement Substitution Request. Architect will notify all bidders of acceptance of the proposed substitute by means of an Addendum to the Procurement and Contracting Documents.
- C. Architect's approval of a substitute during bidding does not relieve Contractor of the responsibility to submit required shop drawings and to comply with all other requirements of the Contract Documents.

**SECTION 00 26 00 - PROCUREMENT
SUBSTITUTION PROCEDURES**

Page 2 of 3

END OF DOCUMENT 00 26 00

**SECTION 00 26 00 - PROCUREMENT
SUBSTITUTION PROCEDURES**

Page 3 of 3

DOCUMENT 00 31 19 - EXISTING CONDITION INFORMATION

1.1 EXISTING CONDITION INFORMATION

- A. This Document with its referenced attachments is part of the Procurement and Contracting Requirements for Project. They provide Owner's information for Bidders' convenience and are intended to supplement rather than serve in lieu of the Bidders' own investigations. They are made available for Bidders' convenience and information, but are not a warranty of existing conditions. This Document and its attachments are not part of the Contract Documents.
- B. Existing drawings that include information on existing conditions including previous construction at Project site are available for viewing at the office of Architect .
- C. Survey information that includes information on existing conditions, prepared by Lavender Smith & Associates Inc , dated August 2015 , is available for viewing as part of Drawings.
- D. Related Requirements:
 - 1. Document 002113 "Instructions to Bidders" for the Bidder's responsibilities for examination of Project site and existing conditions.
 - 2. Document 003126 "Existing Hazardous Material Information" for hazardous materials reports that are made available to bidders.
 - 3. Document 003132 "Geotechnical Data" for reports and soil-boring data from geotechnical investigations that are made available to bidders.

END OF DOCUMENT 00 31 19

DOCUMENT 00 31 26 - EXISTING HAZARDOUS MATERIAL INFORMATION

1.1 EXISTING HAZARDOUS MATERIAL INFORMATION

- A. This Document with its referenced attachments is part of the Procurement and Contracting Requirements for Project. They provide Owner's information for Bidders' convenience and are intended to supplement rather than serve in lieu of Bidders' own investigations. They are made available for Bidders' convenience and information, but are not a warranty of existing conditions. This Document and its attachments are not part of the Contract Documents.
- B. An existing asbestos report for Project, prepared by Crossroads Environmental, LLC , dated July 27, 2021 & January 12, 2022 , is available for viewing as appended to this Document.
- C. Related Requirements:
 - 1. Document 002113 "Instructions to Bidders" for the Bidder's responsibilities for examination of Project site and existing conditions.
 - 2. Document 003119 "Existing Condition Information" for information about existing conditions that is made available to bidders.
 - 3. Document 003132 "Geotechnical Data" for reports and soil-boring data from geotechnical investigations that are made available to bidders.
 - 4. Section 02 41 16 "Structure Demolition" for notification requirements if materials suspected of containing hazardous materials are encountered.
 - 5. Section 02 41 19 "Selective Structure Demolition" for notification requirements if materials suspected of containing hazardous materials are encountered.

END OF DOCUMENT 00 31 26

**SECTION 00 31 26 - EXISTING HAZARDOUS
MATERIAL INFORMATION**

Page 1 of 1



COMPREHENSIVE ASBESTOS INSPECTION REPORT

FOR

MCMILLAN PAZDAN SMITH ARCHITECTURE

**127 Dunbar Street
Spartanburg, SC 29306**

LOCATION

**Byrnes High School- Phase 2 Demolition Extents
150 E Main Street
Duncan, SC 29334**

INSPECTION DATE: May 24 & July 21-22, 2021

REPORT DATE: July 27, 2021

INSPECTOR(S)

**Evans Harris – SC-DHEC License #BI-01224
(864) 680-1233**

**Dustin Henderson – SC-DHEC License #BI-01510
(864) 541-8736**

For

**Crossroads Environmental, LLC
1258 Boiling Springs Road
Spartanburg, South Carolina 29303
(864) 541-8736
CRE Project # 20018-IN**

TABLE OF CONTENTS

INSPECTION REPORT/LETTER

- BACKGROUND INFORMATION
- BUILDING/AREA DESCRIPTION
- INSPECTION STRATEGY/SAMPLING PROTOCOL
- RESULTS
- RELEVANT REGULATORY REQUIREMENTS/RECOMMENDATIONS
- CLOSING STATEMENTS AND LIMITATIONS

ATTACHMENTS

- ATTACHMENT I: ASBESTOS SUMMARY TABLE
- ATTACHMENT II: LABORATORY REPORT(S)
- ATTACHMENT III: BUILDING/AREA SKETCH
- ATTACHMENT IV: INSPECTOR'S LICENSE/ACCREDITATION

July 27, 2021

Mr. Ryan Cloonan
McMillan Pazdan Smith Architecture
127 Dunbar Street
Spartanburg, SC 29306

Re: Comprehensive Asbestos Inspection Report
Byrnes High School- Phase 2 Demolition Extents
150 E Main Street, Duncan, SC 29334
CRE Project Number: 20018-IN

Dear Mr. Cloonan:

Crossroads Environmental, LLC (CRE) completed a comprehensive asbestos inspection of the 'Phase 2 Demolition Extents' at Byrnes High School, located at 150 E Main Street in Duncan, South Carolina. The inspection was performed prior to proposed demolition by SC-DHEC Licensed Asbestos Inspectors, and in accordance with South Carolina Department of Health and Environmental Control (SC-DHEC) and Environmental Protection Agency (EPA) Requirements. **A detailed summary table of the sampling is included in Attachment I; however, this report should be read in its entirety.**

Building Description

The 'Phase 2 Demolition Extents' encompass an approximately 35,000 square foot portion of the school. This area is single-story, slab-on-grade foundation and features brick veneer exterior and built-up roofing materials under TPO membrane. The '300' and '500' wings are original to the school, while the '400' wing, '700 Annex' and '710 Annex' are additions. All building sections feature CMU interior wall construction and drop ceilings grids throughout. There are a variety of vinyl floor types and associated mastics/adhesives, as well as vinyl cove base(s). There are various ceiling tile type(s), and above the drop grids are suspect pipe insulation, penetration caulk(s) and HVAC equipment mastic(s). The 300 and 500 wing electrical rooms feature transite panels in the ceiling, while the other building sections feature fiberboard and/or fiberglass panels below the roof decking.

Inspection Strategy/Sampling Protocol

The inspection consisted of grouping suspect asbestos containing materials into homogeneous areas based on the color and texture of the material, and then performing representative sampling of the materials included in those homogeneous areas. SC-DHEC has requirements for the minimum number of samples that can be collected from each homogeneous area (three samples of each miscellaneous material, three samples of each type of thermal system insulation, and the sample requirements for surfacing are based on square footage). Following

completion of the on-site inspection/sampling, samples were submitted to an accredited laboratory for analysis.

As of June 27, 2008, SC-DHEC requires that any non-friable organically bound (NOB) material that is suspect to contain asbestos, such as floor tile, mastics, roofing material, and caulking must be analyzed by transmission electron microscopy (TEM) if polarized light microscopy (PLM) analyses of that material indicate that no asbestos was detected.

Results

EPA recognizes a material as Asbestos Containing Material (ACM) if an asbestos content of greater than one percent asbestos is detected in a representative sample analyzed by polarized light microscopy. Certain OSHA regulations apply even if the asbestos content is less than one percent (OSHA 29 CFR 1926.1101).

Results indicated that greater than one percent asbestos was detected in the following materials:

- 12" x 12" Golden VFT Mastic (HA01)
- 9" x 9" Light/Dark Brown VFT & Mastic (HA02)
- 12" x 12" Orange VFT Mastic (HA06)
- 12" x 12" Beige/Brown VFT & Mastic (HA08)
- 12" x 12" Gray/Tan VFT Mastic (HA09)
- Transite Ceiling Panel (HA21)
- Pipe Run Insulation (HA24)
- Black Mastic on Roof Drain(s) (HA26)
- Gray/Green Duct Mastic (HA27)
- Black Mastic on HVAC Duct Work (HA32)
- CMU Block Filler/Skim (HA33)
- Brick Skim Coat (HA36)
- Roof Equipment Mechanical Flashing (HA39)
- Roof Perimeter Flashing (HA40)
- Roof Equipment Mechanical Flashing (HA41)
- Built-Up Roofing Field (HA42)
- Parapet Wall/Mechanical Coating (HA43)

Relevant Regulatory Requirements/Recommendations

Friability-Friable materials are defined as materials that can be reduced to powder by hand pressure. It should be noted that non-friable materials may become friable depending on the method of removal. All non-friable materials must be removed by properly accredited asbestos personnel. If the non-friable materials are removed in a friable manner, then all regulations in regard to friable abatement will apply.

Project Design- A Project Design, written by a SC-DHEC Licensed Project Designer, will be required on this project.

Air Monitoring- Air monitoring by a SC-DHEC Licensed Air Monitor will be required on this project.

All asbestos abatement must be performed by a SC-DHEC Licensed Abatement Contractor, and all waste must be disposed of in a SC-DHEC approved landfill.

Closing Statements and Limitations

Every effort was made to identify all materials in accessible areas. There is the possibility that suspect materials were not identified in inaccessible areas. If any suspect material is discovered that is not included within this report, it should be sampled before it is physically disturbed.

This document has been prepared by Crossroads Environmental, LLC at the request of and for the exclusive use of McMillan Pazdan Smith Architecture. This report represents the findings from the date that it was inspected, and is limited in scope to that indicated above.

Crossroads Environmental, LLC appreciates the opportunity to provide McMillan Pazdan Smith Architecture with our consultative services. Should you have any questions or need additional information, please do not hesitate to contact us.

Sincerely,



Evans Harris
Licensed Inspector



Dustin Henderson
Licensed Inspector



Kay H. Horton
President

EH

Attachments- (4)

ATTACHMENT I
ASBESTOS SUMMARY TABLE

CROSSROADS ENVIRONMENTAL, LLC ASBESTOS INSPECTION REPORT							CRE JOB #: 20018-IN			
Location:		Byrnes High School- Phase II Demo Extents								
Client:		McMillan Pazdan Smith Architecture					DATE: May 24 & July 21-22, 2021			
Key: A=Amosite, C=Chrysotile, Cr=Crocidolite, Tr=Tremolite, Ac=Actinolite Asbestos, Misc.=Miscellaneous, HA# =Homogeneous Area #, PLM=Polarized Light Microscopy, TEM=Transmission Electron Microscopy, /=PLM and/or TEM Analysis Not Required sq.ft.=Square Feet, cu.ft.=Cubic Feet, In.ft.=Linear Feet, HJI=Hard Joint Insulation, TSI=Thermal System Insulation, BUR=Built-up Roofing, Surf=Surfacing NAD=No Asbestos Detected, SP=Stop Positive										
HA#	Type of Material TSI, Surf, Misc.	Material Type	Sample Number	Asbestos Content (PLM)	Asbestos Content (TEM)	Location of Sample	Approx. Quantity	Physical Condition	Location/ Comments	
01	Misc	12" x 12" Golden VFT	001 VFT 001 Mastic	NAD 3%C	/ /	Hall outside 500	1,314 sq. ft.	Good; Non-Friable	Located throughout the 500 hallway.	
			002 VFT 002 Mastic	NAD S/P	/ /	Hall outside 504				
			003 VFT 003 Mastic	/ S/P	NAD /	Hall outside 505				
02	Misc	9" x 9" Light Brown & Dark Brown VFT	004 VFT 004 Mastic	10%C NAD	/ /	501/503 Office	11,440 sq. ft.	Good; Non-Friable	Located in rooms 500, 501, 502, 503, 504, 505, 506, 500 Asst. Principal, 500 Conference Room, 300, 301, 302, 303, 304, 305, 306 & 307.	
			005 VFT 005 Mastic	S/P NAD	/ /	502 @ sink				
			006 VFT 006 Mastic	S/P /	/ 1.7%C	307				
03	Misc	2' x 2' Ceiling Tile (Gouges & Pinholes)	007	NAD	/	500 hall outside Conf. Room	N/A	Good; Non-Friable	Located in the 500 hallway, NE hallway/common area, 700 Annex and rooms 304, 700, 701, 702 & 703.	
			008	NAD	/	701				
			009	NAD	/	NE hallway common area				

CROSSROADS ENVIRONMENTAL, LLC ASBESTOS INSPECTION REPORT								CRE JOB #: 20018-IN	
Location:		Byrnes High School- Phase II Demo Extents							
Client:		McMillan Pazdan Smith Architecture					DATE: May 24 & July 21-22, 2021		
Key: A=Amosite, C=Chrysotile, Cr=Crocidolite, Tr=Tremolite, Ac=Actinolite Asbestos, Misc.=Miscellaneous, HA# =Homogeneous Area #, PLM=Polarized Light Microscopy, TEM=Transmission Electron Microscopy, /=PLM and/or TEM Analysis Not Required sq.ft.=Square Feet, cu.ft.=Cubic Feet, In.ft.=Linear Feet, HJI=Hard Joint Insulation, TSI=Thermal System Insulation, BUR=Built-up Roofing, Surf=Surfacing NAD=No Asbestos Detected, SP=Stop Positive									
HA#	Type of Material TSI, Surf, Misc.	Material Type	Sample Number	Asbestos Content (PLM)	Asbestos Content (TEM)	Location of Sample	Approx. Quantity	Physical Condition	Location/ Comments
04	Misc	2' x 2' Ceiling Tile (Squiggles & Pinholes)	010	NAD	/	Hall outside 400	N/A	Good; Non-Friable	Located in rooms 500, 500 Conf., 501, 502, 503, 504, 505, 506, Ne hallway/common area, 408, 400 hallway, 409, 406, 407, 404, 405, 402, 403, 401, 400, 300 hallway, 300, 301, 302, 303, 304, 305, 306 & 307.
			011	NAD	/	303			
			012	NAD	/	500 Conf. Room			
05	Misc	12" x 12" Blue Vinyl Floor Tile	013 VFT 013 Mastic	NAD NAD	/ /	Double door threshold on NE hallway	N/A	Good; Non-Friable	Located I the NE corridor @ double doors, threshold for 700 Annex, SW end of 400 hallway, and SW end of 300 hallway.
			014 VFT 014 Mastic	NAD NAD	/ /	700 Annex double doors			
			015 VFT 015 Mastic	/ /	NAD NAD	NE hallway double doors @ end of 500 hallway			
06	Misc	12" x 12" Orange Vinyl Floor Tile	016 VFT 016 Mastic	NAD 3%C	/ /	Hall outside 401	1,170 sq. ft.	Good; Non-Friable	Located throughout the 400 hallway.
			017 VFT 017 Mastic	NAD S/P	/ /	Hall outside 404			
			018 VFT 018 Mastic	/ S/P	NAD /	Hall outside 409			
07	Surf.	Drywall, Tape & Spackle	019 Spackle Drywall/Tape	019 NAD	/ /	Over locker 509A	<5,000 sq. ft.	Good; Friable	Located above the lockers on the 300, 400, 500 hallways, Room 300, 300 Wing faculty restroom.
			020 Spackle Drywall/Tape	020 NAD	/ /	Over locker 550A			
			021 Spackle Drywall/Tape	021 NAD	/ /	Over locker 486A			
			022 Spackle Drywall/Tape	022 NAD	/ /	Over locker 407A			
			023 Spackle Drywall/Tape	023 NAD	/ /	Over locker 345A			

CROSSROADS ENVIRONMENTAL, LLC ASBESTOS INSPECTION REPORT										CRE JOB #: 20018-IN
Location:		Byrnes High School- Phase II Demo Extents								
Client:		McMillan Pazdan Smith Architecture						DATE: May 24 & July 21-22, 2021		
Key: A=Amosite, C=Chrysotile, Cr=Crocidolite, Tr=Tremolite, Ac=Actinolite Asbestos, Misc.=Miscellaneous, HA# =Homogeneous Area #, PLM=Polarized Light Microscopy, TEM=Transmission Electron Microscopy, /=PLM and/or TEM Analysis Not Required sq.ft.=Square Feet, cu.ft.=Cubic Feet, In.ft.=Linear Feet, HJI=Hard Joint Insulation, TSI=Thermal System Insulation, BUR=Built-up Roofing, Surf=Surfacing NAD=No Asbestos Detected, SP=Stop Positive										
HA#	Type of Material TSI, Surf, Misc.	Material Type	Sample Number	Asbestos Content (PLM)	Asbestos Content (TEM)	Location of Sample	Approx. Quantity	Physical Condition	Location/ Comments	
08	Misc.	12" x 12" Beige/Brown Vinyl Floor Tile	024 VFT Mastic	024 2% 3% C C	/	Hallway outside 306	1,314 sq. ft.	Good; Non- Friable	Located throughout the 300 hallway.	
			025	S/P	/	Hallway outside 303				
			026	S/P	/	Hallway outside 300				
09	Misc	12" x 12" Gray/Tan Vinyl Floor Tile	027 VFT Mastic	027 NAD 3% C C	/	407	10,826 sq. ft.	Good; Non- Friable	Located in 408, 409, 406, 407, 404, 405, 402, 403, 401, 400, 710 Annex hallway, 710, 711, 713 & 714.	
			029 VFT Mastic	029 / 2% C C	NAD /	Main corridor @ 300 entry outside Guidance				
			029-B VFT 029-B Mastic	NAD 3% C C	/	710 Annex hall				
10	Misc	4" Black Cove	030 Cove Mastic	030 NAD NAD	/	500 Conf. Room	N/A	Good; Non- Friable	Located in 500 Conf. Room.	
			031 Cove Mastic	031 NAD NAD	/	500 Conf. Room				
			032 Cove Mastic	032 / /	NAD NAD	500 Conf. Room				
11	Misc	Locker Cove Base	033 Cove Mastic	033 NAD NAD	/	500 hall @ Locker 503A	N/A	Good; Non- Friable	Located at the 500 hallway and 300 hallway locker base(s).	
			034 Cove Mastic	034 NAD NAD	/	501 hall @ Locker 503A				
			035 Cove Mastic	035 / /	NAD NAD	300 hallway				
12	Misc	4" Gray Cove	036 Cove Mastic	036 NAD NAD	/	NE hall @ 300 corridor	N/A	Good; Non- Friable	Located in the NE hallway/common area, 700 Annex hallway, 700, 701, 702 & 703.	
			037 Cove Mastic	037 NAD NAD	/	NE hall @ 300 corridor				
			038 Cove Mastic	038 / /	NAD NAD	700 Annex @ double doors				

CROSSROADS ENVIRONMENTAL, LLC ASBESTOS INSPECTION REPORT							CRE JOB #: 20018-IN		
Location:		Byrnes High School- Phase II Demo Extents							
Client:		McMillan Pazdan Smith Architecture					DATE: May 24 & July 21-22, 2021		
Key: A=Amosite, C=Chrysotile, Cr=Crocidolite, Tr=Tremolite, Ac=Actinolite Asbestos, Misc.=Miscellaneous, HA# =Homogeneous Area #, PLM=Polarized Light Microscopy, TEM=Transmission Electron Microscopy, /=PLM and/or TEM Analysis Not Required sq.ft.=Square Feet, cu.ft.=Cubic Feet, In.ft.=Linear Feet, HJI=Hard Joint Insulation, TSI=Thermal System Insulation, BUR=Built-up Roofing, Surf=Surfacing NAD=No Asbestos Detected, SP=Stop Positive									
HA#	Type of Material TSI, Surf, Misc.	Material Type	Sample Number	Asbestos Content (PLM)	Asbestos Content (TEM)	Location of Sample	Approx. Quantity	Physical Condition	Location/ Comments
13	Misc	Gypsum Wall Panel, Unfinished	039	NAD	/	711	N/A	Good; Friable	Located throughout the 710 Annex.
			040	NAD	/	Over Locker 57			
			041	NAD	/	Over Locker 99			
14	Misc	12" x 12" Tan/Gray Vinyl Floor tile	042 VFT 042 Mastic	NAD NAD	/ /	Planning Room	N/A	Good; Non-Friable	Located in the 710 Annex Planning Room.
			043 VFT 043 Mastic	NAD NAD	/ /	Planning Room			
			044 VFT 044 Mastic	/ /	NAD NAD	Planning Room			
15	Misc	12" x 12" Gray Vinyl Floor Tile w/ Brown Glue	045 VFT 045 Mastic	NAD NAD	/ /	700 Faculty RR's	N/A	Good; Non-Friable	Located throughout the 700 Faculty Restroom(s).
			046 VFT 046 Mastic	NAD NAD	/ /	700 Faculty RR's			
			047 VFT 047 Mastic	/ /	NAD NAD	700 Faculty RR's			
16	Misc	4" Gray Cove	048 Cove 048 Mastic	NAD NAD	/ /	700 Faculty RR's	N/A	Good; Non-Friable	Located throughout the 700 Faculty Restroom(s) at wall base(s).
			049 Cove 049 Mastic	NAD NAD	/ /	700 Faculty RR's			
			050 Cove 050 Mastic	/ /	NAD NAD	700 Faculty RR's			
17	Misc	4" Brown Cove	051 Cove 051 Mastic	NAD NAD	/ /	710 Annex hall	N/A	Good; Non-Friable	Located throughout the 710 Annex hallway and hallway outside Media Center.
			052 Cove 052 Mastic	NAD NAD	/ /	Brick wall adj. to Media Center			
			053 Cove 053 Mastic	/ /	NAD NAD	Double doors to Media Center/710 Annex			
18	Misc	2' x 4' Ceiling Tile (Heavy Gouges)	054	NAD	/	710 Annex hall	N/A	Good; Friable	Located in the 710 Annex hallway, 710, 711, 713, 714 & Planning Room.
			055	NAD	/	713			
			056	NAD	/	710			

CROSSROADS ENVIRONMENTAL, LLC ASBESTOS INSPECTION REPORT								CRE JOB #: 20018-IN	
Location:		Byrnes High School- Phase II Demo Extents							
Client:		McMillan Pazdan Smith Architecture						DATE: May 24 & July 21-22, 2021	
Key: A=Amosite, C=Chrysotile, Cr=Crocidolite, Tr=Tremolite, Ac=Actinolite Asbestos, Misc.=Miscellaneous, HA# =Homogeneous Area #, PLM=Polarized Light Microscopy, TEM=Transmission Electron Microscopy, /=PLM and/or TEM Analysis Not Required sq.ft.=Square Feet, cu.ft.=Cubic Feet, In.ft.=Linear Feet, HJI=Hard Joint Insulation, TSI=Thermal System Insulation, BUR=Built-up Roofing, Surf=Surfacing NAD=No Asbestos Detected, SP=Stop Positive									
HA#	Type of Material TSI, Surf, Misc.	Material Type	Sample Number	Asbestos Content (PLM)	Asbestos Content (TEM)	Location of Sample	Approx. Quantity	Physical Condition	Location/ Comments
19	Misc	12" x 12" Tan VFT	028 VFT	NAD	/	NE locker area adj. to 700 Annex	N/A	Good; Non-Friable	Located in the NE hallway adjacent the 700/710 Annex(s) and at the NE ends of the 300, 400 and 500 hallways; 700 Annex hallway, 700, 701, 702 & 703; 500 Conference Room (over HA02).
			028 Mastic	NAD	/	NE locker area adj. to 700 Annex			
			029-A VFT	NAD	/	703			
			029-A Mastic	NAD	/	703			
			028-B VFT	NAD	/	700 hallway @ end of 300 hallway			
			028-B Mastic	NAD	/	700 hallway @ end of 300 hallway			
			028-C VFT	/	NAD	700 hallway @ end of 500 hallway			
			028-C Mastic	/	NAD	700 hallway @ end of 500 hallway			
20	Misc	4" Beige Cove	060 Cove	NAD	/	713 @ door	N/A	Good; Non-Friable	Located in room 710, 711, 713, 714 & Planning Room.
			060 Mastic	NAD	/	713 @ door			
			061 Cove	NAD	/	713 @ door			
			061 Mastic	NAD	/	713 @ door			
			062 Cove	/	NAD	713 @ door			
			062 Mastic	/	NAD	713 @ door			
21	Misc	Transite Ceiling Panel	063	15%C	/	500 Electrical/Mechanical Room	360 sq. ft.	Good; Non-Friable	Located in the ceiling(s) of the 500 & 300 Electrical/Mechanical Room(s).
22	TSI	Hard Joint Insulation	064	NAD	/	500 Electrical/Mechanical Room	16 Elbow(s)	Good; Friable	Located in the 300 hallway, 500 hallway, and 500 & 300 Electrical/Mechanical Room(s) on potable water line(s).
			065	NAD	/	500 hallway outside Conference Room			
			066	NAD	/	Hallway outside 300 Electrical/Mechanical			
23	Misc	Foamglass Block(s)	067	NAD	/	Over 500 Records Storage plaster ceiling	N/A	Good; Non-Friable	Over the 500 hallway Records Storage plaster ceiling.
			068	NAD	/	Over 500 Records Storage plaster ceiling			
			069	NAD	/	Over 500 Records Storage plaster ceiling			
24	TSI	Pipe Run Insulation	070 Layer 1	65%C	/	500 Electrical/Mechanical Room	300 In. ft.	Good; Friable	Located in the 300 hallway, 500 hallway, and 500 & 300 Electrical/Mechanical Room(s) on potable water line(s).
			070 Layer 2	NAD	/	500 hallway outside 502			
			070 Layer 3	NAD	/	500 hallway outside 502			
			071	S/P	/	500 hallway outside 502			
			072	S/P	/	300 hallway outside 301			
25	Misc	Brown/Gray Duct Mastic	073	NAD	/	700 hallway @ end of 500 hallway	N/A	Good; Non-Friable	Located on the metal box duct throughout the 700 hallway.
			074	NAD	/	700 hallway @ end of 300 hallway			
			075	/	NAD	700 hallway @ end of 300 hallway			

CROSSROADS ENVIRONMENTAL, LLC ASBESTOS INSPECTION REPORT							CRE JOB #: 20018-IN		
Location:		Byrnes High School- Phase II Demo Extents							
Client:		McMillan Pazdan Smith Architecture					DATE: May 24 & July 21-22, 2021		
Key: A=Amosite, C=Chrysotile, Cr=Crocidolite, Tr=Tremolite, Ac=Actinolite Asbestos, Misc.=Miscellaneous, HA# =Homogeneous Area #, PLM=Polarized Light Microscopy, TEM=Transmission Electron Microscopy, /=PLM and/or TEM Analysis Not Required sq.ft.=Square Feet, cu.ft.=Cubic Feet, In.ft.=Linear Feet, HJI=Hard Joint Insulation, TSI=Thermal System Insulation, BUR=Built-up Roofing, Surf=Surfacing NAD=No Asbestos Detected, SP=Stop Positive									
HA#	Type of Material TSI, Surf, Misc.	Material Type	Sample Number	Asbestos Content (PLM)	Asbestos Content (TEM)	Location of Sample	Approx. Quantity	Physical Condition	Location/ Comments
26	Misc	Black Mastic on Fiberglass Roof Drain Insulation	076	5%C	/	Hall @ Room 408	(4) Drains-- 14 In. ft.	Good; Non-Friable	Located on the 400 wing roof drains.
			077	S/P	/	Hall @ Room 404			
			078	S/P	/	Hall @ Room 402			
27	Misc	Gray/Green Duct Mastic on Fiberglass	079 Layer 1	NAD	/	300 Electrical/ Mechanical Room	24 sq. ft.	Good; Non-Friable	Located in the 300 Electrical/ Mechanical Room on duct work at AHU.
			079 Layer 2	10%C	/				
			080	S/P	/	300 Electrical/ Mechanical Room			
28	Surf.	Plaster	082 Skim	NAD	/	500 Records Storage	<1,000 sq. ft.	Good; Friable	Located on the ceiling of the 500 hallway Records Storage.
			082 Base	NAD	/				
			083 Skim	NAD	/	500 Records Storage			
29	Misc	Gray Duct Mastic	084 Base	NAD	/	500 Records Storage	N/A	Good; Non-Friable	Located on duct work for the 300 Hallway Faculty Restroom
			085	NAD	/	300 Hallway Faculty Restroom			
			086	NAD	/	300 Hallway Faculty Restroom			
30	Misc	Tan Penetration Caulk	087	/	NAD	300 Hallway Faculty Restroom	N/A	Good; Non-Friable	Located at thru wall penetration(s) and IT conduit throughout the demo area(s).
			088	NAD	/	500 hallway			
			089	NAD	/	400 hallway			
			090	/	NAD	300 hallway			

CROSSROADS ENVIRONMENTAL, LLC ASBESTOS INSPECTION REPORT							CRE JOB #: 20018-IN		
Location:		Byrnes High School- Phase II Demo Extents							
Client:		McMillan Pazdan Smith Architecture					DATE: May 24 & July 21-22, 2021		
Key: A=Amosite, C=Chrysotile, Cr=Crocidolite, Tr=Tremolite, Ac=Actinolite Asbestos, Misc.=Miscellaneous, HA# =Homogeneous Area #, PLM=Polarized Light Microscopy, TEM=Transmission Electron Microscopy, /=PLM and/or TEM Analysis Not Required sq.ft.=Square Feet, cu.ft.=Cubic Feet, In.ft.=Linear Feet, HJI=Hard Joint Insulation, TSI=Thermal System Insulation, BUR=Built-up Roofing, Surf=Surfacing NAD=No Asbestos Detected, SP=Stop Positive									
HA#	Type of Material TSI, Surf, Misc.	Material Type	Sample Number	Asbestos Content (PLM)	Asbestos Content (TEM)	Location of Sample	Approx. Quantity	Physical Condition	Location/ Comments
31	Misc	Red Penetration Caulk	091	NAD	/	500 hallway	N/A	Good; Non- Friable	Located at thru wall penetration(s) and IT conduit throughout the demo area(s).
			092	NAD	/	400 hallway			
			093	/	NAD	300 hallway			
32	Misc	Black Mastic on Fiberglass Duct Work	094	5%C	/	710 Annex hallway	200 In. ft.	Good; Non- Friable	Located on duct work serving the 710 Annex.
			095	S/P	/	711			
			096	S/P	/	714			
33	Surf.	CMU Block Filler	097 Skim 097 CMU	NAD NAD	/ /	Hallway @ 505	Approximately 30,000 sq. ft.	Good; Friable	Located over CMU throughout the 300 Wing, 500 Wing and 710 Annex.
			098 Skim 098 CMU	NAD NAD	/ /	Room 502			
			099 Skim 099 CMU	2%C NAD	/ /	500 hallway Conf Room			
			100 Skim 100 CMU	<1%C NAD	/ /	Hallway @ 300 Electrical			
			101 Skim 101 CMU	NAD NAD	/ /	Room 303			
			102 Skim 102 CMU	NAD NAD	/ /	Hallway @ Room 306			
			103 Skim 103 CMU	<1%C NAD	/ /	710 Annex			
34	Surf.	CMU Block Filler	104 Skim 104 CMU	NAD NAD	/ /	Hallway @ 401	>5,000 sq. ft.	Good; Friable	Located over CMU throughout the 400 Wing and 700 Annex.
			105 Skim 105 CMU	NAD NAD	/ /	Room 402			
			106 Skim 106 CMU	NAD NAD	/ /	Hallway @ 407			
			107 Skim 107 CMU	NAD NAD	/ /	Room 406			
			108 Skim 108 CMU	NAD NAD	/ /	Hallway @ 408			
			109 Skim 109 CMU	NAD NAD	/ /	700 Annex			
			110 Skim 110 CMU	NAD NAD	/ /	Room 701			

CROSSROADS ENVIRONMENTAL, LLC ASBESTOS INSPECTION REPORT							CRE JOB #: 20018-IN		
Location:		Byrnes High School- Phase II Demo Extents							
Client:		McMillan Pazdan Smith Architecture					DATE: May 24 & July 21-22, 2021		
Key: A=Amosite, C=Chrysotile, Cr=Crocidolite, Tr=Tremolite, Ac=Actinolite Asbestos, Misc.=Miscellaneous, HA# =Homogeneous Area #, PLM=Polarized Light Microscopy, TEM=Transmission Electron Microscopy, /=PLM and/or TEM Analysis Not Required sq.ft.=Square Feet, cu.ft.=Cubic Feet, In.ft.=Linear Feet, HJI=Hard Joint Insulation, TSI=Thermal System Insulation, BUR=Built-up Roofing, Surf=Surfacing NAD=No Asbestos Detected, SP=Stop Positive									
HA#	Type of Material TSI, Surf, Misc.	Material Type	Sample Number	Asbestos Content (PLM)	Asbestos Content (TEM)	Location of Sample	Approx. Quantity	Physical Condition	Location/ Comments
35	Misc	12" x 12" Gray Vinyl Floor Tile	111 VFT 111 Mastic	NAD NAD	/ /	Entry foyer	N/A	Good; Non-Friable	Located throughout the 300 Wing Faculty Restroom.
			112 VFT 112 Mastic	NAD NAD	/ /	Women's restroom @ damage			
			113 VFT 113 Mastic	/ /	NAD NAD	Women's restroom @ damage			
36	Surf.	Brick Skim Coat	114	2%Cr	/	SW 500 hallway	Approximately 2,300 sq. ft.	Good; Friable	Located on the 300 and 500 wing(s); material used to be exterior of structures.
			115	2%Cr	/	SW 500 hallway			
			116	2%Cr	/	SW 300 hallway			
			117	2%Cr	/	NE 500 hallway			
			118	NAD	/	NE 300 hallway			
37	Misc	Fiberboard Roof Panel	119	NAD	/	300 hallway outside 303	N/A	Good; Non-Friable	Located under the roof decking throughout the 300 and 500 wings.
			120	NAD	/	500 hallway outside 500			
			121	NAD	/	500 hallway outside 504			
38	Misc.	TPO Roof Field over Built Up Roofing	122 Black Tar 122 Tan Insulation 122 White Insulation	NAD NAD NAD	/ / /	500- South	N/A	Good; Non-Friable	Located over the 300, 500, 700 Annex, and 710 Annex.
			123 Black Tar 123 Tan Insulation 123 White Insulation	NAD NAD NAD	/ / /	300- Southeast			
			124 Black Tar 124 Felt 124 Tan Insulation 124 White Insulation	NAD NAD NAD NAD	/ / / /	710 Annex			
			124-A Black Tar 124-A Felt 124-A Tan Insulation 124-A White Insulation	/ / NAD NAD	/ / <1%Cr /	700 Annex			

CROSSROADS ENVIRONMENTAL, LLC ASBESTOS INSPECTION REPORT							CRE JOB #: 20018-IN		
Location:		Byrnes High School- Phase II Demo Extents							
Client:		McMillan Pazdan Smith Architecture					DATE: May 24 & July 21-22, 2021		
Key: A=Amosite, C=Chrysotile, Cr=Crocidolite, Tr=Tremolite, Ac=Actinolite Asbestos, Misc.=Miscellaneous, HA# =Homogeneous Area #, PLM=Polarized Light Microscopy, TEM=Transmission Electron Microscopy, /=PLM and/or TEM Analysis Not Required sq.ft.=Square Feet, cu.ft.=Cubic Feet, In.ft.=Linear Feet, HJI=Hard Joint Insulation, TSI=Thermal System Insulation, BUR=Built-up Roofing, Surf=Surfacing NAD=No Asbestos Detected, SP=Stop Positive									
HA#	Type of Material TSI, Surf, Misc.	Material Type	Sample Number	Asbestos Content (PLM)	Asbestos Content (TEM)	Location of Sample	Approx. Quantity	Physical Condition	Location/ Comments
39	Misc.	Mechanical Flashing	125 Silver Paint	2% C	/	300-East Mechanical	164 In. ft.	Good; Non-Friable	Located on the 300 and 500 wing roof sections, excluding the skylights.
			125 Black Flashing	NAD	/				
			125 Black Paper	2% C	/				
			126 Silver Paint	SP	/	300- Southeast Mechanical			
			126 Black Flashing		/				
			126 Black Paper		/				
			126 White Insulation		/				
			127 Silver Paint	/	/	500-Northwest Mechanical			
			127 Black Flashing	/	/				
			127 Black Paper	/	SP				
			127 White Insulation	/	/				
40	Misc	Perimeter Flashing	128 Black Flashing	10% C	/	700- North Hall	525 sq. ft.	Good; Non-Friable	Located along the perimeter ends of the 300, 400, 500, and 700 hall roofing sections.
			128 Black Flashing	NAD	/				
			128 Gray Insulation	NAD	/				
			129 Black Flashing	SP	/	500- South			
			129 Black Flashing		/				
			129 Gray Insulation		/				
			130 Black Flashing	/	/	300- South			
			130 Black Flashing	/	SP				
			130 Gray Insulation	/	/				
41	Misc.	Mechanical Flashing	131 Black Flashing	10% C	/	300 Skylight	220 In. ft.	Good; Non-Friable	Located along the skylights and the mechanicals on the 700 and 710 Annex.
			131 Black Felt	15% C	/				
			131 Black Paint	2% C	/				
			131 Tan/ Black Insul.	NAD	/				
			132 Black Flashing	SP	/	400 Skylight			
			131 Black Felt		/				
			131 Black Paint		/				
			131 Tan/ Black Insul.		/				
			133 Black Flashing	SP	/	700 Mechanical			
			131 Black Felt		/				
			131 Black Paint		/				
			131 Tan/ Black Insul.		/				
			133-A Black Flashing	SP	/	710 Mechanical			
			133-A Black Felt		/				
			133-A Black Paint		/				
			133-A Tan/ Black Insul.		/				
			133-B Black Flashing	/	/	700 Mechanical			
			133-B Black Felt	/	/				
			133-B Black Paint	/	/				
			133-B Tan/ Black Insul.	/	/				

CROSSROADS ENVIRONMENTAL, LLC ASBESTOS INSPECTION REPORT							CRE JOB #: 20018-IN			
Location:		Byrnes High School- Phase II Demo Extents								
Client:		McMillan Pazdan Smith Architecture					DATE: May 24 & July 21-22, 2021			
Key: A=Amosite, C=Chrysotile, Cr=Crocidolite, Tr=Tremolite, Ac=Actinolite Asbestos, Misc.=Miscellaneous, HA#=#Homogeneous Area #, PLM=Polarized Light Microscopy, TEM=Transmission Electron Microscopy, /=PLM and/or TEM Analysis Not Required sq.ft.=Square Feet, cu.ft.=Cubic Feet, In.ft.=Linear Feet, HJI=Hard Joint Insulation, TSI=Thermal System Insulation, BUR=Built-up Roofing, Surf=Surfacing NAD=No Asbestos Detected, SP=Stop Positive										
HA#	Type of Material TSI, Surf, Misc.	Material Type	Sample Number	Asbestos Content (PLM)	Asbestos Content (TEM)	Location of Sample	Approx. Quantity	Physical Condition	Location/ Comments	
42	Misc.	TPO Roof Field over Built Up Roofing w/ Foam	134 Black Tar	NAD	/	700 Hall Roof Section	10,900 sq. ft.	Good; Non-Friable	Located along on the 400 and 700 hall roofing sections.	
			134 Black Felt	15%C	/					
			134 Tan Insulation	NAD	/					
			134 Pink Insulation	NAD	/					
43	Misc.	Wall/ Mechanical Coating	135 Black Tar	SP	/	400-N Hall Roof Section	108 sq. ft. (Perimeter Coating Quantity Included in HA40)	Good; Non-Friable	Located along the perimeter wall and above the flashing on the mechanicals.	
			135 Black Felt		/					
			135 Tan Insulation		/					
44	Misc	White Window Caulk	136 Black Tar	SP	/	400 Hall Central Roof Section	N/A	Good; Non-Friable	Located around the windows of the 700 and 710 Annex.	
			136 Black Felt		/					
45	Misc.	Door Caulk	136 Tan Insulation	/	/	700 North	N/A	Good; Non-Friable	Located around the doors associated with the 700 Hall, 700 Annex, and the 710 Annex.	
			136 Pink Insulation		/					
			136-A Black Tar		/					
46	Misc.	Brown Window Caulk	136-A Black Felt	/	/	700 Hall Windows	N/A	Good; Non-Friable	Located along the windows associated with the 700 hallway.	
			136-A Tan Insulation		/					
			136-A Pink Insulation		/					
43	Misc.	Wall/ Mechanical Coating	137 Black Coating	SP	/	300-S Perimeter	108 sq. ft. (Perimeter Coating Quantity Included in HA40)	Good; Non-Friable	Located along the perimeter wall and above the flashing on the mechanicals.	
			137 Black Coating		10%C					/
			137 Yellow Coating		NAD					/
44	Misc	White Window Caulk	138 Black Coating	/	/	700 Annex	N/A	Good; Non-Friable	Located around the windows of the 700 and 710 Annex.	
			137 Black Coating		/					
			137 Yellow Coating		/					
45	Misc.	Door Caulk	139 Black Coating	/	/	700 Annex	N/A	Good; Non-Friable	Located around the doors associated with the 700 Hall, 700 Annex, and the 710 Annex.	
			139 Black Coating		/					
			139 Yellow Coating		/					
46	Misc.	Brown Window Caulk	140	NAD	/	700 Hall Windows	N/A	Good; Non-Friable	Located along the windows associated with the 700 hallway.	
			141		/					
			142		/					
45	Misc.	Door Caulk	143 White Caulk	NAD	/	700 Hall	N/A	Good; Non-Friable	Located around the doors associated with the 700 Hall, 700 Annex, and the 710 Annex.	
			143 Gray Caulk		/					
			144 White Caulk		NAD					/
46	Misc.	Brown Window Caulk	144 Gray Caulk	/	/	700 Annex	N/A	Good; Non-Friable	Located around the doors associated with the 700 Hall, 700 Annex, and the 710 Annex.	
			145 White Caulk		/					
			145 Gray Caulk		NAD					/
46	Misc.	Brown Window Caulk	146	NAD	/	700 Hall Windows	N/A	Good; Non-Friable	Located along the windows associated with the 700 hallway.	
			147		/					
			148		/					

ATTACHMENT II
LABORATORY REPORT(S)

May 26, 2021

Crossroads Environmental
1258 Boiling Springs Road
Spartanburg, SC 29303

CLIENT PROJECT: Byrnes - Phase II, 20018-IN
CEI LAB CODE: A217119v2

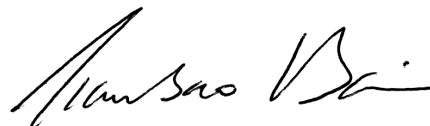
Dear Customer:

Enclosed are asbestos analysis results for PLM Bulk samples received at our laboratory on May 25, 2021. The samples were analyzed for asbestos using polarizing light microscopy (PLM) per the EPA 600 Method.

Sample results containing >1% asbestos are considered asbestos-containing materials (ACMs) per EPA regulatory requirements. The detection limit for the EPA 600 Method is <1% asbestos by weight as determined by visual estimation.

Thank you for your business and we look forward to continuing good relations.

Kind Regards,



Tianbao Bai, Ph.D., CIH
Laboratory Director



CEI

AMENDED

ASBESTOS ANALYTICAL REPORT
By: Polarized Light Microscopy

Prepared for

Crossroads Environmental

CLIENT PROJECT: Byrnes - Phase II, 20018-IN

LAB CODE: A217119v2

TEST METHOD: EPA 600 / R93 / 116 and EPA 600 / M4-82 / 020

REPORT DATE: 05/26/21

TOTAL SAMPLES ANALYZED: 47

SAMPLES >1% ASBESTOS: 8



CEI

AMENDED**Asbestos Report Summary**

By: POLARIZING LIGHT MICROSCOPY

PROJECT: Byrnes - Phase II, 20018-IN**LAB CODE:** A217119v2**METHOD:** EPA 600 / R93 / 116 and EPA 600 / M4-82 / 020

Client ID	Layer	Lab ID	Color	Sample Description	ASBESTOS %
001		A100757A	Mustard	Vft	None Detected
		A100757B	Black	Mastic	Chrysotile 3%
002		A100758A	Mustard	Vft	None Detected
		A100758B		Sample Not Analyzed per COC	
003		A100759A		Sample Submitted for TEM Analysis	
		A100759B		Sample Not Analyzed per COC	
004		A100760A	Light Brown	Vft	Chrysotile 10%
		A100760B	Black	Mastic	None Detected
005		A100761A		Sample Not Analyzed per COC	
		A100761B	Black	Mastic	None Detected
006		A100762A		Sample Not Analyzed per COC	
		A100762B		Sample Submitted for TEM Analysis	
007		A100763	White	Ceiling Tile	None Detected
008		A100764	White	Ceiling Tile	None Detected
009		A100765	White	Ceiling Tile	None Detected
010		A100766	White	Ceiling Tile	None Detected
011		A100767	White	Ceiling Tile	None Detected
012		A100768	White	Ceiling Tile	None Detected
013		A100769A	Blue	Vft	None Detected
		A100769B	Black	Mastic	None Detected
014		A100770A	Blue	Vft	None Detected
		A100770B	Black	Mastic	None Detected
015		A100771A		Sample Submitted for TEM Analysis	
		A100771B		Sample Submitted for TEM Analysis	
016		A100772A	Orange	Vft	None Detected
		A100772B	Black	Mastic	Chrysotile 3%
017		A100773A	Orange	Vft	None Detected
		A100773B		Sample Not Analyzed per COC	



CEI

AMENDED**Asbestos Report Summary**

By: POLARIZING LIGHT MICROSCOPY

PROJECT: Byrnes - Phase II, 20018-IN**LAB CODE:** A217119v2**METHOD:** EPA 600 / R93 / 116 and EPA 600 / M4-82 / 020

Client ID	Layer	Lab ID	Color	Sample Description	ASBESTOS %
018		A100774A		Sample Submitted for TEM Analysis	
		A100774B		Sample Not Analyzed per COC	
019	Layer 1	A100775	White	Spackle	None Detected
	Layer 2	A100775	White	Drywall & Tape	None Detected
020	Layer 1	A100776	White	Spackle	None Detected
	Layer 2	A100776	White	Drywall & Tape	None Detected
021	Layer 1	A100777	White	Spackle	None Detected
	Layer 2	A100777	White	Drywall & Tape	None Detected
022	Layer 1	A100778	White	Spackle	None Detected
	Layer 2	A100778	White	Drywall & Tape	None Detected
023	Layer 1	A100779	White	Spackle	None Detected
	Layer 2	A100779	White	Drywall & Tape	None Detected
024		A100780A	Beige,Brown	Vft	Chrysotile 2%
		A100780B	Black	Mastic	Chrysotile 3%
025		A100781A		Sample Not Analyzed per COC	
		A100781B		Sample Not Analyzed per COC	
026		A100782A		Sample Not Analyzed per COC	
		A100782B		Sample Not Analyzed per COC	
027		A100783A	Gray,Tan	Vft	None Detected
		A100783B	Black	Mastic	Chrysotile 3%
028		A100784A	Gray,Tan	Vft	None Detected
		A100784B	Black	Mastic	None Detected
029		A100785A		Sample Submitted for TEM Analysis	
		A100785B	Black,Brown	Mastic	Chrysotile 2%
030		A100786A	Black	Cove	None Detected
		A100786B	Tan	Mastic	None Detected
031		A100787A	Black	Cove	None Detected
		A100787B	Tan	Mastic	None Detected
032		A100788A		Sample Submitted for TEM Analysis	



CEI

AMENDED**Asbestos Report Summary**

By: POLARIZING LIGHT MICROSCOPY

PROJECT: Byrnes - Phase II, 20018-IN**LAB CODE:** A217119v2**METHOD:** EPA 600 / R93 / 116 and EPA 600 / M4-82 / 020

Client ID	Layer	Lab ID	Color	Sample Description	ASBESTOS %
		A100788B		Sample Submitted for TEM Analysis	
033		A100789A	Brown	Locker Cove	None Detected
		A100789B	Brown	Mastic	None Detected
034		A100790A	Brown	Locker Cove	None Detected
		A100790B	Brown	Mastic	None Detected
035		A100791A		Sample Submitted for TEM Analysis	
		A100791B		Sample Submitted for TEM Analysis	
036		A100792A	Gray	Cove	None Detected
		A100792B	Cream	Mastic	None Detected
037		A100793A	Gray	Cove	None Detected
		A100793B	Cream	Mastic	None Detected
038		A100794A		Sample Submitted for TEM Analysis	
		A100794B		Sample Submitted for TEM Analysis	
039		A100795	White	Gypsum Wall Panel	None Detected
040		A100796	White	Gypsum Wall Panel	None Detected
041		A100797	White	Gypsum Wall Panel	None Detected
042		A100798A	Tan,Gray	Vft	None Detected
		A100798B	Yellow	Mastic	None Detected
043		A100799A	Tan,Gray	Vft	None Detected
		A100799B	Yellow	Mastic	None Detected
044		A100800A		Sample Submitted for TEM Analysis	
		A100800B		Sample Submitted for TEM Analysis	
045		A100801A	Gray	Vft	None Detected
		A100801B	Yellow	Mastic	None Detected
046		A100802A	Gray	Vft	None Detected
		A100802B	Yellow	Mastic	None Detected



CEI

AMENDED**Asbestos Report Summary**

By: POLARIZING LIGHT MICROSCOPY

PROJECT: Byrnes - Phase II, 20018-IN**LAB CODE:** A217119v2**METHOD:** EPA 600 / R93 / 116 and EPA 600 / M4-82 / 020

Client ID	Layer	Lab ID	Color	Sample Description	ASBESTOS %
047		A100803A		Sample Submitted for TEM Analysis	
		A100803B		Sample Submitted for TEM Analysis	
048		A100804A	Gray	Cove	None Detected
		A100804B	Yellow	Mastic	None Detected
049		A100805A	Gray	Cove	None Detected
		A100805B	Yellow	Mastic	None Detected
050		A100806A		Sample Submitted for TEM Analysis	
		A100806B		Sample Submitted for TEM Analysis	
051		A100807A	Brown	Cove	None Detected
		A100807B	Brown	Mastic	None Detected
052		A100808A	Brown	Cove	None Detected
		A100808B	Brown	Mastic	None Detected
053		A100809A		Sample Submitted for TEM Analysis	
		A100809B		Sample Submitted for TEM Analysis	
054		A100810	White,Brown	Ceiling Tile	None Detected
055		A100811	White,Brown	Ceiling Tile	None Detected
056		A100812	White,Brown	Ceiling Tile	None Detected
029-A		A100813A	Gray,Tan	Vft	None Detected
		A100813B	Black	Mastic	None Detected
029-B		A100814A	Gray,Tan	Vft	None Detected
		A100814B	Black	Mastic	Chrysotile 3%
060		A100815A	Beige	Cove	None Detected
		A100815B	Brown	Mastic	None Detected
061		A100816A	Beige	Cove	None Detected
		A100816B	Brown	Mastic	None Detected
062		A100817A		Sample Submitted for TEM Analysis	



CEI

AMENDED

Asbestos Report Summary

By: POLARIZING LIGHT MICROSCOPY

PROJECT: Byrnes - Phase II, 20018-IN

LAB CODE: A217119v2

METHOD: EPA 600 / R93 / 116 and EPA 600 / M4-82 / 020

Client ID	Layer	Lab ID	Color	Sample Description	ASBESTOS %
		A100817B		Sample Submitted for TEM Analysis	



CEI

AMENDED

ASBESTOS BULK ANALYSIS

By: POLARIZING LIGHT MICROSCOPY

Client: Crossroads Environmental
1258 Boiling Springs Road
Spartanburg, SC 29303

Lab Code: A217119v2
Date Received: 05-25-21
Date Analyzed: 05-26-21
Date Reported: 05-26-21

Project: Byrnes - Phase II, 20018-IN

ASBESTOS BULK PLM, EPA 600 METHOD

Client ID Lab ID	Lab Description	Lab Attributes	NON-ASBESTOS COMPONENTS		ASBESTOS %
			Fibrous	Non-Fibrous	
001 A100757A	Vft	Homogeneous Mustard Non-fibrous Tightly Bound	100%	Vinyl	None Detected
A100757B	Mastic	Homogeneous Black Non-fibrous Bound	97%	Tar	3% Chrysotile
002 A100758A	Vft	Homogeneous Mustard Non-fibrous Tightly Bound	100%	Vinyl	None Detected
A100758B	Sample Not Analyzed per COC				
003 A100759A	Sample Submitted for TEM Analysis				
A100759B	Sample Not Analyzed per COC				
004 A100760A	Vft	Homogeneous Light Brown Fibrous Tightly Bound	90%	Vinyl	10% Chrysotile
A100760B	Mastic	Homogeneous Black Non-fibrous Bound	<1%	Cellulose 100% Tar	None Detected
005 A100761A	Sample Not Analyzed per COC				



CEI

AMENDED

ASBESTOS BULK ANALYSIS

By: POLARIZING LIGHT MICROSCOPY

Client: Crossroads Environmental
1258 Boiling Springs Road
Spartanburg, SC 29303

Lab Code: A217119v2
Date Received: 05-25-21
Date Analyzed: 05-26-21
Date Reported: 05-26-21

Project: Byrnes - Phase II, 20018-IN

ASBESTOS BULK PLM, EPA 600 METHOD

Client ID Lab ID	Lab Description	Lab Attributes	NON-ASBESTOS COMPONENTS				ASBESTOS %
			Fibrous		Non-Fibrous		
A100761B	Mastic	Homogeneous Black Non-fibrous Bound	<1%	Cellulose	100%	Tar	None Detected
006 A100762A	Sample Not Analyzed per COC						
A100762B	Sample Submitted for TEM Analysis						
007 A100763	Ceiling Tile	Heterogeneous White Fibrous Loosely Bound	60%	Cellulose	15%	Perlite	None Detected
			20%	Fiberglass	5%	Paint	
008 A100764	Ceiling Tile	Heterogeneous White Fibrous Loosely Bound	60%	Cellulose	15%	Perlite	None Detected
			20%	Fiberglass	5%	Paint	
009 A100765	Ceiling Tile	Heterogeneous White Fibrous Loosely Bound	60%	Cellulose	15%	Perlite	None Detected
			20%	Fiberglass	5%	Paint	
010 A100766	Ceiling Tile	Heterogeneous White Fibrous Loosely Bound	60%	Cellulose	15%	Perlite	None Detected
			20%	Fiberglass	5%	Paint	
011 A100767	Ceiling Tile	Heterogeneous White Fibrous Loosely Bound	60%	Cellulose	15%	Perlite	None Detected
			20%	Fiberglass	5%	Paint	



CEI

AMENDED**ASBESTOS BULK ANALYSIS**

By: POLARIZING LIGHT MICROSCOPY

Client: Crossroads Environmental
1258 Boiling Springs Road
Spartanburg, SC 29303

Lab Code: A217119v2
Date Received: 05-25-21
Date Analyzed: 05-26-21
Date Reported: 05-26-21

Project: Byrnes - Phase II, 20018-IN

ASBESTOS BULK PLM, EPA 600 METHOD

Client ID Lab ID	Lab Description	Lab Attributes	NON-ASBESTOS COMPONENTS				ASBESTOS %
			Fibrous		Non-Fibrous		
012 A100768	Ceiling Tile	Heterogeneous	60%	Cellulose	15%	Perlite	None Detected
		White Fibrous Loosely Bound	20%	Fiberglass	5%	Paint	
013 A100769A	Vft	Heterogeneous			100%	Vinyl	None Detected
		Blue Non-fibrous Tightly Bound					
A100769B	Mastic	Heterogeneous	2%	Cellulose	98%	Tar	None Detected
		Black Non-fibrous Bound					
014 A100770A	Vft	Heterogeneous			100%	Vinyl	None Detected
		Blue Non-fibrous Tightly Bound					
A100770B	Mastic	Heterogeneous	2%	Cellulose	98%	Tar	None Detected
		Black Non-fibrous Bound					
015 A100771A	Sample Submitted for TEM Analysis						
A100771B	Sample Submitted for TEM Analysis						
016 A100772A	Vft	Heterogeneous			100%	Vinyl	None Detected
		Orange Non-fibrous Tightly Bound					



CEI

AMENDED

ASBESTOS BULK ANALYSIS

By: POLARIZING LIGHT MICROSCOPY

Client: Crossroads Environmental
1258 Boiling Springs Road
Spartanburg, SC 29303

Lab Code: A217119v2
Date Received: 05-25-21
Date Analyzed: 05-26-21
Date Reported: 05-26-21

Project: Byrnes - Phase II, 20018-IN

ASBESTOS BULK PLM, EPA 600 METHOD

Client ID Lab ID	Lab Description	Lab Attributes	NON-ASBESTOS COMPONENTS			ASBESTOS %
			Fibrous	Non-Fibrous		
A100772B	Mastic	Heterogeneous Black Non-fibrous Bound	97%	Tar		3% Chrysotile
017 A100773A	Vft	Heterogeneous Orange Non-fibrous Tightly Bound	100%	Vinyl		None Detected
A100773B	Sample Not Analyzed per COC					
018 A100774A	Sample Submitted for TEM Analysis					
A100774B	Sample Not Analyzed per COC					
019 Layer 1 A100775	Spackle	Heterogeneous White Non-fibrous Bound	95%	Calc Carb	None Detected	
			5%	Paint		
Layer 2 A100775	Drywall & Tape	Heterogeneous White Fibrous Bound	20%	Cellulose	80%	Gypsum None Detected
020 Layer 1 A100776	Spackle	Heterogeneous White Non-fibrous Bound	95%	Calc Carb	None Detected	
			5%	Paint		
Layer 2 A100776	Drywall & Tape	Heterogeneous White Fibrous Bound	20%	Cellulose	80%	Gypsum None Detected



CEI

AMENDED

ASBESTOS BULK ANALYSIS

By: POLARIZING LIGHT MICROSCOPY

Client: Crossroads Environmental
1258 Boiling Springs Road
Spartanburg, SC 29303

Lab Code: A217119v2
Date Received: 05-25-21
Date Analyzed: 05-26-21
Date Reported: 05-26-21

Project: Byrnes - Phase II, 20018-IN

ASBESTOS BULK PLM, EPA 600 METHOD

Client ID Lab ID	Lab Description	Lab Attributes	NON-ASBESTOS COMPONENTS			ASBESTOS %	
			Fibrous		Non-Fibrous		
021 Layer 1 A100777	Spackle	Heterogeneous White Non-fibrous Bound	95%	Calc Carb	5%	None Detected	
			5%	Paint			
Layer 2 A100777	Drywall & Tape	Heterogeneous White Fibrous Bound	20%	Cellulose	80%	Gypsum	None Detected
022 Layer 1 A100778	Spackle	Heterogeneous White Non-fibrous Bound	95%	Calc Carb	5%	None Detected	
			5%	Paint			
Layer 2 A100778	Drywall & Tape	Heterogeneous White Fibrous Bound	20%	Cellulose	80%	Gypsum	None Detected
023 Layer 1 A100779	Spackle	Heterogeneous White Non-fibrous Bound	95%	Calc Carb	5%	None Detected	
			5%	Paint			
Layer 2 A100779	Drywall & Tape	Heterogeneous White Fibrous Bound	20%	Cellulose	80%	Gypsum	None Detected
024 A100780A	Vft	Homogeneous Beige,Brown Non-fibrous Tightly Bound	98%	Vinyl		2% Chrysotile	



CEI

AMENDED**ASBESTOS BULK ANALYSIS**

By: POLARIZING LIGHT MICROSCOPY

Client: Crossroads Environmental
 1258 Boiling Springs Road
 Spartanburg, SC 29303

Lab Code: A217119v2
Date Received: 05-25-21
Date Analyzed: 05-26-21
Date Reported: 05-26-21

Project: Byrnes - Phase II, 20018-IN

ASBESTOS BULK PLM, EPA 600 METHOD

Client ID Lab ID	Lab Description	Lab Attributes	NON-ASBESTOS COMPONENTS		ASBESTOS %
			Fibrous	Non-Fibrous	
A100780B	Mastic	Homogeneous Black Non-fibrous Bound	97%	Tar	3% Chrysotile
025 A100781A	Sample Not Analyzed per COC				
A100781B	Sample Not Analyzed per COC				
026 A100782A	Sample Not Analyzed per COC				
A100782B	Sample Not Analyzed per COC				
027 A100783A	Vft	Homogeneous Gray,Tan Non-fibrous Tightly Bound	100%	Vinyl	None Detected
A100783B	Mastic	Homogeneous Black Non-fibrous Bound	97%	Tar	3% Chrysotile
028 A100784A	Vft	Homogeneous Gray,Tan Non-fibrous Tightly Bound	100%	Vinyl	None Detected
A100784B	Mastic	Homogeneous Black Fibrous Bound	2%	Cellulose	98% Tar None Detected
029 A100785A	Sample Submitted for TEM Analysis				



CEI

AMENDED**ASBESTOS BULK ANALYSIS**

By: POLARIZING LIGHT MICROSCOPY

Client: Crossroads Environmental
 1258 Boiling Springs Road
 Spartanburg, SC 29303

Lab Code: A217119v2
Date Received: 05-25-21
Date Analyzed: 05-26-21
Date Reported: 05-26-21

Project: Byrnes - Phase II, 20018-IN

ASBESTOS BULK PLM, EPA 600 METHOD

Client ID Lab ID	Lab Description	Lab Attributes	NON-ASBESTOS COMPONENTS		ASBESTOS %
			Fibrous	Non-Fibrous	
A100785B	Mastic	Heterogeneous Black,Brown Non-fibrous Bound	78% 20%	Mastic Tar	2% Chrysotile
Lab Notes: Unable to separate mastics for analysis.					
030 A100786A	Cove	Homogeneous Black Non-fibrous Tightly Bound	100%	Vinyl	None Detected
A100786B	Mastic	Homogeneous Tan Non-fibrous Bound	100%	Mastic	None Detected
031 A100787A	Cove	Homogeneous Black Non-fibrous Tightly Bound	100%	Vinyl	None Detected
A100787B	Mastic	Homogeneous Tan Non-fibrous Bound	100%	Mastic	None Detected
032 A100788A	Sample Submitted for TEM Analysis				
A100788B	Sample Submitted for TEM Analysis				
033 A100789A	Locker Cove	Homogeneous Brown Non-fibrous Tightly Bound	100%	Vinyl	None Detected



CEI

AMENDED

ASBESTOS BULK ANALYSIS

By: POLARIZING LIGHT MICROSCOPY

Client: Crossroads Environmental
1258 Boiling Springs Road
Spartanburg, SC 29303

Lab Code: A217119v2
Date Received: 05-25-21
Date Analyzed: 05-26-21
Date Reported: 05-26-21

Project: Byrnes - Phase II, 20018-IN

ASBESTOS BULK PLM, EPA 600 METHOD

Client ID Lab ID	Lab Description	Lab Attributes	NON-ASBESTOS COMPONENTS		ASBESTOS %
			Fibrous	Non-Fibrous	
A100789B	Mastic	Homogeneous Brown Non-fibrous Bound	100%	Mastic	None Detected
034 A100790A	Locker Cove	Homogeneous Brown Non-fibrous Tightly Bound	100%	Vinyl	None Detected
A100790B	Mastic	Homogeneous Brown Non-fibrous Bound	100%	Mastic	None Detected
035 A100791A	Sample Submitted for TEM Analysis				
A100791B	Sample Submitted for TEM Analysis				
036 A100792A	Cove	Homogeneous Gray Non-fibrous Tightly Bound	100%	Vinyl	None Detected
A100792B	Mastic	Homogeneous Cream Non-fibrous Bound	100%	Mastic	None Detected
037 A100793A	Cove	Homogeneous Gray Non-fibrous Tightly Bound	100%	Vinyl	None Detected



CEI

AMENDED

ASBESTOS BULK ANALYSIS

By: POLARIZING LIGHT MICROSCOPY

Client: Crossroads Environmental
1258 Boiling Springs Road
Spartanburg, SC 29303

Lab Code: A217119v2
Date Received: 05-25-21
Date Analyzed: 05-26-21
Date Reported: 05-26-21

Project: Byrnes - Phase II, 20018-IN

ASBESTOS BULK PLM, EPA 600 METHOD

Client ID Lab ID	Lab Description	Lab Attributes	NON-ASBESTOS COMPONENTS			ASBESTOS %	
			Fibrous		Non-Fibrous		
A100793B	Mastic	Homogeneous Cream Non-fibrous Bound	100%		Mastic	None Detected	
038 A100794A	Sample Submitted for TEM Analysis						
A100794B	Sample Submitted for TEM Analysis						
039 A100795	Gypsum Wall Panel	Heterogeneous White Fibrous Bound	15% 5%	Cellulose Fiberglass	75% 5%	Gypsum Paint	None Detected
040 A100796	Gypsum Wall Panel	Heterogeneous White Fibrous Bound	15% 5%	Cellulose Fiberglass	75% 5%	Gypsum Paint	None Detected
041 A100797	Gypsum Wall Panel	Heterogeneous White Fibrous Bound	15% 5%	Cellulose Fiberglass	75% 5%	Gypsum Paint	None Detected
042 A100798A	Vft	Homogeneous Tan, Gray Non-fibrous Tightly Bound			100%	Vinyl	None Detected
A100798B	Mastic	Homogeneous Yellow Non-fibrous Bound	100%		Mastic	None Detected	



CEI

AMENDED

ASBESTOS BULK ANALYSIS

By: POLARIZING LIGHT MICROSCOPY

Client: Crossroads Environmental
1258 Boiling Springs Road
Spartanburg, SC 29303

Lab Code: A217119v2
Date Received: 05-25-21
Date Analyzed: 05-26-21
Date Reported: 05-26-21

Project: Byrnes - Phase II, 20018-IN

ASBESTOS BULK PLM, EPA 600 METHOD

Client ID Lab ID	Lab Description	Lab Attributes	NON-ASBESTOS COMPONENTS		ASBESTOS %
			Fibrous	Non-Fibrous	
043 A100799A	Vft	Homogeneous Tan, Gray Non-fibrous Tightly Bound	100%	Vinyl	None Detected
A100799B	Mastic	Homogeneous Yellow Non-fibrous Bound	100%	Mastic	None Detected
044 A100800A	Sample Submitted for TEM Analysis				
A100800B	Sample Submitted for TEM Analysis				
045 A100801A	Vft	Homogeneous Gray Non-fibrous Tightly Bound	100%	Vinyl	None Detected
A100801B	Mastic	Homogeneous Yellow Non-fibrous Bound	100%	Mastic	None Detected
046 A100802A	Vft	Homogeneous Gray Non-fibrous Tightly Bound	100%	Vinyl	None Detected
A100802B	Mastic	Homogeneous Yellow Non-fibrous Bound	100%	Mastic	None Detected
047 A100803A	Sample Submitted for TEM Analysis				



CEI

AMENDED

ASBESTOS BULK ANALYSIS

By: POLARIZING LIGHT MICROSCOPY

Client: Crossroads Environmental
1258 Boiling Springs Road
Spartanburg, SC 29303

Lab Code: A217119v2
Date Received: 05-25-21
Date Analyzed: 05-26-21
Date Reported: 05-26-21

Project: Byrnes - Phase II, 20018-IN

ASBESTOS BULK PLM, EPA 600 METHOD

Client ID Lab ID	Lab Description	Lab Attributes	NON-ASBESTOS COMPONENTS		ASBESTOS %
			Fibrous	Non-Fibrous	
A100803B	Sample Submitted for TEM Analysis				
048	Cove	Homogeneous Gray	100%	Vinyl	None Detected
A100804A		Non-fibrous Tightly Bound			
A100804B	Mastic	Homogeneous Yellow Non-fibrous Bound	100%	Mastic	None Detected
049	Cove	Homogeneous Gray	100%	Vinyl	None Detected
A100805A		Non-fibrous Tightly Bound			
A100805B	Mastic	Homogeneous Yellow Non-fibrous Bound	100%	Mastic	None Detected
050 A100806A	Sample Submitted for TEM Analysis				
A100806B	Sample Submitted for TEM Analysis				
051	Cove	Homogeneous Brown	100%	Vinyl	None Detected
A100807A		Non-fibrous Tightly Bound			
A100807B	Mastic	Homogeneous Brown Non-fibrous Bound	100%	Mastic	None Detected



CEI

AMENDED**ASBESTOS BULK ANALYSIS**

By: POLARIZING LIGHT MICROSCOPY

Client: Crossroads Environmental
1258 Boiling Springs Road
Spartanburg, SC 29303

Lab Code: A217119v2
Date Received: 05-25-21
Date Analyzed: 05-26-21
Date Reported: 05-26-21

Project: Byrnes - Phase II, 20018-IN

ASBESTOS BULK PLM, EPA 600 METHOD

Client ID Lab ID	Lab Description	Lab Attributes	NON-ASBESTOS COMPONENTS				ASBESTOS %
			Fibrous		Non-Fibrous		
052 A100808A	Cove	Homogeneous Brown Non-fibrous Tightly Bound	100%	Vinyl			None Detected
A100808B	Mastic	Homogeneous Brown Non-fibrous Bound	100%	Mastic			None Detected
053 A100809A	Sample Submitted for TEM Analysis						
A100809B	Sample Submitted for TEM Analysis						
054 A100810	Ceiling Tile	Heterogeneous White,Brown Fibrous Loosely Bound	60% 20%	Cellulose Fiberglass	15% 5%	Perlite Paint	None Detected
055 A100811	Ceiling Tile	Heterogeneous White,Brown Fibrous Loosely Bound	60% 20%	Cellulose Fiberglass	15% 5%	Perlite Paint	None Detected
056 A100812	Ceiling Tile	Heterogeneous White,Brown Fibrous Loosely Bound	60% 20%	Cellulose Fiberglass	15% 5%	Perlite Paint	None Detected
029-A A100813A	Vft	Heterogeneous Gray,Tan Non-fibrous Tightly Bound	100%	Vinyl			None Detected

Client: Crossroads Environmental
 1258 Boiling Springs Road
 Spartanburg, SC 29303

Lab Code: A217119v2
Date Received: 05-25-21
Date Analyzed: 05-26-21
Date Reported: 05-26-21

Project: Byrnes - Phase II, 20018-IN

ASBESTOS BULK PLM, EPA 600 METHOD

Client ID Lab ID	Lab Description	Lab Attributes	NON-ASBESTOS COMPONENTS			ASBESTOS %	
			Fibrous	Non-Fibrous			
A100813B	Mastic	Heterogeneous Black Non-fibrous Bound	2%	Cellulose	98%	Tar	None Detected
029-B A100814A	Vft	Heterogeneous Gray,Tan Non-fibrous Tightly Bound			100%	Vinyl	None Detected
A100814B	Mastic	Heterogeneous Black Non-fibrous Bound			97%	Tar	3% Chrysotile
060 A100815A	Cove	Heterogeneous Beige Non-fibrous Tightly Bound			100%	Vinyl	None Detected
A100815B	Mastic	Heterogeneous Brown Non-fibrous Bound			100%	Mastic	None Detected
061 A100816A	Cove	Heterogeneous Beige Non-fibrous Tightly Bound			100%	Vinyl	None Detected
A100816B	Mastic	Heterogeneous Brown Non-fibrous Bound			100%	Mastic	None Detected
062 A100817A	Sample Submitted for TEM Analysis						



CEI

AMENDED

ASBESTOS BULK ANALYSIS

By: POLARIZING LIGHT MICROSCOPY

Client: Crossroads Environmental
1258 Boiling Springs Road
Spartanburg, SC 29303

Lab Code: A217119v2
Date Received: 05-25-21
Date Analyzed: 05-26-21
Date Reported: 05-26-21

Project: Byrnes - Phase II, 20018-IN

ASBESTOS BULK PLM, EPA 600 METHOD

Client ID Lab ID	Lab Description	Lab Attributes	NON-ASBESTOS COMPONENTS		ASBESTOS %
			Fibrous	Non-Fibrous	
A100817B	Sample Submitted for TEM Analysis				

LEGEND: Non-Anth = Non-Asbestiform Anthophyllite
 Non-Trem = Non-Asbestiform Tremolite
 Calc Carb = Calcium Carbonate

METHOD: EPA 600 / R93 / 116 and EPA 600 / M4-82 / 020

REPORTING LIMIT: <1% by visual estimation

REPORTING LIMIT FOR POINT COUNTS: 0.25% by 400 Points or 0.1% by 1,000 Points

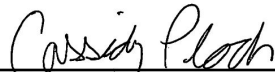
REGULATORY LIMIT: >1% by weight

Due to the limitations of the EPA 600 method, nonfriable organically bound materials (NOBs) such as vinyl floor tiles can be difficult to analyze via polarized light microscopy (PLM). EPA recommends that all NOBs analyzed by PLM, and found not to contain asbestos, be further analyzed by Transmission Electron Microscopy (TEM). Please note that PLM analysis of dust and soil samples for asbestos is not covered under NVLAP accreditation. *Estimated measurement of uncertainty is available on request.*

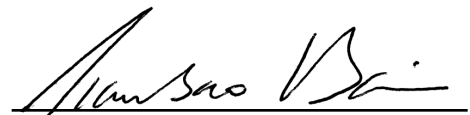
This report relates only to the samples tested or analyzed and may not be reproduced, except in full, without written approval by Eurofins CEI. Eurofins CEI makes no warranty representation regarding the accuracy of client submitted information in preparing and presenting analytical results. Interpretation of the analytical results is the sole responsibility of the client. Samples were received in acceptable condition unless otherwise noted. This report may not be used by the client to claim product endorsement by NVLAP or any other agency of the U.S. Government.

Information provided by customer includes customer sample ID and sample description.

ANALYST: _____


Cassidy Ploch

APPROVED BY: _____


Tianbao Bai, Ph.D., CIH
Laboratory Director

AMENDED due to Client Wishes to Change Specifications for Analysis - Undo Positive Stop



CHAIN OF CUSTODY

(61)

730 S.E. Maynard Rd., Cary, NC 27511
 Tel: 919-481-1413; Fax: 919-481-1442

LAB USE ONLY:	
CEI Lab Code:	A21719 7
CEI Lab I.D. Range:	A100757 - A100810

COMPANY CONTACT INFORMATION	
Company: CROSSROADS ENVIRONMENTAL, LLC	Client #:
Address: 1258 BOILING SPRINGS RD.	Job Contact: Evans Harris
SPARTANBURG, SC 29303	Email: RESULTS@CROSSROADSENV.NET
	Tel: 864-541-8736
Project Name: Byrnes- Phase II	Fax: 864-541-8776
Project ID #: 20018-IN	P.O. #:

ASBESTOS	METHOD	4 HR*	8 HR*	24 HR	2 DAY	3 DAY	5 DAY
PLM BULK	EPA 600			X			
TEM BULK	CHATFIELD			X			
PLM POINT COUNT (400)	EPA 600						
PLM POINT COUNT (1000)	EPA 600						
PLM GRAVIMETRIC	EPA 600						
PLM GRAV w POINT COUNT	EPA 600						
OTHER:							

POSITIVE STOP ANALYSIS	X
SOUTH CAROLINA SAMPLES	X
NORTH CAROLINA SAMPLES	

TEM INSTRUCTIONS	
BEGIN TEM ANALYSIS AFTER NEGATIVE PLM	X
ANALYZE TEM SAMPLES SIMULTANEOUSLY WITH PLM	

		<input checked="" type="checkbox"/> Accept Samples <input type="checkbox"/> Reject Samples	
Relinquished By:	Date/Time	Received By:	Date/Time
Evans Harris	5/24/2021 @ 17:00	CB	5/25 10:00

*Call to confirm RUSH analysis.

Samples will be disposed of 30 days after analysis



SAMPLING FORM

COMPANY CONTACT INFORMATION	
Crossroads Environmental, LLC	Job Contact: Evans Harris
Project Name: Byrnes- Phase II	
Project ID #: 20018-IN	Tel: 864-541-8736

SAMPLE ID#	HA	DESCRIPTION / LOCATION	TEST			
			PLM		TEM	
001 /	01	12" Mustard VFT	PLM		TEM	
002 /	01	12" Mustard VFT	PLM	X	TEM	
003 /	01	12" Mustard VFT	PLM		TEM	
004 /	02	9" light brown VFT	PLM	X	TEM	
005 /	02	9" light brown VFT	PLM	X	TEM	
006 /	02	9" light brown VFT	PLM		TEM	
007 /	03	2' x 2' ceiling tile	PLM	X	TEM	
008 /	03	2' x 2' ceiling tile	PLM	X	TEM	
009 /	03	2' x 2' ceiling tile	PLM	X	TEM	
010 /	04	2' x 2' ceiling tile	PLM	X	TEM	
011 /	04	2' x 2' ceiling tile	PLM	X	TEM	
012 /	04	2' x 2' ceiling tile	PLM	X	TEM	
013 /	05	12" Blue VFT	PLM	X	TEM	
014 /	05	12" Blue VFT	PLM	X	TEM	
015 /	05	12" Blue VFT	PLM		TEM	
016 /	06	12" Orange VFT	PLM	X	TEM	
017 /	06	12" Orange VFT	PLM	X	TEM	
018 /	06	12" Orange VFT	PLM		TEM	
019 /	07	Drywall, tape & spackle	PLM	X	TEM	
020 /	07	Drywall, tape & spackle	PLM	X	TEM	
021 /	07	Drywall, tape & spackle	PLM	X	TEM	
022 /	07	Drywall, tape & spackle	PLM	X	TEM	
023 /	07	Drywall, tape & spackle	PLM	X	TEM	
024 /	08	12" Beige/Brown VFT	PLM	X	TEM	
025 /	08	12" Beige/Brown VFT	PLM	X	TEM	
026 /	08	12" Beige/Brown VFT	PLM		TEM	
027 /	09	12" x 12" Gray/Tan VFT	PLM	X	TEM	
028 /	09	12" x 12" Gray/Tan VFT	PLM	X	TEM	
029 /	09	12" x 12" Gray/Tan VFT	PLM		TEM	
030 /	10	4" black cove	PLM	X	TEM	
031 /	10	4" black cove	PLM	X	TEM	
032 /	10	4" black cove	PLM		TEM	



SAMPLING FORM

COMPANY CONTACT INFORMATION	
Crossroads Environmental, LLC	Job Contact: Evans Harris
Project Name: Byrnes- Phase II	
Project ID #: 20018-IN	Tel: 864-541-8736

SAMPLE ID#	HA	DESCRIPTION / LOCATION	TEST			
			PLM	X	TEM	
033 /	11	Locker cove	PLM	X	TEM	
034 /	11	Locker cove	PLM	X	TEM	
035 /	11	Locker cove	PLM		TEM	
036 /	12	4" gray cove	PLM	X	TEM	
037 /	12	4" gray cove	PLM	X	TEM	
038 /	12	4" gray cove	PLM		TEM	
039 /	13	gypsum wall panel	PLM	X	TEM	
040 /	13	gypsum wall panel	PLM	X	TEM	
041 /	13	gypsum wall panel	PLM	X	TEM	
042 /	14	12" tan/gray VFT	PLM	X	TEM	
043 /	14	12" tan/gray VFT	PLM	X	TEM	
044 /	14	12" tan/gray VFT	PLM		TEM	
045 /	15	12" Gray VFT	PLM	X	TEM	
046 /	15	12" Gray VFT	PLM	X	TEM	
047 /	15	12" Gray VFT	PLM		TEM	
048 /	16	4" gray cove	PLM	X	TEM	
049 /	16	4" gray cove	PLM	X	TEM	
050 /	16	4" gray cove	PLM		TEM	
051 /	17	4" brown cove	PLM	X	TEM	
052 /	17	4" brown cove	PLM	X	TEM	
053 /	17	4" brown cove	PLM		TEM	
054 /	18	2' x 4' ceiling tile	PLM	X	TEM	
055 /	18	2' x 4' ceiling tile	PLM	X	TEM	
056 /	18	2' x 4' ceiling tile	PLM	X	TEM	
029-A /	09	12" x 12" Gray/Tan VFT	PLM	X	TEM	
029-B /	09	12" x 12" Gray/Tan VFT	PLM	X	TEM	
060 /	20	4" Beige cove	PLM	X	TEM	
061 /	20	4" Beige cove	PLM	X	TEM	
062 /	20	4" Beige cove	PLM		TEM	X
			PLM		TEM	
			PLM		TEM	
			PLM		TEM	
			PLM		TEM	
			PLM		TEM	

July 26, 2021

Crossroads Environmental
1258 Boiling Springs Road
Spartanburg, SC 29303

CLIENT PROJECT: Byrnes High School - Phase 2, 20018-IN
CEI LAB CODE: A2110617

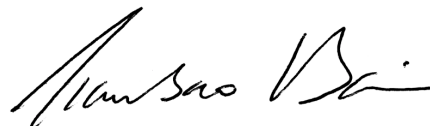
Dear Customer:

Enclosed are asbestos analysis results for PLM Bulk samples received at our laboratory on July 23, 2021. The samples were analyzed for asbestos using polarizing light microscopy (PLM) per the EPA 600 Method.

Sample results containing >1% asbestos are considered asbestos-containing materials (ACMs) per EPA regulatory requirements. The detection limit for the EPA 600 Method is <1% asbestos by weight as determined by visual estimation.

Thank you for your business and we look forward to continuing good relations.

Kind Regards,



Tianbao Bai, Ph.D., CIH
Laboratory Director



CEI

ASBESTOS ANALYTICAL REPORT

By: Polarized Light Microscopy

Prepared for

Crossroads Environmental

CLIENT PROJECT: Byrnes High School - Phase 2, 20018-IN

LAB CODE: A2110617

TEST METHOD: EPA 600 / R93 / 116 and EPA 600 / M4-82 / 020

REPORT DATE: 07/26/21

TOTAL SAMPLES ANALYZED: 63

SAMPLES >1% ASBESTOS: 18



CEI

Asbestos Report Summary

By: POLARIZING LIGHT MICROSCOPY

PROJECT: Byrnes High School - Phase 2, 20018-IN LAB CODE: A2110617

METHOD: EPA 600 / R93 / 116 and EPA 600 / M4-82 / 020

Client ID	Layer	Lab ID	Color	Sample Description	ASBESTOS %
063		A151363	Gray	Transite	Chrysotile 15%
064		A151364	Gray	Hard Joint/ Elbow	None Detected
065		A151365	Gray	Hard Joint/ Elbow	None Detected
066		A151366	Gray	Hard Joint/ Elbow	None Detected
067		A151367	Black	Foamglass	None Detected
068		A151368	Black	Foamglass	None Detected
069		A151369	Black	Foamglass	None Detected
070	Layer 1	A151370	White	Pipe Run Insulation	Chrysotile 65%
	Layer 2	A151370	Tan	Pipe Run Insulation	None Detected
	Layer 3	A151370	Black	Pipe Run Insulation	None Detected
071		A151371		Sample Not Analyzed per COC	
072		A151372		Sample Not Analyzed per COC	
073		A151373	Brown,Gray	Duct Mastic	None Detected
074		A151374	Brown,Gray	Duct Mastic	None Detected
075		A151375		Sample Submitted for TEM Analysis	
076		A151376	Black	Mastic	Chrysotile 5%
077		A151377		Sample Not Analyzed per COC	
078		A151378		Sample Not Analyzed per COC	
079	Layer 1	A151379	Gray	Duct Mastic	None Detected
	Layer 2	A151379	Gray,Green	Duct Mastic	Chrysotile 10%
080		A151380		Sample Not Analyzed per COC	
081		A151381		Sample Not Analyzed per COC	
082	Layer 1	A151382	White	Plaster Skim Coat	None Detected
	Layer 2	A151382	Gray	Plaster Base Coat	None Detected
083	Layer 1	A151383	White	Plaster Skim Coat	None Detected
	Layer 2	A151383	Gray	Plaster Base Coat	None Detected
084	Layer 1	A151384	White	Plaster Skim Coat	None Detected
	Layer 2	A151384	Gray	Plaster Base Coat	None Detected
085		A151385	Gray	Duct Mastic	None Detected
086		A151386	Gray	Duct Mastic	None Detected



CEI

Asbestos Report Summary

By: POLARIZING LIGHT MICROSCOPY

PROJECT: Byrnes High School - Phase 2, 20018-IN LAB CODE: A2110617

METHOD: EPA 600 / R93 / 116 and EPA 600 / M4-82 / 020

Client ID	Layer	Lab ID	Color	Sample Description	ASBESTOS %
087		A151387		Sample Submitted for TEM Analysis	
088		A151388	Tan	Fire Stop	None Detected
089		A151389	Tan	Fire Stop	None Detected
090		A151390		Sample Submitted for TEM Analysis	
091		A151391	Red	Fire Stop	None Detected
092		A151392	Red	Fire Stop	None Detected
093		A151393		Sample Submitted for TEM Analysis	
094		A151394	Black	Mastic	Chrysotile 5%
095		A151395		Sample Not Analyzed per COC	
096		A151396		Sample Not Analyzed per COC	
097	Layer 1	A151397	White	Block Skim	None Detected
	Layer 2	A151397	Gray	Block Filler	None Detected
098	Layer 1	A151398	White	Block Skim	None Detected
	Layer 2	A151398	Gray	Block Filler	None Detected
099	Layer 1	A151399	Beige	Block Skim	Chrysotile 2%
	Layer 2	A151399	Gray	Block Filler	None Detected
100	Layer 1	A151400	Beige	Block Skim	Chrysotile <1%
	Layer 2	A151400	Gray	Block Filler	None Detected
101	Layer 1	A151401	White	Block Skim	None Detected
	Layer 2	A151401	Gray	Block Filler	None Detected
102	Layer 1	A151402	White	Block Skim	None Detected
	Layer 2	A151402	Gray	Block Filler	None Detected
103	Layer 1	A151403	Beige	Block Skim	Chrysotile <1%
	Layer 2	A151403	Gray	Block Filler	None Detected
104	Layer 1	A151404	White	Block Skim	None Detected
	Layer 2	A151404	Gray	Block Filler	None Detected
105	Layer 1	A151405	White	Block Skim	None Detected
	Layer 2	A151405	Gray	Block Filler	None Detected
106	Layer 1	A151406	White	Block Skim	None Detected



CEI

Asbestos Report Summary

By: POLARIZING LIGHT MICROSCOPY

PROJECT: Byrnes High School - Phase 2, 20018-IN LAB CODE: A2110617

METHOD: EPA 600 / R93 / 116 and EPA 600 / M4-82 / 020

Client ID	Layer	Lab ID	Color	Sample Description	ASBESTOS %
	Layer 2	A151406	Gray	Block Filler	None Detected
107	Layer 1	A151407	White	Block Skim	None Detected
	Layer 2	A151407	Gray	Block Filler	None Detected
108	Layer 1	A151408	White	Block Skim	None Detected
	Layer 2	A151408	Gray	Block Filler	None Detected
109	Layer 1	A151409	White	Block Skim	None Detected
	Layer 2	A151409	Gray	Block Filler	None Detected
110	Layer 1	A151410	White	Block Skim	None Detected
	Layer 2	A151410	Gray	Block Filler	None Detected
111		A151411A	Gray	Vinyl Floor Tile	None Detected
		A151411B	Yellow	Mastic	None Detected
112		A151412A	Gray	Vinyl Floor Tile	None Detected
		A151412B	Yellow	Mastic	None Detected
113		A151413		Sample Submitted for TEM Analysis	
114		A151414	Beige	Brick Skim Coat	Chrysotile 2%
115		A151415	Beige	Brick Skim Coat	Chrysotile 2%
116		A151416	Beige	Brick Skim Coat	Chrysotile 2%
117		A151417	Beige	Brick Skim Coat	Chrysotile 2%
118		A151418	White	Brick Skim Coat	None Detected
119		A151419	Tan	Fiberboard	None Detected
120		A151420	Tan	Fiberboard	None Detected
121		A151421	Tan	Fiberboard	None Detected
122	Layer 1	A151422	Black	Tpo Roofing - Tar	None Detected
	Layer 2	A151422	Tan	Tpo Roofing - Insulation	None Detected
	Layer 3	A151422	White	Tpo Roofing - Insulation	None Detected
123	Layer 1	A151423	Black	Tpo Roofing - Tar	None Detected
	Layer 2	A151423	Tan	Tpo Roofing - Insulation	None Detected
	Layer 3	A151423	White	Tpo Roofing - Insulation	None Detected
124	Layer 1	A151424	Black	Tpo Roofing - Tar	None Detected
	Layer 2	A151424	Black	Tpo Roofing - Felt Paper	None Detected

Asbestos Report Summary

By: POLARIZING LIGHT MICROSCOPY

PROJECT: Byrnes High School - Phase 2, 20018-IN **LAB CODE:** A2110617

METHOD: EPA 600 / R93 / 116 and EPA 600 / M4-82 / 020

Client ID	Layer	Lab ID	Color	Sample Description	ASBESTOS %
	Layer 3	A151424	Tan	Tpo Roofing - Insulation	None Detected
	Layer 4	A151424	White	Tpo Roofing - Insulation	None Detected
124-A	Layer 1	A151425		Sample Submitted for TEM Analysis	
	Layer 2	A151425		Sample Submitted for TEM Analysis	
	Layer 3	A151425	Tan	Tpo Roofing - Insulation	None Detected
	Layer 4	A151425	White	Tpo Roofing - Insulation	None Detected
125	Layer 1	A151426	Silver	Silver Paint	Chrysotile 2%
	Layer 2	A151426	Black	Mechanical Flashing	None Detected
	Layer 3	A151426	Black	Felt Paper	Chrysotile 2%
	Layer 4	A151426	White	Insulation	None Detected
126		A151427		Sample Not Analyzed per COC	
127		A151428		Sample Not Analyzed per COC	
128	Layer 1	A151429	Black	Perimeter Flashing	Chrysotile 10%
	Layer 2	A151429	Black	Perimeter Flashing	None Detected
	Layer 3	A151429	Gray	Insulation	None Detected
129		A151430		Sample Not Analyzed per COC	
130		A151431		Sample Not Analyzed per COC	
131	Layer 1	A151432	Black	Mechanical Flashing	Chrysotile 10%
	Layer 2	A151432	Black	Felt Paper	Chrysotile 15%
	Layer 3	A151432	Black	Silver Paint	Chrysotile 2%
	Layer 4	A151432	Tan,Black	Insulation	None Detected
132		A151433		Sample Not Analyzed per COC	
133		A151434		Sample Not Analyzed per COC	
133-A		A151435		Sample Not Analyzed per COC	
133-B		A151436		Sample Not Analyzed per COC	
134	Layer 1	A151437	Black	Tpo Roofing - Tar	None Detected
	Layer 2	A151437	Black	Tpo Roofing - Felt Paper	Chrysotile 15%
	Layer 3	A151437	Tan	Tpo Roofing - Insulation	None Detected
	Layer 4	A151437	Pink	Tpo Roofing - Insulation	None Detected
135		A151438		Sample Not Analyzed per COC	



CEI

Asbestos Report Summary

By: POLARIZING LIGHT MICROSCOPY

PROJECT: Byrnes High School - Phase 2, 20018-IN LAB CODE: A2110617

METHOD: EPA 600 / R93 / 116 and EPA 600 / M4-82 / 020

Client ID	Layer	Lab ID	Color	Sample Description	ASBESTOS %
136		A151439		Sample Not Analyzed per COC	
136-A		A151440		Sample Not Analyzed per COC	
137	Layer 1	A151441	Black	Wall / Mechanical Coating	None Detected
	Layer 2	A151441	Black	Wall / Mechanical Coating	Chrysotile 10%
	Layer 3	A151441	Yellow	Wall / Mechanical Coating	None Detected
138		A151442		Sample Not Analyzed per COC	
139		A151443		Sample Not Analyzed per COC	
140		A151444	White	Window Caulk	None Detected
141		A151445	White	Window Caulk	None Detected
142		A151446		Sample Submitted for TEM Analysis	
143	Layer 1	A151447	White	Door Caulk	None Detected
	Layer 2	A151447	Gray	Door Caulk	None Detected
144	Layer 1	A151448	White	Door Caulk	None Detected
	Layer 2	A151448	Gray	Door Caulk	None Detected
145		A151449		Sample Submitted for TEM Analysis	
146		A151450	Brown,Dark Brown	Window Caulk	None Detected
147		A151451	Brown,Dark Brown	Window Caulk	None Detected
148		A151452		Sample Submitted for TEM Analysis	
028-A		A151453A	Gray	Vinyl Floor Tile	None Detected
		A151453B	Black	Mastic	None Detected
028-B		A151454A	Gray	Vinyl Floor Tile	None Detected
		A151454B	Black	Mastic	None Detected
028-C		A151455		Sample Submitted for TEM Analysis	

ASBESTOS BULK ANALYSIS

By: POLARIZING LIGHT MICROSCOPY

Client: Crossroads Environmental
 1258 Boiling Springs Road
 Spartanburg, SC 29303

Lab Code: A2110617
Date Received: 07-23-21
Date Analyzed: 07-26-21
Date Reported: 07-26-21

Project: Byrnes High School - Phase 2, 20018-IN

ASBESTOS BULK PLM, EPA 600 METHOD

Client ID Lab ID	Lab Description	Lab Attributes	NON-ASBESTOS COMPONENTS			ASBESTOS %	
			Fibrous	Non-Fibrous			
063 A151363	Transite	Heterogeneous		35%	Silicates	15% Chrysotile	
		Gray		50%	Binder		
		Fibrous					
		Bound					
Lab Notes: Samples A151363-A151396, A151444-A151455 analyzed by S. Card							
064 A151364	Hard Joint/ Elbow	Heterogeneous	5%	Cellulose	10%	Silicates	None Detected
		Gray	30%	Fiberglass	55%	Binder	
		Fibrous					
		Loose					
065 A151365	Hard Joint/ Elbow	Heterogeneous	5%	Cellulose	10%	Silicates	None Detected
		Gray	30%	Fiberglass	55%	Binder	
		Fibrous					
		Loose					
066 A151366	Hard Joint/ Elbow	Heterogeneous	5%	Cellulose	10%	Silicates	None Detected
		Gray	30%	Fiberglass	55%	Binder	
		Fibrous					
		Loose					
067 A151367	Foamglass	Homogeneous		100%	Foamglass	None Detected	
		Black					
		Non-fibrous Bound					
068 A151368	Foamglass	Homogeneous		100%	Foamglass	None Detected	
		Black					
		Non-fibrous					
		Bound					
069 A151369	Foamglass	Homogeneous		100%	Foamglass	None Detected	
		Black					
		Non-fibrous					
		Bound					



CEI

ASBESTOS BULK ANALYSIS

By: POLARIZING LIGHT MICROSCOPY

Client: Crossroads Environmental
1258 Boiling Springs Road
Spartanburg, SC 29303

Lab Code: A2110617
Date Received: 07-23-21
Date Analyzed: 07-26-21
Date Reported: 07-26-21

Project: Byrnes High School - Phase 2, 20018-IN

ASBESTOS BULK PLM, EPA 600 METHOD

Client ID Lab ID	Lab Description	Lab Attributes	NON-ASBESTOS COMPONENTS			ASBESTOS %	
			Fibrous	Non-Fibrous			
070 Layer 1 A151370	Pipe Run Insulation	Homogeneous White Fibrous Loosely Bound	10%	Cellulose	25%	Binder	65% Chrysotile
Layer 2 A151370	Pipe Run Insulation	Homogeneous Tan Fibrous Loosely Bound	100%	Cellulose			None Detected
Layer 3 A151370	Pipe Run Insulation	Homogeneous Black Fibrous Bound	70%	Cellulose	30%	Tar	None Detected
071 A151371	Sample Not Analyzed per COC						
072 A151372	Sample Not Analyzed per COC						
073 A151373	Duct Mastic	Homogeneous Brown, Gray Non-fibrous Bound			100%	Mastic	None Detected
074 A151374	Duct Mastic	Homogeneous Brown, Gray Non-fibrous Bound			100%	Mastic	None Detected
075 A151375	Sample Submitted for TEM Analysis						
076 A151376	Mastic	Homogeneous Black Fibrous Bound			95%	Mastic	5% Chrysotile



CEI

ASBESTOS BULK ANALYSIS

By: POLARIZING LIGHT MICROSCOPY

Client: Crossroads Environmental
1258 Boiling Springs Road
Spartanburg, SC 29303

Lab Code: A2110617
Date Received: 07-23-21
Date Analyzed: 07-26-21
Date Reported: 07-26-21

Project: Byrnes High School - Phase 2, 20018-IN

ASBESTOS BULK PLM, EPA 600 METHOD

Client ID Lab ID	Lab Description	Lab Attributes	NON-ASBESTOS COMPONENTS				ASBESTOS %
			Fibrous		Non-Fibrous		
077 A151377	Sample Not Analyzed per COC						
078 A151378	Sample Not Analyzed per COC						
079 Layer 1 A151379	Duct Mastic	Homogeneous Gray Fibrous Bound	5% 5%	Cellulose Fiberglass	90%	Mastic	None Detected
Layer 2 A151379	Duct Mastic	Homogeneous Gray,Green Fibrous Bound			90%	Mastic	10% Chrysotile
080 A151380	Sample Not Analyzed per COC						
081 A151381	Sample Not Analyzed per COC						
082 Layer 1 A151382	Plaster Skim Coat	Heterogeneous White Non-fibrous Bound			5% 35% 60%	Paint Calc Carb Binder	None Detected
Layer 2 A151382	Plaster Base Coat	Homogeneous Gray Non-fibrous Bound	<1%	Cellulose	35% 65%	Vermiculite Binder	None Detected
083 Layer 1 A151383	Plaster Skim Coat	Heterogeneous White Non-fibrous Bound			5% 35% 60%	Paint Calc Carb Binder	None Detected

ASBESTOS BULK ANALYSIS

By: POLARIZING LIGHT MICROSCOPY

Client: Crossroads Environmental
 1258 Boiling Springs Road
 Spartanburg, SC 29303

Lab Code: A2110617
Date Received: 07-23-21
Date Analyzed: 07-26-21
Date Reported: 07-26-21

Project: Byrnes High School - Phase 2, 20018-IN

ASBESTOS BULK PLM, EPA 600 METHOD

Client ID Lab ID	Lab Description	Lab Attributes	NON-ASBESTOS COMPONENTS				ASBESTOS %
			Fibrous		Non-Fibrous		
Layer 2 A151383	Plaster Base Coat	Homogeneous Gray Non-fibrous Bound	<1%	Cellulose	35%	Vermiculite	None Detected
					65%	Binder	
084 Layer 1 A151384	Plaster Skim Coat	Heterogeneous White Non-fibrous Bound			5%	Paint	None Detected
					35%	Calc Carb	
					60%	Binder	
Layer 2 A151384	Plaster Base Coat	Homogeneous Gray Non-fibrous Bound	<1%	Cellulose	35%	Vermiculite	None Detected
					65%	Binder	
085 A151385	Duct Mastic	Homogeneous Gray Fibrous Bound	5%	Cellulose	95%	Mastic	None Detected
			<1%	Synthetic Fiber			
086 A151386	Duct Mastic	Homogeneous Gray Fibrous Bound	5%	Cellulose	95%	Mastic	None Detected
			<1%	Synthetic Fiber			
087 A151387	Sample Submitted for TEM Analysis						
088 A151388	Fire Stop	Homogeneous Tan Fibrous Bound	10%	Cellulose	80%	Binder	None Detected
					10%	Calc Carb	
089 A151389	Fire Stop	Homogeneous Tan Fibrous Bound	10%	Cellulose	80%	Binder	None Detected
					10%	Calc Carb	

ASBESTOS BULK ANALYSIS

By: POLARIZING LIGHT MICROSCOPY

Client: Crossroads Environmental
 1258 Boiling Springs Road
 Spartanburg, SC 29303

Lab Code: A2110617
Date Received: 07-23-21
Date Analyzed: 07-26-21
Date Reported: 07-26-21

Project: Byrnes High School - Phase 2, 20018-IN

ASBESTOS BULK PLM, EPA 600 METHOD

Client ID Lab ID	Lab Description	Lab Attributes	NON-ASBESTOS COMPONENTS				ASBESTOS %
			Fibrous		Non-Fibrous		
090 A151390	Sample Submitted for TEM Analysis						
091 A151391	Fire Stop	Homogeneous Red Fibrous Bound	15%	Cellulose	85%	Binder	None Detected
092 A151392	Fire Stop	Homogeneous Red Fibrous Bound	15%	Cellulose	85%	Binder	None Detected
093 A151393	Sample Submitted for TEM Analysis						
094 A151394	Mastic	Homogeneous Black Fibrous Bound	5%	Fiberglass	90%	Mastic	5% Chrysotile
095 A151395	Sample Not Analyzed per COC						
096 A151396	Sample Not Analyzed per COC						
097 Layer 1 A151397	Block Skim	Heterogeneous White Non-fibrous Bound			95%	Binder	None Detected
					5%	Paint	
Lab Notes: Samples A151397-A151443 analyzed by C. Ploch.							
Layer 2 A151397	Block Filler	Heterogeneous Gray Non-fibrous Bound			40%	Binder	None Detected
					60%	Silicates	

ASBESTOS BULK ANALYSIS

By: POLARIZING LIGHT MICROSCOPY

Client: Crossroads Environmental
 1258 Boiling Springs Road
 Spartanburg, SC 29303

Lab Code: A2110617
Date Received: 07-23-21
Date Analyzed: 07-26-21
Date Reported: 07-26-21

Project: Byrnes High School - Phase 2, 20018-IN

ASBESTOS BULK PLM, EPA 600 METHOD

Client ID Lab ID	Lab Description	Lab Attributes	NON-ASBESTOS COMPONENTS		ASBESTOS %
			Fibrous	Non-Fibrous	
098 Layer 1 A151398	Block Skim	Heterogeneous	95%	Binder	None Detected
		White Non-fibrous Bound	5%	Paint	
Layer 2 A151398	Block Filler	Heterogeneous	40%	Binder	None Detected
		Gray Non-fibrous Bound	60%	Silicates	
099 Layer 1 A151399	Block Skim	Heterogeneous	93%	Binder	2% Chrysotile
		Beige Non-fibrous Bound	5%	Paint	
Layer 2 A151399	Block Filler	Heterogeneous	40%	Binder	None Detected
		Gray Non-fibrous Bound	60%	Silicates	
100 Layer 1 A151400	Block Skim	Heterogeneous	95%	Binder	<1% Chrysotile
		Beige Non-fibrous Bound	5%	Paint	
Layer 2 A151400	Block Filler	Heterogeneous	40%	Binder	None Detected
		Gray Non-fibrous Bound	60%	Silicates	
101 Layer 1 A151401	Block Skim	Heterogeneous	95%	Binder	None Detected
		White Non-fibrous Bound	5%	Paint	

ASBESTOS BULK ANALYSIS

By: POLARIZING LIGHT MICROSCOPY

Client: Crossroads Environmental
 1258 Boiling Springs Road
 Spartanburg, SC 29303

Lab Code: A2110617
Date Received: 07-23-21
Date Analyzed: 07-26-21
Date Reported: 07-26-21

Project: Byrnes High School - Phase 2, 20018-IN

ASBESTOS BULK PLM, EPA 600 METHOD

Client ID Lab ID	Lab Description	Lab Attributes	NON-ASBESTOS COMPONENTS		ASBESTOS %
			Fibrous	Non-Fibrous	
Layer 2 A151401	Block Filler	Heterogeneous Gray Non-fibrous Bound	40%	Binder 60% Silicates	None Detected
102 Layer 1 A151402	Block Skim	Heterogeneous White Non-fibrous Bound	95%	Binder 5% Paint	None Detected
Layer 2 A151402	Block Filler	Heterogeneous Gray Non-fibrous Bound	40%	Binder 60% Silicates	None Detected
103 Layer 1 A151403	Block Skim	Heterogeneous Beige Non-fibrous Bound	95%	Binder 5% Paint	<1% Chrysotile
Layer 2 A151403	Block Filler	Heterogeneous Gray Non-fibrous Bound	40%	Binder 60% Silicates	None Detected
104 Layer 1 A151404	Block Skim	Heterogeneous White Non-fibrous Bound	95%	Binder 5% Paint	None Detected
Layer 2 A151404	Block Filler	Heterogeneous Gray Non-fibrous Bound	40%	Binder 60% Silicates	None Detected

ASBESTOS BULK ANALYSIS

By: POLARIZING LIGHT MICROSCOPY

Client: Crossroads Environmental
 1258 Boiling Springs Road
 Spartanburg, SC 29303

Lab Code: A2110617
Date Received: 07-23-21
Date Analyzed: 07-26-21
Date Reported: 07-26-21

Project: Byrnes High School - Phase 2, 20018-IN

ASBESTOS BULK PLM, EPA 600 METHOD

Client ID Lab ID	Lab Description	Lab Attributes	NON-ASBESTOS COMPONENTS		ASBESTOS %
			Fibrous	Non-Fibrous	
105 Layer 1 A151405	Block Skim	Heterogeneous	95%	Binder	None Detected
		White Non-fibrous Bound	5%	Paint	
Layer 2 A151405	Block Filler	Heterogeneous	40%	Binder	None Detected
		Gray Non-fibrous Bound	60%	Silicates	
106 Layer 1 A151406	Block Skim	Heterogeneous	95%	Binder	None Detected
		White Non-fibrous Bound	5%	Paint	
Layer 2 A151406	Block Filler	Heterogeneous	40%	Binder	None Detected
		Gray Non-fibrous Bound	60%	Silicates	
107 Layer 1 A151407	Block Skim	Heterogeneous	95%	Binder	None Detected
		White Non-fibrous Bound	5%	Paint	
Layer 2 A151407	Block Filler	Heterogeneous	40%	Binder	None Detected
		Gray Non-fibrous Bound	60%	Silicates	
108 Layer 1 A151408	Block Skim	Heterogeneous	95%	Binder	None Detected
		White Non-fibrous Bound	5%	Paint	

ASBESTOS BULK ANALYSIS

By: POLARIZING LIGHT MICROSCOPY

Client: Crossroads Environmental
 1258 Boiling Springs Road
 Spartanburg, SC 29303

Lab Code: A2110617
Date Received: 07-23-21
Date Analyzed: 07-26-21
Date Reported: 07-26-21

Project: Byrnes High School - Phase 2, 20018-IN

ASBESTOS BULK PLM, EPA 600 METHOD

Client ID Lab ID	Lab Description	Lab Attributes	NON-ASBESTOS COMPONENTS		ASBESTOS %
			Fibrous	Non-Fibrous	
Layer 2 A151408	Block Filler	Heterogeneous Gray Non-fibrous Bound	40%	Binder 60% Silicates	None Detected
109 Layer 1 A151409	Block Skim	Heterogeneous White Non-fibrous Bound	95%	Binder 5% Paint	None Detected
Layer 2 A151409	Block Filler	Heterogeneous Gray Non-fibrous Bound	40%	Binder 60% Silicates	None Detected
110 Layer 1 A151410	Block Skim	Heterogeneous White Non-fibrous Bound	95%	Binder 5% Paint	None Detected
Layer 2 A151410	Block Filler	Heterogeneous Gray Non-fibrous Bound	40%	Binder 60% Silicates	None Detected
111 A151411A	Vinyl Floor Tile	Homogeneous Gray Non-fibrous Tightly Bound	<1%	Cellulose 100% Vinyl	None Detected
A151411B	Mastic	Homogeneous Yellow Non-fibrous Bound	100%	Mastic	None Detected

ASBESTOS BULK ANALYSIS

By: POLARIZING LIGHT MICROSCOPY

Client: Crossroads Environmental
 1258 Boiling Springs Road
 Spartanburg, SC 29303

Lab Code: A2110617
Date Received: 07-23-21
Date Analyzed: 07-26-21
Date Reported: 07-26-21

Project: Byrnes High School - Phase 2, 20018-IN

ASBESTOS BULK PLM, EPA 600 METHOD

Client ID Lab ID	Lab Description	Lab Attributes	NON-ASBESTOS COMPONENTS			ASBESTOS %
			Fibrous	Non-Fibrous		
112 A151412A	Vinyl Floor Tile	Homogeneous Gray Non-fibrous Tightly Bound	<1% Cellulose	100% Vinyl		None Detected
A151412B	Mastic	Homogeneous Yellow Non-fibrous Bound		100% Mastic		None Detected
113 A151413	Sample Submitted for TEM Analysis					
114 A151414	Brick Skim Coat	Homogeneous Beige Non-fibrous Bound		93% Binder 5% Paint		2% Chrysotile
115 A151415	Brick Skim Coat	Heterogeneous Beige Non-fibrous Bound		93% Binder 5% Paint		2% Chrysotile
116 A151416	Brick Skim Coat	Heterogeneous Beige Non-fibrous Bound		93% Binder 5% Paint		2% Chrysotile
117 A151417	Brick Skim Coat	Heterogeneous Beige Non-fibrous Bound		93% Binder 5% Paint		2% Chrysotile
118 A151418	Brick Skim Coat	Heterogeneous White Non-fibrous Bound		90% Binder 5% Tar 5% Paint		None Detected

ASBESTOS BULK ANALYSIS

By: POLARIZING LIGHT MICROSCOPY

Client: Crossroads Environmental
 1258 Boiling Springs Road
 Spartanburg, SC 29303

Lab Code: A2110617
Date Received: 07-23-21
Date Analyzed: 07-26-21
Date Reported: 07-26-21

Project: Byrnes High School - Phase 2, 20018-IN

ASBESTOS BULK PLM, EPA 600 METHOD

Client ID Lab ID	Lab Description	Lab Attributes	NON-ASBESTOS COMPONENTS				ASBESTOS %
			Fibrous		Non-Fibrous		
119 A151419	Fiberboard	Heterogeneous Tan Fibrous Loose	90%	Cellulose	10%	Binder	None Detected
120 A151420	Fiberboard	Heterogeneous Tan Fibrous Loose	90%	Cellulose	10%	Binder	None Detected
121 A151421	Fiberboard	Heterogeneous Tan Fibrous Loose	90%	Cellulose	10%	Binder	None Detected
122 Layer 1 A151422	Tpo Roofing - Tar	Heterogeneous Black Non-fibrous Bound			100%	Tar	None Detected
Layer 2 A151422	Tpo Roofing - Insulation	Heterogeneous Tan Fibrous Bound	85%	Cellulose	15%	Binder	None Detected
Layer 3 A151422	Tpo Roofing - Insulation	Heterogeneous White Fibrous Bound	10%	Cellulose	90%	Gypsum	None Detected
123 Layer 1 A151423	Tpo Roofing - Tar	Heterogeneous Black Non-fibrous Bound			100%	Tar	None Detected

ASBESTOS BULK ANALYSIS

By: POLARIZING LIGHT MICROSCOPY

Client: Crossroads Environmental
 1258 Boiling Springs Road
 Spartanburg, SC 29303

Lab Code: A2110617
Date Received: 07-23-21
Date Analyzed: 07-26-21
Date Reported: 07-26-21

Project: Byrnes High School - Phase 2, 20018-IN

ASBESTOS BULK PLM, EPA 600 METHOD

Client ID Lab ID	Lab Description	Lab Attributes	NON-ASBESTOS COMPONENTS			ASBESTOS %	
			Fibrous	Non-Fibrous			
Layer 2 A151423	Tpo Roofing - Insulation	Heterogeneous Tan Fibrous Bound	85%	Cellulose	15%	Binder	None Detected
Layer 3 A151423	Tpo Roofing - Insulation	Heterogeneous White Fibrous Bound	10%	Cellulose	90%	Gypsum	None Detected
124 Layer 1 A151424	Tpo Roofing - Tar	Heterogeneous Black Non-fibrous Bound			100%	Tar	None Detected
Layer 2 A151424	Tpo Roofing - Felt Paper	Heterogeneous Black Fibrous Bound	50%	Cellulose	50%	Tar	None Detected
Layer 3 A151424	Tpo Roofing - Insulation	Heterogeneous Tan Fibrous Bound	85%	Cellulose	15%	Binder	None Detected
Layer 4 A151424	Tpo Roofing - Insulation	Heterogeneous White Fibrous Bound	10%	Cellulose	90%	Gypsum	None Detected
124-A Layer 1 A151425	Sample Submitted for TEM Analysis						
Layer 2 A151425	Sample Submitted for TEM Analysis						



CEI

ASBESTOS BULK ANALYSIS

By: POLARIZING LIGHT MICROSCOPY

Client: Crossroads Environmental
1258 Boiling Springs Road
Spartanburg, SC 29303

Lab Code: A2110617
Date Received: 07-23-21
Date Analyzed: 07-26-21
Date Reported: 07-26-21

Project: Byrnes High School - Phase 2, 20018-IN

ASBESTOS BULK PLM, EPA 600 METHOD

Client ID Lab ID	Lab Description	Lab Attributes	NON-ASBESTOS COMPONENTS				ASBESTOS %
			Fibrous		Non-Fibrous		
Layer 3 A151425	Tpo Roofing - Insulation	Heterogeneous Tan Fibrous Bound	85%	Cellulose	15%	Binder	None Detected
Layer 4 A151425	Tpo Roofing - Insulation	Heterogeneous White Fibrous Bound	10%	Cellulose	90%	Gypsum	None Detected
125 Layer 1 A151426	Silver Paint	Heterogeneous Silver Fibrous Bound	3%	Talc	75%	Paint 20% Tar	2% Chrysotile
Layer 2 A151426	Mechanical Flashing	Heterogeneous Black Fibrous Bound	10%	Fiberglass	90%	Tar	None Detected
Layer 3 A151426	Felt Paper	Heterogeneous Black Fibrous Bound	48%	Cellulose	50%	Tar	2% Chrysotile
Layer 4 A151426	Insulation	Heterogeneous White Fibrous Bound	10%	Cellulose	90%	Gypsum	None Detected
126 A151427	Sample Not Analyzed per COC						
127 A151428	Sample Not Analyzed per COC						

ASBESTOS BULK ANALYSIS

By: POLARIZING LIGHT MICROSCOPY

Client: Crossroads Environmental
 1258 Boiling Springs Road
 Spartanburg, SC 29303

Lab Code: A2110617
Date Received: 07-23-21
Date Analyzed: 07-26-21
Date Reported: 07-26-21

Project: Byrnes High School - Phase 2, 20018-IN

ASBESTOS BULK PLM, EPA 600 METHOD

Client ID Lab ID	Lab Description	Lab Attributes	NON-ASBESTOS COMPONENTS				ASBESTOS %
			Fibrous		Non-Fibrous		
128 Layer 1 A151429	Perimeter Flashing	Heterogeneous Black Fibrous Bound	90%		Tar		10% Chrysotile
Layer 2 A151429	Perimeter Flashing	Heterogeneous Black Fibrous Bound	10%	Cellulose	90%	Tar	None Detected
Layer 3 A151429	Insulation	Heterogeneous Gray Fibrous Bound	10%	Cellulose	90%	Gypsum	None Detected
129 A151430	Sample Not Analyzed per COC						
130 A151431	Sample Not Analyzed per COC						
131 Layer 1 A151432	Mechanical Flashing	Heterogeneous Black Fibrous Bound	90%		Tar		10% Chrysotile
Layer 2 A151432	Felt Paper	Heterogeneous Black Fibrous Bound	35%	Cellulose	50%	Tar	15% Chrysotile
Layer 3 A151432	Silver Paint	Heterogeneous Black Fibrous Bound	3%	Talc	95%	Tar	2% Chrysotile

ASBESTOS BULK ANALYSIS

By: POLARIZING LIGHT MICROSCOPY

Client: Crossroads Environmental
 1258 Boiling Springs Road
 Spartanburg, SC 29303

Lab Code: A2110617
Date Received: 07-23-21
Date Analyzed: 07-26-21
Date Reported: 07-26-21

Project: Byrnes High School - Phase 2, 20018-IN

ASBESTOS BULK PLM, EPA 600 METHOD

Client ID Lab ID	Lab Description	Lab Attributes	NON-ASBESTOS COMPONENTS				ASBESTOS %
			Fibrous		Non-Fibrous		
Layer 4 A151432	Insulation	Heterogeneous Tan,Black Fibrous Bound	75%	Cellulose	25%	Tar	None Detected
132 A151433	Sample Not Analyzed per COC						
133 A151434	Sample Not Analyzed per COC						
133-A A151435	Sample Not Analyzed per COC						
133-B A151436	Sample Not Analyzed per COC						
134 Layer 1 A151437	Tpo Roofing - Tar	Heterogeneous Black Fibrous Bound	<1%	Cellulose	100%	Tar	None Detected
Layer 2 A151437	Tpo Roofing - Felt Paper	Heterogeneous Black Fibrous Bound	35%	Cellulose	50%	Tar	15% Chrysotile
Layer 3 A151437	Tpo Roofing - Insulation	Heterogeneous Tan Fibrous Bound	85%	Cellulose	15%	Binder	None Detected
Layer 4 A151437	Tpo Roofing - Insulation	Heterogeneous Pink Non-fibrous Bound			100%	Foam	None Detected
135 A151438	Sample Not Analyzed per COC						



CEI

ASBESTOS BULK ANALYSIS

By: POLARIZING LIGHT MICROSCOPY

Client: Crossroads Environmental
1258 Boiling Springs Road
Spartanburg, SC 29303

Lab Code: A2110617
Date Received: 07-23-21
Date Analyzed: 07-26-21
Date Reported: 07-26-21

Project: Byrnes High School - Phase 2, 20018-IN

ASBESTOS BULK PLM, EPA 600 METHOD

Client ID Lab ID	Lab Description	Lab Attributes	NON-ASBESTOS COMPONENTS			ASBESTOS %
			Fibrous	Non-Fibrous		
136 A151439	Sample Not Analyzed per COC					
136-A A151440	Sample Not Analyzed per COC					
137 Layer 1 A151441	Wall / Mechanical Coating	Heterogeneous Black Fibrous Bound	5%	Cellulose	95%	Tar None Detected
Layer 2 A151441	Wall / Mechanical Coating	Heterogeneous Black Fibrous Bound			90%	Tar 10% Chrysotile
Layer 3 A151441	Wall / Mechanical Coating	Heterogeneous Yellow Non-fibrous Bound			100%	Mastic None Detected
138 A151442	Sample Not Analyzed per COC					
139 A151443	Sample Not Analyzed per COC					
140 A151444	Window Caulk	Homogeneous White Non-fibrous Bound			98% 2%	Caulk Binder None Detected
141 A151445	Window Caulk	Homogeneous White Non-fibrous Bound			98% 2%	Caulk Binder None Detected
142 A151446	Sample Submitted for TEM Analysis					

ASBESTOS BULK ANALYSIS

By: POLARIZING LIGHT MICROSCOPY

Client: Crossroads Environmental
 1258 Boiling Springs Road
 Spartanburg, SC 29303

Lab Code: A2110617
Date Received: 07-23-21
Date Analyzed: 07-26-21
Date Reported: 07-26-21

Project: Byrnes High School - Phase 2, 20018-IN

ASBESTOS BULK PLM, EPA 600 METHOD

Client ID Lab ID	Lab Description	Lab Attributes	NON-ASBESTOS COMPONENTS		ASBESTOS %
			Fibrous	Non-Fibrous	
143 Layer 1 A151447	Door Caulk	Heterogeneous	95%	Caulk	None Detected
		White	2%	Binder	
		Non-fibrous	3%	Paint	
		Bound			
Layer 2 A151447	Door Caulk	Heterogeneous	95%	Caulk	None Detected
		Gray	2%	Binder	
		Non-fibrous	3%	Paint	
		Bound			
144 Layer 1 A151448	Door Caulk	Heterogeneous	95%	Caulk	None Detected
		White	2%	Binder	
		Non-fibrous	3%	Paint	
		Bound			
Layer 2 A151448	Door Caulk	Heterogeneous	95%	Caulk	None Detected
		Gray	2%	Binder	
		Non-fibrous	3%	Paint	
		Bound			
145 A151449	Sample Submitted for TEM Analysis				
146 A151450	Window Caulk	Heterogeneous	95%	Caulk	None Detected
		Brown,Dark	2%	Binder	
		Brown	3%	Paint	
		Non-fibrous			
		Bound			
147 A151451	Window Caulk	Heterogeneous	95%	Caulk	None Detected
		Brown,Dark	2%	Binder	
		Brown	3%	Paint	
		Non-fibrous			
		Bound			
148 A151452	Sample Submitted for TEM Analysis				



CEI

ASBESTOS BULK ANALYSIS

By: POLARIZING LIGHT MICROSCOPY

Client: Crossroads Environmental
1258 Boiling Springs Road
Spartanburg, SC 29303

Lab Code: A2110617
Date Received: 07-23-21
Date Analyzed: 07-26-21
Date Reported: 07-26-21

Project: Byrnes High School - Phase 2, 20018-IN

ASBESTOS BULK PLM, EPA 600 METHOD

Client ID Lab ID	Lab Description	Lab Attributes	NON-ASBESTOS COMPONENTS				ASBESTOS %
			Fibrous		Non-Fibrous		
028-A A151453A	Vinyl Floor Tile	Homogeneous Gray Non-fibrous Bound			100%	Vinyl	None Detected
A151453B	Mastic	Homogeneous Black Non-fibrous Bound	2%	Cellulose	98%	Mastic	None Detected
028-B A151454A	Vinyl Floor Tile	Homogeneous Gray Non-fibrous Bound			100%	Vinyl	None Detected
A151454B	Mastic	Homogeneous Black Non-fibrous Bound	2%	Cellulose	98%	Mastic	None Detected
028-C A151455	Sample Submitted for TEM Analysis						

LEGEND: Non-Anth = Non-Asbestiform Anthophyllite
Non-Trem = Non-Asbestiform Tremolite
Calc Carb = Calcium Carbonate

METHOD: EPA 600 / R93 / 116 and EPA 600 / M4-82 / 020

REPORTING LIMIT: <1% by visual estimation

REPORTING LIMIT FOR POINT COUNTS: 0.25% by 400 Points or 0.1% by 1,000 Points

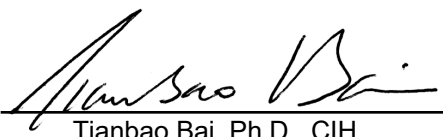
REGULATORY LIMIT: >1% by weight

Due to the limitations of the EPA 600 method, nonfriable organically bound materials (NOBs) such as vinyl floor tiles can be difficult to analyze via polarized light microscopy (PLM). EPA recommends that all NOBs analyzed by PLM, and found not to contain asbestos, be further analyzed by Transmission Electron Microscopy (TEM). Please note that PLM analysis of dust and soil samples for asbestos is not covered under NVLAP accreditation. *Estimated measurement of uncertainty is available on request.*

This report relates only to the samples tested or analyzed and may not be reproduced, except in full, without written approval by Eurofins CEI. Eurofins CEI makes no warranty representation regarding the accuracy of client submitted information in preparing and presenting analytical results. Interpretation of the analytical results is the sole responsibility of the client. Samples were received in acceptable condition unless otherwise noted. This report may not be used by the client to claim product endorsement by NVLAP or any other agency of the U.S. Government.

Information provided by customer includes customer sample ID and sample description.

ANALYST: 
Samantha Card

APPROVED BY: 
Tianbao Bai, Ph.D., CIH
Laboratory Director



730 S.E. Maynard Rd., Cary, NC 27511
 Tel: 919-481-1413; Fax: 919-481-1442

CHAIN OF CUSTODY

LAB USE ONLY:	
CEI Lab Code:	A2110617
CEI Lab I.D. Range:	AB1363-A151455

COMPANY CONTACT INFORMATION

Company: CROSSROADS ENVIRONMENTAL, LLC	Client #: 93
Address: 1258 BOILING SPRINGS RD. SPARTANBURG, SC 29303	Job Contact: Kay H. Horton
	Email: RESULTS@CROSSROADSENV.NET
	Tel: 864-541-8736
Project Name: Byrnes High School- Phase 2	Fax: 864-541-8776
Project ID #: 20018-IN	P.O. #:

ASBESTOS	METHOD	4 HR*	8 HR*	24 HR	2 DAY	3 DAY	5 DAY
PLM BULK	EPA 600			X			
TEM BULK	CHATFIELD			X			
PLM POINT COUNT (400)	EPA 600						
PLM POINT COUNT (1000)	EPA 600						
PLM GRAVIMETRIC	EPA 600						
PLM GRAV w POINT COUNT	EPA 600						
OTHER:							

POSITIVE STOP ANALYSIS	X
SOUTH CAROLINA SAMPLES	X
NORTH CAROINA SAMPLES	

TEM INSTRUCTIONS	
BEGIN TEM ANALYSIS AFTER NEGATIVE PLM	
ANALYZE TEM SAMPLES SIMULTANEOUSLY WITH PLM	

No Positive Stop on Surfacing		<input checked="" type="checkbox"/> Accept Samples <input type="checkbox"/> Reject Samples	
Relinquished By:	Date/Time	Received By:	Date/Time
Dustin Henderson <i>[Signature]</i>	7/22/2021 0:00	BNB	7/23 9:20

*Call to confirm RUSH analysis.

Samples will be disposed of 30 days after analysis



SAMPLING FORM

COMPANY CONTACT INFORMATION	
Crossroads Environmental, LLC	Job Contact: Dustin Henderson
Project Name: Byrnes High School- Phase 2	
Project ID #: 20018-IN	Tel: 864-541-8736

SAMPLE ID#	HA	DESCRIPTION / LOCATION	TEST			
			PLM	X	TEM	
063	21	Transite	PLM	X	TEM	
064	22	Hard Joint/ Elbow	PLM	X	TEM	
065	22	Hard Joint/ Elbow	PLM	X	TEM	
066	22	Hard Joint/ Elbow	PLM	X	TEM	
067	23	Foamglass	PLM	X	TEM	
068	23	Foamglass	PLM	X	TEM	
069	23	Foamglass	PLM	X	TEM	
070	24	Pipe Run Insulation	PLM	X	TEM	
071	24	Pipe Run Insulation	PLM	X	TEM	
072	24	Pipe Run Insulation	PLM	X	TEM	
073	25	Brown/ Gray Duct Mastic	PLM	X	TEM	
074	25	Brown/ Gray Duct Mastic	PLM	X	TEM	
075	25	Brown/ Gray Duct Mastic	PLM		TEM	X
076	26	Black Mastic on F/G Roof Drains	PLM	X	TEM	
077	26	Black Mastic on F/G Roof Drains	PLM	X	TEM	
078	26	Black Mastic on F/G Roof Drains	PLM		TEM	X
079	27	Gray/ Green Duct Mastic	PLM	X	TEM	
080	27	Gray/ Green Duct Mastic	PLM	X	TEM	
081	27	Gray/ Green Duct Mastic	PLM		TEM	X
082	28	Plaster	PLM	X	TEM	
083	28	Plaster	PLM	X	TEM	
084	28	Plaster	PLM	X	TEM	
085	29	Gray Duct Mastic	PLM	X	TEM	
086	29	Gray Duct Mastic	PLM	X	TEM	
087	29	Gray Duct Mastic	PLM		TEM	X
088	30	Tan Fire Stop	PLM	X	TEM	
089	30	Tan Fire Stop	PLM	X	TEM	
090	30	Tan Fire Stop	PLM		TEM	X
091	31	Red Fire Stop	PLM	X	TEM	
092	31	Red Fire Stop	PLM	X	TEM	
093	31	Red Fire Stop	PLM		TEM	X
094	32	Black Mastic on F/G Duct	PLM	X	TEM	
095	32	Black Mastic on F/G Duct	PLM	X	TEM	

A2110617



SAMPLING FORM

COMPANY CONTACT INFORMATION

Crossroads Environmental, LLC	Job Contact: Dustin Henderson
Project Name: Byrnes High School- Phase 2	
Project ID #: 20018-IN	Tel: 864-541-8736

SAMPLE ID#	HA	DESCRIPTION / LOCATION	TEST			
			PLM	X	TEM	X
096	32	Black Mastic on F/G Duct	PLM		TEM	X
097	33	Block Skim/ Filler	PLM	X	TEM	
098	33	Block Skim/ Filler	PLM	X	TEM	
099	33	Block Skim/ Filler	PLM	X	TEM	
100	33	Block Skim/ Filler	PLM	X	TEM	
101	33	Block Skim/ Filler	PLM	X	TEM	
102	33	Block Skim/ Filler	PLM	X	TEM	
103	33	Block Skim/ Filler	PLM	X	TEM	
104	34	Block Skim/ Filler	PLM	X	TEM	
105	34	Block Skim/ Filler	PLM	X	TEM	
106	34	Block Skim/ Filler	PLM	X	TEM	
107	34	Block Skim/ Filler	PLM	X	TEM	
108	34	Block Skim/ Filler	PLM	X	TEM	
109	34	Block Skim/ Filler	PLM	X	TEM	
110	34	Block Skim/ Filler	PLM	X	TEM	
111	35	12" Gray Vinyl Floor Tile	PLM	X	TEM	
112	35	12" Gray Vinyl Floor Tile	PLM	X	TEM	
113	35	12" Gray Vinyl Floor Tile	PLM		TEM	X
114	36	Brick Skim Coat	PLM	X	TEM	
115	36	Brick Skim Coat	PLM	X	TEM	
116	36	Brick Skim Coat	PLM	X	TEM	
117	36	Brick Skim Coat	PLM	X	TEM	
118	36	Brick Skim Coat	PLM	X	TEM	
119	37	Fiber Board	PLM	X	TEM	
120	37	Fiber Board	PLM	X	TEM	
121	37	Fiber Board	PLM	X	TEM	
122	38	TPO over B.U.R Field	PLM	X	TEM	
123	38	TPO over B.U.R Field	PLM	X	TEM	
124	38	TPO over B.U.R Field	PLM	X	TEM	
124-A	38	TPO over B.U.R Field	PLM		TEM	X
125	39	Mechanical Flashing	PLM	X	TEM	
126	39	Mechanical Flashing	PLM	X	TEM	
127	39	Mechanical Flashing	PLM		TEM	X
128	40	Perimeter Flashing	PLM	X	TEM	



SAMPLING FORM

COMPANY CONTACT INFORMATION	
Crossroads Environmental, LLC	Job Contact: Dustin Henderson
Project Name: Byrnes High School- Phase 2	
Project ID #: 20018-IN	Tel: 864-541-8736

SAMPLE ID#	HA	DESCRIPTION / LOCATION	TEST			
			PLM	X	TEM	
129	40	Perimeter Flashing	PLM	X	TEM	
130	40	Perimeter Flashing	PLM		TEM	X
131	41	Mechanical Flashing	PLM	X	TEM	
132	41	Mechanical Flashing	PLM	X	TEM	
133	41	Mechanical Flashing	PLM		TEM	X
133-A	41	Mechanical Flashing	PLM	X	TEM	
133-B	41	Mechanical Flashing	PLM	X	TEM	
134	42	TPO over B.U.R Field	PLM	X	TEM	
135	42	TPO over B.U.R Field	PLM	X	TEM	
136	42	TPO over B.U.R Field	PLM		TEM	X
136-A	42	TPO over B.U.R Field	PLM	X	TEM	
137	43	Wall/ Mechanical Coating	PLM	X	TEM	
138	43	Wall/ Mechanical Coating	PLM	X	TEM	
139	43	Wall/ Mechanical Coating	PLM		TEM	X
140	44	White Window Caulk	PLM	X	TEM	
141	44	White Window Caulk	PLM	X	TEM	
142	44	White Window Caulk	PLM		TEM	X
143	45	Door Caulk	PLM	X	TEM	
144	45	Door Caulk	PLM	X	TEM	
145	45	Door Caulk	PLM		TEM	X
146	46	Brown/ Dark Window Caulk	PLM	X	TEM	
147	46	Brown/ Dark Window Caulk	PLM	X	TEM	
148	46	Brown/ Dark Window Caulk	PLM		TEM	X
028-A		12"Gray Vinyl Floor Tile w/ Mastic	PLM	X	TEM	
028-B		12"Gray Vinyl Floor Tile w/ Mastic	PLM	X	TEM	
028-C		12"Gray Vinyl Floor Tile w/ Mastic	PLM	X	TEM	
			PLM		TEM	
			PLM		TEM	
			PLM		TEM	
			PLM		TEM	
			PLM		TEM	
			PLM		TEM	
			PLM		TEM	
			PLM		TEM	
			PLM		TEM	

A2110617



SAMPLING FORM

COMPANY CONTACT INFORMATION	
Crossroads Environmental, LLC	Job Contact: Dustin Henderson
Project Name: Byrnes High School- Phase 2	
Project ID #: 20018-IN	Tel: 864-541-8736

SAMPLE ID#	HA	DESCRIPTION / LOCATION	TEST			
			PLM		TEM	
			PLM		TEM	
			PLM		TEM	
			PLM		TEM	
			PLM		TEM	

May 27, 2021

Crossroads Environmental
1258 Boiling Springs Road
Spartanburg, SC 29303

CLIENT PROJECT: Byrnes - Phase II, 20018-IN
LAB CODE: T211219

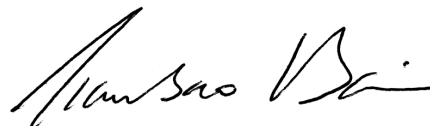
Dear Customer:

Enclosed are asbestos analysis results for TEM bulk samples received at our laboratory on May 26, 2021. The samples were analyzed for asbestos using transmission electron microscopy (TEM) per Chatfield/EPA 600/R-93/116 Sec. 2.5.5.1 method.

Sample results containing > 1% asbestos are considered asbestos-containing materials (ACMs) per the EPA regulatory requirements. The detection limit for the TEM Chatfield/EPA 600/R-93/116 Sec. 2.5.5.1 method is <1% depending on the processed weight and constituents of the sample.

Thank you for your business and we look forward to continuing good relations.

Kind Regards,



Tianbao Bai, Ph.D., CIH
Laboratory Director



CEI

ASBESTOS ANALYTICAL REPORT
By: Transmission Electron Microscopy

Prepared for

Crossroads Environmental

CLIENT PROJECT: Byrnes - Phase II, 20018-IN

LAB CODE: T211219

TEST METHOD: Bulk Chatfield
EPA 600 / R93 / 116 Sec. 2.5.5.1

REPORT DATE: 05/27/21



CEI

ASBESTOS BULK ANALYSIS

By: TRANSMISSION ELECTRON MICROSCOPY

Client: Crossroads Environmental
1258 Boiling Springs Road
Spartanburg, SC 29303

Lab Code: T211219
Date Received: 05-26-21
Date Analyzed: 05-27-21
Date Reported: 05-27-21

Project: Byrnes - Phase II, 20018-IN

TEM BULK CHATFIELD / EPA 600 / R93 / 116 Sec. 2.5.5.1

Client ID Lab ID	Material Description	Sample Weight (g)	Organic Material %	Acid Soluble Material %	Acid Insoluble Material %	Asbestos %
003 T23991	Vft	0.518	22.6	68.9	8.5	None Detected
006 T23992	Mastic	0.123	59.3	6.5	34.2	1.7% Chrysotile
Probable contamination from positive floor tile.						
015 T23993	Vft	0.476	17.9	79	3.1	None Detected
015 T23994	Mastic Sample weight below protocol guidelines	0.059	61	5.1	33.9	None Detected
018 T23995	Vft	0.527	18.6	67	14.4	None Detected
029 T23996	Vft	0.705	23	76.3	.7	None Detected
032 T23997	Cove	0.584	44	35.3	20.7	None Detected
032 T23998	Mastic	0.326	54.9	42.6	2.5	None Detected
035 T23999	Locker cove	0.571	33.8	63.6	2.6	None Detected
035 T24000	Mastic	0.435	43	56.6	.4	None Detected
038 T24001	Cove	0.656	24.5	27.7	47.8	None Detected
038 T24002	Mastic	0.386	30.3	38.3	31.4	None Detected



CEI

ASBESTOS BULK ANALYSIS

By: TRANSMISSION ELECTRON MICROSCOPY

Client: Crossroads Environmental
1258 Boiling Springs Road
Spartanburg, SC 29303

Lab Code: T211219
Date Received: 05-26-21
Date Analyzed: 05-27-21
Date Reported: 05-27-21

Project: Byrnes - Phase II, 20018-IN

TEM BULK CHATFIELD / EPA 600 / R93 / 116 Sec. 2.5.5.1

Client ID Lab ID	Material Description	Sample Weight (g)	Organic Material %	Acid Soluble Material %	Acid Insoluble Material %	Asbestos %
044 T24003	Vft	0.947	20.8	65.8	13.4	None Detected
044 T24004	Mastic	0.24	54.6	12.1	33.3	None Detected
047 T24005	Vft	0.912	21.3	78.3	.4	None Detected
047 T24006	Mastic	0.159	39	35.8	25.2	None Detected
050 T24007	Covebase	0.539	39.9	41.6	18.5	None Detected
050 T24008	Mastic	0.393	38.7	53.4	7.9	None Detected
053 T24009	Covebase	0.447	41.4	52.6	6	None Detected
053 T24010	Mastic	01.293	88.1	.4	11.5	None Detected
062 T24011	Covebase	0.585	34.2	57.4	8.4	None Detected
062 T24012	Mastic	0.29	47.2	2.8	50	None Detected

LEGEND: None

METHOD: CHATFIELD & EPA/600/R-93/116 Sec. 2.5.5.1

LIMIT OF DETECTION: Varies with the weight and constituents of the sample (<1%)

REGULATORY LIMIT: >1% by weight

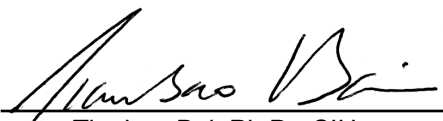
This report relates only to the samples tested or analyzed and may not be reproduced, except in full, without written approval by Eurofins CEI. Eurofins CEI makes no warranty representation regarding the accuracy of client submitted information in preparing and presenting analytical results. Interpretation of the analytical results is the sole responsibility of the client. *Estimated measurement of uncertainty is available on request.* Samples were received in acceptable condition unless otherwise noted.

Information provided by customer includes customer sample ID, location, volume and area as well as date and time of sampling.

ANALYST:


Partima Poudel Acharya

APPROVED BY:


Tianbao Bai, Ph.D., CIH
Laboratory Director



730 S.E. Maynard Rd., Cary, NC 27511
 Tel: 919-481-1413; Fax: 919-481-1442

T211219
 T23991-24012 (22)

CHAIN OF CUSTODY

(61)

LAB USE ONLY:	
CEI Lab Code: <u>A217119</u>	<u>7</u>
CEI Lab I.D. Range: <u>A100757 - A100810</u>	

COMPANY CONTACT INFORMATION	
Company: CROSSROADS ENVIRONMENTAL, LLC	Client #:
Address: 1258 BOILING SPRINGS RD.	Job Contact: Evans Harris
SPARTANBURG, SC 29303	Email: RESULTS@CROSSROADSENV.NET
	Tel: 864-541-8736
Project Name: Byrnes- Phase II	Fax: 864-541-8776
Project ID #: 20018-IN	P.O. #:

ASBESTOS	METHOD	4 HR*	8 HR*	24 HR	2 DAY	3 DAY	5 DAY
PLM BULK	EPA 600			X			
TEM BULK	CHATFIELD			X			
PLM POINT COUNT (400)	EPA 600						
PLM POINT COUNT (1000)	EPA 600						
PLM GRAVIMETRIC	EPA 600						
PLM GRAV w POINT COUNT	EPA 600						
OTHER:							

POSITIVE STOP ANALYSIS	X
SOUTH CAROLINA SAMPLES	X
NORTH CAROLINA SAMPLES	

TEM INSTRUCTIONS	
BEGIN TEM ANALYSIS AFTER NEGATIVE PLM	X
ANALYZE TEM SAMPLES SIMULTANEOUSLY WITH PLM	

				<input checked="" type="checkbox"/> Accept Samples <input type="checkbox"/> Reject Samples
Relinquished By:	Date/Time	Received By:	Date/Time	
<u>Evans Harris</u>	5/24/2021 @ 17:00	<u>CB</u>	5/25	
<u>CP</u>	5/26/21 12:15	<u>LLW</u>	5/26	10:00

*Call to confirm RUSH analysis.

Samples will be disposed of 30 days after analysis



SAMPLING FORM

COMPANY CONTACT INFORMATION	
Crossroads Environmental, LLC	Job Contact: Evans Harris
Project Name: Byrnes- Phase II	
Project ID #: 20018-IN	Tel: 864-541-8736

SAMPLE ID#	HA	DESCRIPTION / LOCATION	TEST		
			PLM		TEM
			PLM		TEM
001	01	12" Mustard VFT	PLM	X	TEM
002	01	12" Mustard VFT	PLM	X	TEM
003	01	12" Mustard VFT	PLM		TEM
004	02	9" light brown VFT	PLM	X	TEM
005	02	9" light brown VFT	PLM	X	TEM
006	02	9" light brown VFT	PLM		TEM
007	03	2' x 2' ceiling tile	PLM	X	TEM
008	03	2' x 2' ceiling tile	PLM	X	TEM
009	03	2' x 2' ceiling tile	PLM	X	TEM
010	04	2' x 2' ceiling tile	PLM	X	TEM
011	04	2' x 2' ceiling tile	PLM	X	TEM
012	04	2' x 2' ceiling tile	PLM	X	TEM
013	05	12" Blue VFT	PLM	X	TEM
014	05	12" Blue VFT	PLM	X	TEM
015	05	12" Blue VFT	PLM		TEM
016	06	12" Orange VFT	PLM	X	TEM
017	06	12" Orange VFT	PLM	X	TEM
018	06	12" Orange VFT	PLM		TEM
019	07	Drywall, tape & spackle	PLM	X	TEM
020	07	Drywall, tape & spackle	PLM	X	TEM
021	07	Drywall, tape & spackle	PLM	X	TEM
022	07	Drywall, tape & spackle	PLM	X	TEM
023	07	Drywall, tape & spackle	PLM	X	TEM
024	08	12" Beige/Brown VFT	PLM	X	TEM
025	08	12" Beige/Brown VFT	PLM	X	TEM
026	08	12" Beige/Brown VFT	PLM		TEM
027	09	12" x 12" Gray/Tan VFT	PLM	X	TEM
028	09	12" x 12" Gray/Tan VFT	PLM	X	TEM
029	09	12" x 12" Gray/Tan VFT	PLM		TEM
030	10	4" black cove	PLM	X	TEM
031	10	4" black cove	PLM	X	TEM
032	10	4" black cove	PLM		TEM



SAMPLING FORM

COMPANY CONTACT INFORMATION	
Crossroads Environmental, LLC	Job Contact: Evans Harris
Project Name: Byrnes- Phase II	
Project ID #: 20018-IN	Tel: 864-541-8736

SAMPLE ID#	HA	DESCRIPTION / LOCATION	TEST			
			PLM	X	TEM	
033 ✓	11	Locker cove	PLM	X	TEM	
034 ✓	11	Locker cove	PLM	X	TEM	
035 ✓	11	Locker cove	PLM		TEM	
036 ✓	12	4" gray cove	PLM	X	TEM	
037 ✓	12	4" gray cove	PLM	X	TEM	
038 ✓	12	4" gray cove	PLM		TEM	
039 ✓	13	gypsum wall panel	PLM	X	TEM	
040 ✓	13	gypsum wall panel	PLM	X	TEM	
041 ✓	13	gypsum wall panel	PLM	X	TEM	
042 ✓	14	12" tan/gray VFT	PLM	X	TEM	
043 ✓	14	12" tan/gray VFT	PLM	X	TEM	
044 ✓	14	12" tan/gray VFT	PLM		TEM	
045 ✓	15	12" Gray VFT	PLM	X	TEM	
046 ✓	15	12" Gray VFT	PLM	X	TEM	
047 ✓	15	12" Gray VFT	PLM		TEM	
048 ✓	16	4" gray cove	PLM	X	TEM	
049 ✓	16	4" gray cove	PLM	X	TEM	
050 ✓	16	4" gray cove	PLM		TEM	
051 ✓	17	4" brown cove	PLM	X	TEM	
052 ✓	17	4" brown cove	PLM	X	TEM	
053 ✓	17	4" brown cove	PLM		TEM	
054 ✓	18	2' x 4' ceiling tile	PLM	X	TEM	
055 ✓	18	2' x 4' ceiling tile	PLM	X	TEM	
056 ✓	18	2' x 4' ceiling tile	PLM	X	TEM	
029-A ✓	09	12" x 12" Gray/Tan VFT	PLM	X	TEM	
029-B ✓	09	12" x 12" Gray/Tan VFT	PLM	X	TEM	
060 ✓	20	4" Beige cove	PLM	X	TEM	
061 ✓	20	4" Beige cove	PLM	X	TEM	
062 ✓	20	4" Beige cove	PLM		TEM	X
			PLM		TEM	
			PLM		TEM	
			PLM		TEM	
			PLM		TEM	
			PLM		TEM	

July 27, 2021

Crossroads Environmental
1258 Boiling Springs Road
Spartanburg, SC 29303

CLIENT PROJECT: Byrnes High School - Phase 2, 20018-IN
LAB CODE: T211687

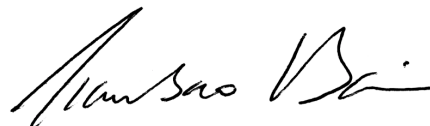
Dear Customer:

Enclosed are asbestos analysis results for TEM bulk samples received at our laboratory on July 26, 2021. The samples were analyzed for asbestos using transmission electron microscopy (TEM) per Chatfield/EPA 600/R-93/116 Sec. 2.5.5.1 method.

Sample results containing > 1% asbestos are considered asbestos-containing materials (ACMs) per the EPA regulatory requirements. The detection limit for the TEM Chatfield/EPA 600/R-93/116 Sec. 2.5.5.1 method is <1% depending on the processed weight and constituents of the sample.

Thank you for your business and we look forward to continuing good relations.

Kind Regards,



Tianbao Bai, Ph.D., CIH
Laboratory Director



CEI

ASBESTOS ANALYTICAL REPORT
By: Transmission Electron Microscopy

Prepared for

Crossroads Environmental

CLIENT PROJECT: Byrnes High School - Phase 2, 20018-IN

LAB CODE: T211687

TEST METHOD: Bulk Chatfield
EPA 600 / R93 / 116 Sec. 2.5.5.1

REPORT DATE: 07/27/21



CEI

ASBESTOS BULK ANALYSIS

By: TRANSMISSION ELECTRON MICROSCOPY

Client: Crossroads Environmental
1258 Boiling Springs Road
Spartanburg, SC 29303

Lab Code: T211687
Date Received: 07-26-21
Date Analyzed: 07-27-21
Date Reported: 07-27-21

Project: Byrnes High School - Phase 2, 20018-IN

TEM BULK CHATFIELD / EPA 600 / R93 / 116 Sec. 2.5.5.1

Client ID Lab ID	Material Description	Sample Weight (g)	Organic Material %	Acid Soluble Material %	Acid Insoluble Material %	Asbestos %
075 T26362	Brown/Gray Duct Mastic	0.1532	59.3	1.6	39.1	None Detected
087 T26363	Gray Duct Mastic	0.3163	54.7	37.1	8.2	None Detected
090 T26364	Tan Fire Stop	0.7097	75.5	5.6	18.9	None Detected
093 T26365	Red Fire Stop	0.5452	60.6	.1	39.3	None Detected
113 T26366	Gray Vinyl Floor Tile	0.5684	22.8	40.6	36.6	None Detected
113 T26367	Yellow Mastic	0.0618	37.2	48.2	14.6	None Detected
124-A T26368	Black Tpo Roofing-Tar	0.3507	91.5	4.8	3.7	None Detected
124-A T26369	Black Tpo Roofing-Felt Paper	0.2815	89.9	2.6	7.5	<1% Chrysotile
142 T26370	White Window Caulk	0.4252	14	57.3	28.7	None Detected
145 T26371	White Door Caulk	0.2518	32.2	61	6.8	None Detected
145 T26372	Gray Door Caulk	0.3665	28.4	67	4.6	None Detected
148 T26373	Brown/Dark Brown Window Caulk	0.4257	27.2	65.9	6.9	None Detected



CEI

ASBESTOS BULK ANALYSIS

By: TRANSMISSION ELECTRON MICROSCOPY

Client: Crossroads Environmental
1258 Boiling Springs Road
Spartanburg, SC 29303

Lab Code: T211687
Date Received: 07-26-21
Date Analyzed: 07-27-21
Date Reported: 07-27-21

Project: Byrnes High School - Phase 2, 20018-IN

TEM BULK CHATFIELD / EPA 600 / R93 / 116 Sec. 2.5.5.1

Client ID Lab ID	Material Description	Sample Weight (g)	Organic Material %	Acid Soluble Material %	Acid Insoluble Material %	Asbestos %
028-C T26374	Gray Vinyl Floor Tile	0.357	19.3	79.3	1.4	None Detected
028-C T26375	Black Mastic	0.1098	34.2	63.1	2.7	None Detected

LEGEND: None

METHOD: CHATFIELD & EPA/600/R-93/116 Sec. 2.5.5.1

LIMIT OF DETECTION: Varies with the weight and constituents of the sample (<1%)

REGULATORY LIMIT: >1% by weight

This report relates only to the samples tested or analyzed and may not be reproduced, except in full, without written approval by Eurofins CEI. Eurofins CEI makes no warranty representation regarding the accuracy of client submitted information in preparing and presenting analytical results. Interpretation of the analytical results is the sole responsibility of the client. *Estimated measurement of uncertainty is available on request.* Samples were received in acceptable condition unless otherwise noted.

Information provided by customer includes customer sample ID, location, volume and area as well as date and time of sampling.

ANALYST:


Brunilda Gjoka

APPROVED BY:


Tianbao Bai, Ph.D., CIH
Laboratory Director



730 S.E. Maynard Rd., Cary, NC 27511
 Tel: 919-481-1413; Fax: 919-481-1442

T211687
 T26362-T26375 (14)

CHAIN OF CUSTODY

LAB USE ONLY:	
CEI Lab Code:	A2110617
CEI Lab I.D. Range:	AF1363-A151455

COMPANY CONTACT INFORMATION	
Company: CROSSROADS ENVIRONMENTAL, LLC	Client #: 93
Address: 1258 BOILING SPRINGS RD. SPARTANBURG, SC 29303	Job Contact: Kay H. Horton
	Email: RESULTS@CROSSROADSENV.NET
	Tel: 864-541-8736
Project Name: Byrnes High School- Phase 2	Fax: 864-541-8776
Project ID #: 20018-IN	P.O. #:

ASBESTOS	METHOD	4 HR*	8 HR*	24 HR	2 DAY	3 DAY	5 DAY
PLM BULK	EPA 600			X			
TEM BULK	CHATFIELD			X			
PLM POINT COUNT (400)	EPA 600						
PLM POINT COUNT (1000)	EPA 600						
PLM GRAVIMETRIC	EPA 600						
PLM GRAV w POINT COUNT	EPA 600						
OTHER:							

POSITIVE STOP ANALYSIS	X
SOUTH CAROLINA SAMPLES	X
NORTH CAROLINA SAMPLES	

TEM INSTRUCTIONS	
BEGIN TEM ANALYSIS AFTER NEGATIVE PLM	
ANALYZE TEM SAMPLES SIMULTANEOUSLY WITH PLM	

No Positive Stop on Surfacing				<input checked="" type="checkbox"/> Accept Samples <input type="checkbox"/> Reject Samples
Relinquished By:	Date/Time	Received By:	Date/Time	
Dustin Henderson <i>[Signature]</i>	7/22/2021 0:00	BNB	7/23 9:20	
SC	7-26-21 12:10pm	J.C	07/26 12:10	

*Call to confirm RUSH analysis.

Samples will be disposed of 30 days after analysis



SAMPLING FORM

COMPANY CONTACT INFORMATION	
Crossroads Environmental, LLC	Job Contact: Dustin Henderson
Project Name: Byrnes High School- Phase 2	
Project ID #: 20018-IN	Tel: 864-541-8736

SAMPLE ID#	HA	DESCRIPTION / LOCATION	TEST			
			PLM	X	TEM	
063	21	Transite	PLM	X	TEM	
064	22	Hard Joint/ Elbow	PLM	X	TEM	
065	22	Hard Joint/ Elbow	PLM	X	TEM	
066	22	Hard Joint/ Elbow	PLM	X	TEM	
067	23	Foamglass	PLM	X	TEM	
068	23	Foamglass	PLM	X	TEM	
069	23	Foamglass	PLM	X	TEM	
070	24	Pipe Run Insulation	PLM	X	TEM	
071	24	Pipe Run Insulation	PLM	X	TEM	
072	24	Pipe Run Insulation	PLM	X	TEM	
073	25	Brown/ Gray Duct Mastic	PLM	X	TEM	
074	25	Brown/ Gray Duct Mastic	PLM	X	TEM	
075	25	Brown/ Gray Duct Mastic	PLM		TEM	X
076	26	Black Mastic on F/G Roof Drains	PLM	X	TEM	
077	26	Black Mastic on F/G Roof Drains	PLM	X	TEM	
078	26	Black Mastic on F/G Roof Drains	PLM		TEM	X
079	27	Gray/ Green Duct Mastic	PLM	X	TEM	
080	27	Gray/ Green Duct Mastic	PLM	X	TEM	
081	27	Gray/ Green Duct Mastic	PLM		TEM	X
082	28	Plaster	PLM	X	TEM	
083	28	Plaster	PLM	X	TEM	
084	28	Plaster	PLM	X	TEM	
085	29	Gray Duct Mastic	PLM	X	TEM	
086	29	Gray Duct Mastic	PLM	X	TEM	
087	29	Gray Duct Mastic	PLM		TEM	X
088	30	Tan Fire Stop	PLM	X	TEM	
089	30	Tan Fire Stop	PLM	X	TEM	
090	30	Tan Fire Stop	PLM		TEM	X
091	31	Red Fire Stop	PLM	X	TEM	
092	31	Red Fire Stop	PLM	X	TEM	
093	31	Red Fire Stop	PLM		TEM	X
094	32	Black Mastic on F/G Duct	PLM	X	TEM	
095	32	Black Mastic on F/G Duct	PLM	X	TEM	



A2110617

SAMPLING FORM

COMPANY CONTACT INFORMATION	
Crossroads Environmental, LLC	Job Contact: Dustin Henderson
Project Name: Byrnes High School- Phase 2	
Project ID #: 20018-IN	Tel: 864-541-8736

SAMPLE ID#	HA	DESCRIPTION / LOCATION	TEST			
			PLM		TEM	
096	32	Black Mastic on F/G Duct	PLM		TEM	X
097	33	Block Skim/ Filler	PLM	X	TEM	
098	33	Block Skim/ Filler	PLM	X	TEM	
099	33	Block Skim/ Filler	PLM	X	TEM	
100	33	Block Skim/ Filler	PLM	X	TEM	
101	33	Block Skim/ Filler	PLM	X	TEM	
102	33	Block Skim/ Filler	PLM	X	TEM	
103	33	Block Skim/ Filler	PLM	X	TEM	
104	34	Block Skim/ Filler	PLM	X	TEM	
105	34	Block Skim/ Filler	PLM	X	TEM	
106	34	Block Skim/ Filler	PLM	X	TEM	
107	34	Block Skim/ Filler	PLM	X	TEM	
108	34	Block Skim/ Filler	PLM	X	TEM	
109	34	Block Skim/ Filler	PLM	X	TEM	
110	34	Block Skim/ Filler	PLM	X	TEM	
111	35	12" Gray Vinyl Floor Tile	PLM	X	TEM	
112	35	12" Gray Vinyl Floor Tile	PLM	X	TEM	
113	35	12" Gray Vinyl Floor Tile	PLM		TEM	X
114	36	Brick Skim Coat	PLM	X	TEM	
115	36	Brick Skim Coat	PLM	X	TEM	
116	36	Brick Skim Coat	PLM	X	TEM	
117	36	Brick Skim Coat	PLM	X	TEM	
118	36	Brick Skim Coat	PLM	X	TEM	
119	37	Fiber Board	PLM	X	TEM	
120	37	Fiber Board	PLM	X	TEM	
121	37	Fiber Board	PLM	X	TEM	
122	38	TPO over B.U.R Field	PLM	X	TEM	
123	38	TPO over B.U.R Field	PLM	X	TEM	
124	38	TPO over B.U.R Field	PLM	X	TEM	
124-A	38	TPO over B.U.R Field	PLM		TEM	X
125	39	Mechanical Flashing	PLM	X	TEM	
126	39	Mechanical Flashing	PLM	X	TEM	
127	39	Mechanical Flashing	PLM		TEM	X
128	40	Perimeter Flashing	PLM	X	TEM	



SAMPLING FORM

COMPANY CONTACT INFORMATION	
Crossroads Environmental, LLC	Job Contact: Dustin Henderson
Project Name: Byrnes High School- Phase 2	
Project ID #: 20018-IN	Tel: 864-541-8736

SAMPLE ID#	HA	DESCRIPTION / LOCATION	TEST			
			PLM	X	TEM	
129	40	Perimeter Flashing	PLM	X	TEM	
130	40	Perimeter Flashing	PLM		TEM	X
131	41	Mechanical Flashing	PLM	X	TEM	
132	41	Mechanical Flashing	PLM	X	TEM	
133	41	Mechanical Flashing	PLM		TEM	X
133-A	41	Mechanical Flashing	PLM	X	TEM	
133-B	41	Mechanical Flashing	PLM	X	TEM	
134	42	TPO over B.U.R Field	PLM	X	TEM	
135	42	TPO over B.U.R Field	PLM	X	TEM	
136	42	TPO over B.U.R Field	PLM		TEM	X
136-A	42	TPO over B.U.R Field	PLM	X	TEM	
137	43	Wall/ Mechanical Coating	PLM	X	TEM	
138	43	Wall/ Mechanical Coating	PLM	X	TEM	
139	43	Wall/ Mechanical Coating	PLM		TEM	X
140	44	White Window Caulk	PLM	X	TEM	
141	44	White Window Caulk	PLM	X	TEM	
142	44	White Window Caulk	PLM		TEM	X
143	45	Door Caulk	PLM	X	TEM	
144	45	Door Caulk	PLM	X	TEM	
145	45	Door Caulk	PLM		TEM	X
146	46	Brown/ Dark Window Caulk	PLM	X	TEM	
147	46	Brown/ Dark Window Caulk	PLM	X	TEM	
148	46	Brown/ Dark Window Caulk	PLM		TEM	X
028-A		12"Gray Vinyl Floor Tile w/ Mastic	PLM	X	TEM	
028-B		12"Gray Vinyl Floor Tile w/ Mastic	PLM	X	TEM	
028-C		12"Gray Vinyl Floor Tile w/ Mastic	PLM	X	TEM	
			PLM		TEM	
			PLM		TEM	
			PLM		TEM	
			PLM		TEM	
			PLM		TEM	
			PLM		TEM	
			PLM		TEM	
			PLM		TEM	
			PLM		TEM	
			PLM		TEM	
			PLM		TEM	
			PLM		TEM	
			PLM		TEM	
			PLM		TEM	
			PLM		TEM	
			PLM		TEM	

ATTACHMENT III
SAMPLE LOCATION SKETCH AND/OR PHOTOS



/// ACM Vinyl Flooring Material(s)

□ Double-Layer ACM Flooring



Untitled Map

Write a description for your map.



SAMPLE LOCATION SKETCH

Sketch #: Roof Sketch

Project Name: James F. Byrnes High School

Project ID: 20018-IN

Date: 7/22/2021

Legend

James F. Byrnes High School



**ATTACHMENT IV
ACCREDITATION(S)**

SCDHEC ISSUED

Asbestos ID Card

Evans Harris



AIR SAMPLER	AS-00383
CONSULTBI	BI-01224
CONSULTPD	PD-00149

Expiration Date:

08/30/21

08/31/21

11/17/21

SCDHEC ISSUED

Asbestos ID Card

Dustin Henderson



AIR SAMPLER	AS-00479
CONSULTBI	BI-01510

Expiration Date:

11/15/21

11/16/21



COMPREHENSIVE ASBESTOS INSPECTION REPORT

FOR

MCMILLAN PAZDAN SMITH ARCHITECTURE

**127 Dunbar Street
Spartanburg, SC 29306**

LOCATION

**Byrnes High School- Phase 2 Demolition Extents (Additional)
150 E Main Street
Duncan, SC 29334**

INSPECTION DATE: January 20 & 26, 2022

REPORT DATE: February 2, 2022

INSPECTOR(S)

**Evans Harris – SC-DHEC License #BI-01224
(864) 680-1233**

**Kay H. Horton – SC-DHEC License #ASB-23394
(864) 541-8736**

For

**Crossroads Environmental, LLC
1258 Boiling Springs Road
Spartanburg, South Carolina 29303
(864) 541-8736
CRE Project # 20759-IN**

TABLE OF CONTENTS

INSPECTION REPORT/LETTER

- BACKGROUND INFORMATION
- BUILDING/AREA DESCRIPTION
- INSPECTION STRATEGY/SAMPLING PROTOCOL
- RESULTS
- RELEVANT REGULATORY REQUIREMENTS/RECOMMENDATIONS
- CLOSING STATEMENTS AND LIMITATIONS

ATTACHMENTS

- ATTACHMENT I: ASBESTOS SUMMARY TABLE
- ATTACHMENT II: LABORATORY REPORT(S)
- ATTACHMENT III: BUILDING/AREA SKETCH
- ATTACHMENT IV: INSPECTOR'S LICENSE/ACCREDITATION

February 2, 2022

Mr. Ryan Cloonan
McMillan Pazdan Smith Architecture
127 Dunbar Street
Spartanburg, SC 29306

Re: Comprehensive Asbestos Inspection Report
Byrnes High School- Phase 2 Demolition Extents (Additional)
150 E Main Street, Duncan, SC 29334
CRE Project Number: 20759-IN

Dear Mr. Cloonan:

Crossroads Environmental, LLC (CRE) completed a comprehensive asbestos inspection of the 'Phase 2 Demolition Extents (Additional)' at Byrnes High School, located at 150 E Main Street in Duncan, South Carolina. The inspection was performed on January 20 & 26, 2022 prior to proposed demolition by SC-DHEC Licensed Asbestos Inspectors, and in accordance with South Carolina Department of Health and Environmental Control (SC-DHEC) and Environmental Protection Agency (EPA) Requirements. **A detailed summary table of the sampling is included in Attachment I; however, this report should be read in its entirety.**

Building Description

The 'Phase 2 Demolition Extents (Additional)' encompasses Classrooms 202/203, the Media Center Foyer and associated corridor and offices and the Orchestra 721/722 wings. These area are single-story, slab-on-grade foundation and feature brick veneer exterior and built-up roofing materials under TPO membrane. All building sections feature CMU interior wall construction and drop ceilings grids throughout. There are a variety of vinyl floor types and associated mastics/adhesives, as well as vinyl cove base(s). There are various ceiling tile type(s), and above the drop grids are suspect pipe insulation, penetration caulk(s) and HVAC equipment mastic(s). The Orchestra 722 wing is newer and features non-suspect TPO membrane and foam roofing over metal decking.

Inspection Strategy/Sampling Protocol

The inspection consisted of grouping suspect asbestos containing materials into homogeneous areas based on the color and texture of the material, and then performing representative sampling of the materials included in those homogeneous areas. SC-DHEC has requirements for the minimum number of samples that can be collected from each homogeneous area (three samples of each miscellaneous material, three samples of each type of thermal system insulation, and the sample requirements for surfacing are based on square footage). Following completion of the on-site inspection/sampling, samples were submitted to an accredited laboratory for analysis.

As of June 27, 2008, SC-DHEC requires that any non-friable organically bound (NOB) material that is suspect to contain asbestos, such as floor tile, mastics, roofing material, and caulking must be analyzed by transmission electron microscopy (TEM) if polarized light microscopy (PLM) analyses of that material indicate that no asbestos was detected.

Results

EPA recognizes a material as Asbestos Containing Material (ACM) if an asbestos content of greater than one percent asbestos is detected in a representative sample analyzed by polarized light microscopy. Certain OSHA regulations apply even if the asbestos content is less than one percent (OSHA 29 CFR 1926.1101).

Results indicated that greater than one percent asbestos was detected in the following materials:

- **12" x 12" Burnt Orange VFT Mastic (HA01)**
- **CMU Bock Filler (HA05)**
- **Black Mastic on Roof Drain Insulation (HA11)**
- **White/Gray Duct Insulation Mastic (HA12)**
- **Brown Wood Panel Adhesive (HA15)**
- **12" x 12" Tan/Off-White VFT Mastic (HA16)**
- **Black Mastic on F/G Insulated HVAC Duct (HA22)**
- **Roof Equipment Mechanical Flashing (HA30)**
- **Built-Up Roofing Field (HA28)**
- **Perimeter Flashing (HA29)**

Relevant Regulatory Requirements/Recommendations

Friability-Friable materials are defined as materials that can be reduced to powder by hand pressure. It should be noted that non-friable materials may become friable depending on the method of removal. All non-friable materials must be removed by properly accredited asbestos personnel. If the non-friable materials are removed in a friable manner, then all regulations in regard to friable abatement will apply.

Project Design- A Project Design, written by a SC-DHEC Licensed Project Designer, will be required on this project.

Air Monitoring- Air monitoring by a SC-DHEC Licensed Air Monitor will be required on this project.

All asbestos abatement must be performed by a SC-DHEC Licensed Abatement Contractor, and all waste must be disposed of in a SC-DHEC approved landfill.

Closing Statements and Limitations

Every effort was made to identify all materials in accessible areas. There is the possibility that suspect materials were not identified in inaccessible areas. If any suspect material is discovered that is not included within this report, it should be sampled before it is physically disturbed.

This document has been prepared by Crossroads Environmental, LLC at the request of and for the exclusive use of McMillan Pazdan Smith Architecture. This report represents the findings from the date that it was inspected, and is limited in scope to that indicated above.

Crossroads Environmental, LLC appreciates the opportunity to provide McMillan Pazdan Smith Architecture with our consultative services. Should you have any questions or need additional information, please do not hesitate to contact us.

Sincerely,



Evans Harris
Licensed Inspector



Kay H. Horton
President

Attachments- (4)

ATTACHMENT I
ASBESTOS SUMMARY TABLE

CROSSROADS ENVIRONMENTAL, LLC ASBESTOS INSPECTION REPORT							CRE JOB #: 20759-IN			
Location:		Byrnes High School- Phase II Demo Extents (Additional)								
Client:		McMillan Pazdan Smith Architecture					DATE: January 20 & 26, 2022			
Key: A=Amosite, C=Chrysotile, Cr=Crocidolite, Tr=Tremolite, Ac=Actinolite Asbestos, Misc.=Miscellaneous, HA#=Homogeneous Area #, PLM=Polarized Light Microscopy, TEM=Transmission Electron Microscopy, /=PLM and/or TEM Analysis Not Required sq.ft.=Square Feet, cu.ft.=Cubic Feet, In.ft.=Linear Feet, HJI=Hard Joint Insulation, TSI=Thermal System Insulation, BUR=Built-up Roofing, Surf=Surfacing NAD=No Asbestos Detected, SP=Stop Positive										
HA#	Type of Material TSI, Surf, Misc.	Material Type	Sample Number	Asbestos Content (PLM)	Asbestos Content (TEM)	Location of Sample	Approx. Quantity	Physical Condition	Location/ Comments	
01	Misc	12" Burnt Orange VFT	100 VFT 100 Mastic	NAD 3%C	/ /	202	750 sq. ft.	Good; Non-Friable	Located throughout Classroom 202.	
			101 VFT 101 Mastic	NAD S/P	/ /	202				
			102 VFT 102 Mastic	/ S/P	NAD /	202				
02	Misc	2' x 2' Squiggle Ceiling Tile	103	NAD	/	202	N/A	Good; Friable	Located in Classroom 202, Media Center foyer, IT Office/ Server Room, Periodicals, Orchestra 721 corridor, Orchestra 721 and Orchestra 722.	
			104	NAD	/	Orchestra 721 corridor				
			105	NAD	/	Media Center foyer				
03	Misc	2' x 2' Ceiling Tile (Gouges)	106	NAD	/	203	N/A	Good; Friable	Located in Classroom 203, Media Center corridor and 722 Orchestra.	
			107	NAD	/	Media Center foyer				
			108	NAD	/	722 Orchestra				

CROSSROADS ENVIRONMENTAL, LLC ASBESTOS INSPECTION REPORT							CRE JOB #: 20759-IN			
Location:		Byrnes High School- Phase II Demo Extents (Additional)								
Client:		McMillan Pazdan Smith Architecture					DATE: January 20 & 26, 2022			
Key: A=Amosite, C=Chrysotile, Cr=Crocidolite, Tr=Tremolite, Ac=Actinolite Asbestos, Misc.=Miscellaneous, HA#=Homogeneous Area #, PLM=Polarized Light Microscopy, TEM=Transmission Electron Microscopy, /=PLM and/or TEM Analysis Not Required sq.ft.=Square Feet, cu.ft.=Cubic Feet, In.ft.=Linear Feet, HJI=Hard Joint Insulation, TSI=Thermal System Insulation, BUR=Built-up Roofing, Surf=Surfacing NAD=No Asbestos Detected, SP=Stop Positive										
HA#	Type of Material TSI, Surf, Misc.	Material Type	Sample Number	Asbestos Content (PLM)	Asbestos Content (TEM)	Location of Sample	Approx. Quantity	Physical Condition	Location/ Comments	
04	Misc	12" Gray Vinyl Floor Tile	109 VFT 109 Mastic	NAD NAD	/ /	203	N/A	Good; Non- Friable	Located throughout Classroom 203.	
			110 VFT 110 Mastic	NAD NAD	/ /	203				
			111 VFT 111 Mastic	/ /	NAD <1%C	203				
05	Surf.	Block Filler	112 Mud 112 Filler	2%C NAD	/ /	Classroom 202	TBD Based on Scope	Good; Friable	Located throughout on walls.	
			113 Mud 113 Filler	NAD NAD	/ /	Classroom 203				
			114 Mud 114 Filler	NAD NAD	/ /	Media Center corridor				
			115 Mud 115 Filler	NAD NAD	/ /	Orchestra 721 corridor				
			116 Mud 116 Filler	NAD NAD	/ /	722 Orchestra				
06	Misc	4" Gray Cove Adhesive	117	NAD	/	Classroom 203	N/A	Good; Non- Friable	Located in Classroom 203, Orchestra 721 corridor, 721 Orchestra, 722 Orchestra.	
			118	NAD	/	Orchestra 721 corridor				
			119	/	NAD	Classroom 203				
07	Misc	Gray Metal Duct Mastic	120	NAD	/	Classrom 203	N/A	Good; Non- Friable	Located on Classroom 203 HVAC ductwork.	
			121	NAD	/	Classrom 203				
			122	/	NAD	Classrom 203				

CROSSROADS ENVIRONMENTAL, LLC ASBESTOS INSPECTION REPORT							CRE JOB #: 20759-IN			
Location:		Byrnes High School- Phase II Demo Extents (Additional)								
Client:		McMillan Pazdan Smith Architecture					DATE: January 20 & 26, 2022			
Key: A=Amosite, C=Chrysotile, Cr=Crocidolite, Tr=Tremolite, Ac=Actinolite Asbestos, Misc.=Miscellaneous, HA#=Homogeneous Area #, PLM=Polarized Light Microscopy, TEM=Transmission Electron Microscopy, /=PLM and/or TEM Analysis Not Required sq.ft.=Square Feet, cu.ft.=Cubic Feet, In.ft.=Linear Feet, HJI=Hard Joint Insulation, TSI=Thermal System Insulation, BUR=Built-up Roofing, Surf=Surfacing NAD=No Asbestos Detected, SP=Stop Positive										
HA#	Type of Material TSI, Surf, Misc.	Material Type	Sample Number	Asbestos Content (PLM)	Asbestos Content (TEM)	Location of Sample	Approx. Quantity	Physical Condition	Location/ Comments	
08	Misc	Lab Countertops	123	NAD	/	Classrom 203	N/A	Good; Non-Friable	Located in Classroom 203.	
			124	NAD	/	Classrom 203				
			125	/	NAD	Classrom 203				
09	Misc	Transite Sink	126	NAD	/	Classroom 202	N/A	Good; Non-Friable	Located in Classroom 202.	
			127	NAD	/	Classroom 202				
			128	/	NAD	Classroom 202				
10	Misc	12" Blue/Gray Vinyl Floor Tile	129 VFT 129 Mastic	NAD NAD	/ /	Media Center foyer	N/A	Good; Non-Friable	Located in the Media Center foyer.	
			130 VFT 130 Mastic	NAD NAD	/ /	Media Center foyer				
			131 VFT 131 Mastic	/ /	NAD NAD	Media Center foyer				
11	Misc	Black Mastic on Roof Drain Insulation	132	10%C	/	Media Center Foyer	24 sq. ft.	Good; Non-Friable	Located in the Media Center foyer, Media Center corridor, and IT Office/Server Room.	
			133	S/P	/	IT Office/Server Room				
			134	S/P	/	Media Center corridor				
12	Misc	White/Gray Duct Mastic	135	5%C	/	Media Center foyer	90 In. ft.	Good; Non-Friable	Located in the Media Center foyer, IT Office/Server Room, and Periodicals.	
			136	S/P	/	Media Center foyer				
			137	S/P	/	Periodicals				

CROSSROADS ENVIRONMENTAL, LLC ASBESTOS INSPECTION REPORT							CRE JOB #: 20759-IN			
Location:		Byrnes High School- Phase II Demo Extents (Additional)								
Client:		McMillan Pazdan Smith Architecture					DATE: January 20 & 26, 2022			
Key: A=Amosite, C=Chrysotile, Cr=Crocidolite, Tr=Tremolite, Ac=Actinolite Asbestos, Misc.=Miscellaneous, HA#=Homogeneous Area #, PLM=Polarized Light Microscopy, TEM=Transmission Electron Microscopy, /=PLM and/or TEM Analysis Not Required sq.ft.=Square Feet, cu.ft.=Cubic Feet, In.ft.=Linear Feet, HJI=Hard Joint Insulation, TSI=Thermal System Insulation, BUR=Built-up Roofing, Surf=Surfacing NAD=No Asbestos Detected, SP=Stop Positive										
HA#	Type of Material TSI, Surf, Misc.	Material Type	Sample Number	Asbestos Content (PLM)	Asbestos Content (TEM)	Location of Sample	Approx. Quantity	Physical Condition	Location/ Comments	
13	Misc	Carpet Glue	138	NAD	/	Media Center foyer	N/A	Good; Non-Friable	Located in Periodicals, IT Office/Server Room, and Media Center.	
			139	NAD	/	IT Office				
			140	/	NAD	Periodicals				
14	Surf.	Drywall & Joint Compound	141 Drywall 141 Joint Comp.	NAD NAD	/ /	Server Room	<1,000 sq. ft.	Good; Friable	Located in Periodicals, IT Office/Server Room, and Media Center foyer.	
			142 Drywall 142 Joint Comp.	NAD NAD	/ /	Periodicals				
			143 Drywall 143 Joint Comp.	NAD NAD	/ /	Periodicals				
15	Misc	Brown Panel Adhesive	Assumed to Contain Asbestos (Inaccessible).			600 sq. ft.	Unknown	Located behind wood paneling in the Media Center foyer off corridor.		
16	Misc	12" Tan/Off-White Vinyl Floor Tile	144 VFT 144 Mastic	NAD 3%C	/ /	Media Center corridor	510 sq. ft.	Good; Non-Friable	Located in the corridor outside Media Center.	
			145 VFT 145 Mastic	NAD S/P	/ /	Media Center corridor				
			146 VFT 146 Mastic	/ S/P	<1%C NAD	Media Center corridor				
17	Misc	4" Brown Cove Adhesive	147 Brown 147 Cream	NAD NAD	/ /	Media Center corridor	N/A	Good; Non-Friable	Located in the corridor outside Media Center.	
			148 Brown 148 Cream	NAD NAD	/ /	Media Center corridor				
			149 Brown 149 Cream	/ /	NAD NAD	Media Center corridor				
18	Misc	12" Tan/Beige Vinyl Floor Tile	150 Tan VFT 150 Mastic 150 VFT 150 Mastic	NAD NAD NAD NAD	/ / / /	Orchestra 721 corridor	N/A	Good; Non-Friable	Located in the 721 Orchestra corridor and Instrument Storage.	
			151 Tan VFT 151 Mastic 151 VFT 151 Mastic	NAD NAD NAD NAD	/ / / /	Orchestra 721 corridor				
			152 Tan VFT 152 Mastic 152 VFT 152 Mastic	/ / / /	NAD NAD NAD NAD	Orchestra 721 corridor				

CROSSROADS ENVIRONMENTAL, LLC ASBESTOS INSPECTION REPORT							CRE JOB #: 20759-IN			
Location:		Byrnes High School- Phase II Demo Extents (Additional)								
Client:		McMillan Pazdan Smith Architecture					DATE: January 20 & 26, 2022			
Key: A=Amosite, C=Chrysotile, Cr=Crocidolite, Tr=Tremolite, Ac=Actinolite Asbestos, Misc.=Miscellaneous, HA#=#Homogeneous Area #, PLM=Polarized Light Microscopy, TEM=Transmission Electron Microscopy, /=PLM and/or TEM Analysis Not Required sq.ft.=Square Feet, cu.ft.=Cubic Feet, In.ft.=Linear Feet, HJI=Hard Joint Insulation, TSI=Thermal System Insulation, BUR=Built-up Roofing, Surf=Surfacing NAD=No Asbestos Detected, SP=Stop Positive										
HA#	Type of Material TSI, Surf, Misc.	Material Type	Sample Number	Asbestos Content (PLM)	Asbestos Content (TEM)	Location of Sample	Approx. Quantity	Physical Condition	Location/ Comments	
19	Misc	2' x 4' Ceiling Tile (Deep Gouge)	153	NAD	/	Orchestra 721 storage	N/A	Good; Friable	Located in the 721 Orchestra storage rooms and associated offices off corridor; 720 Chorus.	
			154	NAD	/	Orchestra 721 storage				
			155	NAD	/	Orchestra 721 office				
20	Misc	12" x 12" Gray Vinyl Floor Tile (Under Carpet)	156 VFT 156 Mastic	NAD NAD	/ /	721 Orchestra	N/A	Unknown; Friable	Located in 721 Orchestra, Practice Room and Uniform Storage.	
			157 VFT 157 Mastic	NAD NAD	/ /	721 Orchestra				
			158 VFT 158 Mastic	/ /	NAD NAD	721 Orchestra				
21	Misc	Carpet Glue	159	NAD	/	Orchestra 721	N/A	Good; Non- Friable	Located in the 721 Orchestra storage rooms, 721 Orchestra offices off corridor, 721 Orchestra and 722 Orchestra Storage.	
			160	NAD	/	Orchestra Storage				
			161	/	NAD	722 Orchestra storage				
22	Misc	Black Mastic on F/G Insulated Duct	162	10%K	/	721 Orchestra corridor	300 In. ft.	Good; Non- Friable	Located throughout the 721 Orchestra wing.	
			163	S/P	/	721 Orchestra storage				
			164	S/P	/	721 Orchestra office off corridor				
23	Misc	Blue Cove Adhesive	165	NAD	/	721 Orchestra	N/A	Good; Non- Friable	Located in Orchestra 721.	
			166	NAD	/	721 Orchestra				
			167	/	NAD	721 Orchestra				
24	Misc	Brown Cove Adhesive	168	NAD	/	720 Chorus	N/A	Good; Non- Friable	Located in 720 Chorus and Orchestra Instrument Storage.	
			169	NAD	/	Instrument Storage				
			170	/	NAD	Instrument Storage				

CROSSROADS ENVIRONMENTAL, LLC ASBESTOS INSPECTION REPORT							CRE JOB #: 20759-IN			
Location:		Byrnes High School- Phase II Demo Extents (Additional)								
Client:		McMillan Pazdan Smith Architecture					DATE: January 20 & 26, 2022			
Key: A=Amosite, C=Chrysotile, Cr=Crocidolite, Tr=Tremolite, Ac=Actinolite Asbestos, Misc.=Miscellaneous, HA#=Homogeneous Area #, PLM=Polarized Light Microscopy, TEM=Transmission Electron Microscopy, /=PLM and/or TEM Analysis Not Required sq.ft.=Square Feet, cu.ft.=Cubic Feet, In.ft.=Linear Feet, HJI=Hard Joint Insulation, TSI=Thermal System Insulation, BUR=Built-up Roofing, Surf=Surfacing NAD=No Asbestos Detected, SP=Stop Positive										
HA#	Type of Material TSI, Surf, Misc.	Material Type	Sample Number	Asbestos Content (PLM)	Asbestos Content (TEM)	Location of Sample	Approx. Quantity	Physical Condition	Location/ Comments	
25	Surf.	Spray-Applied Fireproofing	171	NAD	/	Orchestra 721 Practice Room	<1,000 sq. ft.	Good; Friable	Located in the 721 Orchestra and 722 Orchestra building sections.	
			172	NAD	/	Orchestra 721 Practice Room				
			173	NAD	/	Orchestra 722 Storage				
26	Misc	12" x 12" Dark Gray Vinyl Floor Tile	174 VFT 174 Mastic	NAD NAD	/ /	722 Orchestra	N/A	Good; Non- Friable	Located in Orchestra 722.	
			175 VFT 175 Mastic	NAD NAD	/ /	722 Orchestra				
			176 VFT 176 Mastic	/ /	NAD	722 Orchestra				
27	Misc	Tan Duct Mastic	177	NAD	/	Orchestra 721 storage	N/A	Good; Non- Friable	Located on metal duct work in Orchestra 722.	
			178	NAD	/	Orchestra 722 Storage				
			179	/	NAD	Orchestra 722 Storage				
28	Misc	Roof Field	180- Roof Field-tar 180- Roof Field-felt 180- Roof Field-felt 180- Roof Field-gypsum 180- Roof Field-ceiling tile	NAD NAD 10% NAD NAD	/ / / / /	721 Orchestra	8,200 sq. ft.	Good; Non- Friable	Located on the roof section(s) over Classrooms 202/203; the Media Center foyer and associated corridor; and the 721 Orchestra wing. Please Note: The roofing materials over the newer 722 Orchestra wing are non-suspect to contain asbestos (TPO over foam over metal decking).	
			181	SP	/	Media Center				
			182	SP	/	Classroom 202/203				
29	Misc	Perimeter Flashing	183- Perimeter Flashing 183- Insulation	10% /	/ /	721 Orchestra	410 In. ft.	Good; Non- Friable	Located around perimeters on the roof section(s) over Classrooms 202/203; the Media Center foyer and associated corridor; and the 721 Orchestra wing. Please Note: The roofing materials over the newer 722 Orchestra wing are non-suspect to contain asbestos (TPO over foam over metal decking).	
			184	SP	/	Media Center				
			185	SP	/	Classroom 202/203				

CROSSROADS ENVIRONMENTAL, LLC ASBESTOS INSPECTION REPORT							CRE JOB #: 20759-IN		
Location:		Byrnes High School- Phase II Demo Extents (Additional)							
Client:		McMillan Pazdan Smith Architecture					DATE: January 20 & 26, 2022		
Key: A=Amosite, C=Chrysotile, Cr=Crocidolite, Tr=Tremolite, Ac=Actinolite Asbestos, Misc.=Miscellaneous, HA#=Homogeneous Area #, PLM=Polarized Light Microscopy, TEM=Transmission Electron Microscopy, /=PLM and/or TEM Analysis Not Required sq.ft.=Square Feet, cu.ft.=Cubic Feet, In.ft.=Linear Feet, HJI=Hard Joint Insulation, TSI=Thermal System Insulation, BUR=Built-up Roofing, Surf=Surfacing NAD=No Asbestos Detected, SP=Stop Positive									
HA#	Type of Material TSI, Surf, Misc.	Material Type	Sample Number	Asbestos Content (PLM)	Asbestos Content (TEM)	Location of Sample	Approx. Quantity	Physical Condition	Location/ Comments
30	Misc	Mechanical Flashing	186- Mechanical Flashing 186- Insulation	10% /	/ /	721 Orchestra	180 in. ft.	Good; Non- Friable	Located around mechanical equipment/curb(s) on the roof section(s) over Classrooms 202/203; the Media Center foyer and associated corridor; and the 721 Orchestra wing. Please Note: The roofing materials over the newer 722 Orchestra wing are non-suspect to contain asbestos (TPO over foam over metal decking).
			187	SP	/	Media Center			
			188	SP	/	Classroom 202/203			
31	Misc	Black Shingle Material	189	NAD	/	721 Orchestra	N/A	Good; Friable	Located on the east roof section over 721 Orchestra wing.
			190	NAD	/	721 Orchestra			
			191	/	NAD	721 Orchestra			

ATTACHMENT II
LABORATORY REPORT(S)

January 25, 2022

Crossroads Environmental
1258 Boiling Springs Road
Spartanburg, SC 29303

CLIENT PROJECT: Byrnes HS, 20759-IN
CEI LAB CODE: B221720

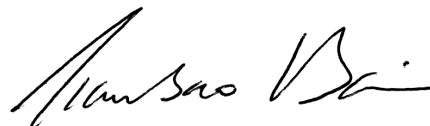
Dear Customer:

Enclosed are asbestos analysis results for PLM Bulk samples received at our laboratory on January 24, 2022. The samples were analyzed for asbestos using polarizing light microscopy (PLM) per the EPA 600 Method.

Sample results containing >1% asbestos are considered asbestos-containing materials (ACMs) per EPA regulatory requirements. The detection limit for the EPA 600 Method is <1% asbestos by weight as determined by visual estimation.

Thank you for your business and we look forward to continuing good relations.

Kind Regards,



Tianbao Bai, Ph.D., CIH
Laboratory Director



CEI

ASBESTOS ANALYTICAL REPORT

By: Polarized Light Microscopy

Prepared for

Crossroads Environmental

CLIENT PROJECT: Byrnes HS, 20759-IN

LAB CODE: B221720

TEST METHOD: EPA 600 / R93 / 116 and EPA 600 / M4-82 / 020

REPORT DATE: 01/25/22

TOTAL SAMPLES ANALYZED: 57

SAMPLES >1% ASBESTOS: 6



CEI

Asbestos Report Summary

By: POLARIZING LIGHT MICROSCOPY

PROJECT: Byrnes HS, 20759-IN

LAB CODE: B221720

METHOD: EPA 600 / R93 / 116 and EPA 600 / M4-82 / 020

Client ID	Layer	Lab ID	Color	Sample Description	ASBESTOS %
100		B221720.01A	Orange	Vft	None Detected
		B221720.01B	Black	Mastic	Chrysotile 3%
101		B221720.02A	Orange	Vft	None Detected
		B221720.02B		Sample Not Analyzed per COC	
102		B221720.03A		Sample Submitted for TEM Analysis	
		B221720.03B		Sample Not Analyzed per COC	
103		B221720.04	Off-white	Ceiling Tile	None Detected
104		B221720.05	Off-white	Ceiling Tile	None Detected
105		B221720.06	Off-white	Ceiling Tile	None Detected
106		B221720.07	Off-white	Ceiling Tile	None Detected
107		B221720.08	Off-white	Ceiling Tile	None Detected
108		B221720.09	Off-white	Ceiling Tile	None Detected
109		B221720.10A	Gray	Vft	None Detected
		B221720.10B	Yellow	Mastic	None Detected
110		B221720.11A	Gray	Vft	None Detected
		B221720.11B	Yellow	Mastic	None Detected
111		B221720.12A		Sample Submitted for TEM Analysis	
		B221720.12B		Sample Submitted for TEM Analysis	
112	Layer 1	B221720.13	Green	Mud	Chrysotile 2%
	Layer 2	B221720.13	Gray	Block Filler	None Detected
113	Layer 1	B221720.14	White	Mud	None Detected
	Layer 2	B221720.14	Gray	Block Filler	None Detected
114	Layer 1	B221720.15	White	Mud	None Detected
	Layer 2	B221720.15	Gray	Block Filler	None Detected
115	Layer 1	B221720.16	White	Mud	None Detected
	Layer 2	B221720.16	Gray	Block Filler	None Detected
116	Layer 1	B221720.17	White	Mud	None Detected
	Layer 2	B221720.17	Gray	Block Filler	None Detected
117		B221720.18	Cream	Covebase Adhesive	None Detected

Asbestos Report Summary

By: POLARIZING LIGHT MICROSCOPY

PROJECT: Byrnes HS, 20759-IN

LAB CODE: B221720

METHOD: EPA 600 / R93 / 116 and EPA 600 / M4-82 / 020

Client ID	Layer	Lab ID	Color	Sample Description	ASBESTOS %
118		B221720.19	Cream	Covebase Adhesive	None Detected
119		B221720.20		Sample Submitted for TEM Analysis	
120		B221720.21	Gray	Duct Mastic	None Detected
121		B221720.22	Gray	Duct Mastic	None Detected
122		B221720.23		Sample Submitted for TEM Analysis	
123		B221720.24	Black	Lab Countertop	None Detected
124		B221720.25	Black	Lab Countertop	None Detected
125		B221720.26		Sample Submitted for TEM Analysis	
126		B221720.27	Gray	Transite Sink	None Detected
127		B221720.28	Gray	Transite Sink	None Detected
128		B221720.29		Sample Submitted for TEM Analysis	
129		B221720.30A	Blue,Gray	Vft	None Detected
		B221720.30B	Yellow	Mastic	None Detected
130		B221720.31A	Blue,Gray	Vft	None Detected
		B221720.31B	Yellow	Mastic	None Detected
131		B221720.32A		Sample Submitted for TEM Analysis	
		B221720.32B		Sample Submitted for TEM Analysis	
132		B221720.33	Black	Mastic	Chrysotile 10%
133		B221720.34		Sample Not Analyzed per COC	
134		B221720.35		Sample Not Analyzed per COC	
135		B221720.36	White	Duct Mastic	Chrysotile 5%
136		B221720.37		Sample Not Analyzed per COC	
137		B221720.38		Sample Not Analyzed per COC	
138		B221720.39	Yellow	Carpet Glue	None Detected
139		B221720.40	Yellow	Carpet Glue	None Detected
140		B221720.41		Sample Submitted for TEM Analysis	

Asbestos Report Summary

By: POLARIZING LIGHT MICROSCOPY

PROJECT: Byrnes HS, 20759-IN

LAB CODE: B221720

METHOD: EPA 600 / R93 / 116 and EPA 600 / M4-82 / 020

Client ID	Layer	Lab ID	Color	Sample Description	ASBESTOS %
141	Layer 1	B221720.42	White,Tan	Drywall	None Detected
	Layer 2	B221720.42	White	Joint Compound	None Detected
142	Layer 1	B221720.43	White,Tan	Drywall	None Detected
	Layer 2	B221720.43	White	Joint Compound	None Detected
143	Layer 1	B221720.44	White,Tan	Drywall	None Detected
	Layer 2	B221720.44	White	Joint Compound	None Detected
144		B221720.45A	Tan,Off-white	Vft	None Detected
		B221720.45B	Black	Mastic	Chrysotile 3%
145		B221720.46A	Tan,Off-white	Vft	None Detected
		B221720.46B		Sample Not Analyzed per COC	
146		B221720.47A		Sample Submitted for TEM Analysis	
		B221720.47B		Sample Not Analyzed per COC	
147	Layer 1	B221720.48	Brown	Cove Adhesive	None Detected
	Layer 2	B221720.48	Cream	Cove Adhesive	None Detected
148	Layer 1	B221720.49	Brown	Cove Adhesive	None Detected
	Layer 2	B221720.49	Cream	Cove Adhesive	None Detected
149		B221720.50		Sample Submitted for TEM Analysis	
150		B221720.51A	Tan,Beige	Vft	None Detected
		B221720.51B	Yellow	Mastic	None Detected
		B221720.51C	Off-white	Vft	None Detected
		B221720.51D	Yellow	Mastic	None Detected
151		B221720.52A	Tan,Beige	Vft	None Detected
		B221720.52B	Yellow	Mastic	None Detected
		B221720.52C	Off-white	Vft	None Detected
		B221720.52D	Yellow	Mastic	None Detected
152		B221720.53A		Sample Submitted for TEM Analysis	
		B221720.53B		Sample Submitted for TEM Analysis	



CEI

Asbestos Report Summary

By: POLARIZING LIGHT MICROSCOPY

PROJECT: Byrnes HS, 20759-IN

LAB CODE: B221720

METHOD: EPA 600 / R93 / 116 and EPA 600 / M4-82 / 020

Client ID	Layer	Lab ID	Color	Sample Description	ASBESTOS %
		B221720.53C		Sample Submitted for TEM Analysis	
		B221720.53D		Sample Submitted for TEM Analysis	
153		B221720.54	Gray	Ceiling Tile	None Detected
154		B221720.55	Gray	Ceiling Tile	None Detected
155		B221720.56	Gray	Ceiling Tile	None Detected
156		B221720.57A	Gray	Vft	None Detected
		B221720.57B	Black	Mastic	None Detected
157		B221720.58A	Gray	Vft	None Detected
		B221720.58B	Black	Mastic	None Detected
158		B221720.59A		Sample Submitted for TEM Analysis	
		B221720.59B		Sample Submitted for TEM Analysis	
159		B221720.60	Yellow	Carpet Glue	None Detected
160		B221720.61	Yellow	Carpet Glue	None Detected
161		B221720.62		Sample Submitted for TEM Analysis	
162		B221720.63	Black	Mastic	Chrysotile 10%
163		B221720.64		Sample Not Analyzed per COC	
164		B221720.65		Sample Not Analyzed per COC	
165		B221720.66	Cream	Cove Adhesive	None Detected
166		B221720.67	Cream	Cove Adhesive	None Detected
167		B221720.68		Sample Submitted for TEM Analysis	
168		B221720.69	Brown	Cove Adhesive	None Detected
169		B221720.70	Brown	Cove Adhesive	None Detected
170		B221720.71		Sample Submitted for TEM Analysis	
171		B221720.72	Gray	Spray-applied Fireproofing	None Detected
172		B221720.73	Gray	Spray-applied Fireproofing	None Detected
173		B221720.74	Gray	Spray-applied Fireproofing	None Detected



CEI

Asbestos Report Summary

By: POLARIZING LIGHT MICROSCOPY

PROJECT: Byrnes HS, 20759-IN

LAB CODE: B221720

METHOD: EPA 600 / R93 / 116 and EPA 600 / M4-82 / 020

Client ID	Layer	Lab ID	Color	Sample Description	ASBESTOS %
174		B221720.75A	Dark Gray	Vft	None Detected
		B221720.75B	Yellow	Mastic	None Detected
175		B221720.76A	Dark Gray	Vft	None Detected
		B221720.76B	Yellow	Mastic	None Detected
176		B221720.77A		Sample Submitted for TEM Analysis	
		B221720.77B		Sample Submitted for TEM Analysis	
177		B221720.78	Tan	Duct Mastic	None Detected
178		B221720.79	Tan	Duct Mastic	None Detected
179		B221720.80		Sample Submitted for TEM Analysis	

ASBESTOS BULK ANALYSIS

By: POLARIZING LIGHT MICROSCOPY

Client: Crossroads Environmental
 1258 Boiling Springs Road
 Spartanburg, SC 29303

Lab Code: B221720
Date Received: 01-24-22
Date Analyzed: 01-24-22
Date Reported: 01-25-22

Project: Byrnes HS, 20759-IN

ASBESTOS BULK PLM, EPA 600 METHOD

Client ID Lab ID	Lab Description	Lab Attributes	NON-ASBESTOS COMPONENTS			ASBESTOS %
			Fibrous	Non-Fibrous		
100 B221720.01A	Vft	Heterogeneous Orange Non-fibrous Bound	65%	Vinyl	None Detected	
			35%	Calc Carb		
B221720.01B	Mastic	Heterogeneous Black Non-fibrous Bound	97%	Mastic	3% Chrysotile	
101 B221720.02A	Vft	Heterogeneous Orange Non-fibrous Bound	65%	Vinyl	None Detected	
			35%	Calc Carb		
B221720.02B	Sample Not Analyzed per COC					
102 B221720.03A	Sample Submitted for TEM Analysis					
B221720.03B	Sample Not Analyzed per COC					
103 B221720.04	Ceiling Tile	Heterogeneous Off-white Fibrous Loosely Bound	35%	Cellulose	None Detected	
			30%	Fiberglass		
			32%	Perlite		
			3%	Paint		
104 B221720.05	Ceiling Tile	Heterogeneous Off-white Fibrous Loosely Bound	35%	Cellulose	None Detected	
			30%	Fiberglass		
			32%	Perlite		
			3%	Paint		
105 B221720.06	Ceiling Tile	Heterogeneous Off-white Fibrous Loosely Bound	35%	Cellulose	None Detected	
			30%	Fiberglass		
			32%	Perlite		
			3%	Paint		

ASBESTOS BULK ANALYSIS

By: POLARIZING LIGHT MICROSCOPY

Client: Crossroads Environmental
 1258 Boiling Springs Road
 Spartanburg, SC 29303

Lab Code: B221720
Date Received: 01-24-22
Date Analyzed: 01-24-22
Date Reported: 01-25-22

Project: Byrnes HS, 20759-IN

ASBESTOS BULK PLM, EPA 600 METHOD

Client ID Lab ID	Lab Description	Lab Attributes	NON-ASBESTOS COMPONENTS				ASBESTOS %
			Fibrous		Non-Fibrous		
106 B221720.07	Ceiling Tile	Heterogeneous	35%	Cellulose	32%	Perlite	None Detected
		Off-white Fibrous Loosely Bound	30%	Fiberglass	3%	Paint	
107 B221720.08	Ceiling Tile	Heterogeneous	35%	Cellulose	32%	Perlite	None Detected
		Off-white Fibrous Loosely Bound	30%	Fiberglass	3%	Paint	
108 B221720.09	Ceiling Tile	Heterogeneous	35%	Cellulose	32%	Perlite	None Detected
		Off-white Fibrous Loosely Bound	30%	Fiberglass	3%	Paint	
109 B221720.10A	Vft	Heterogeneous			65%	Vinyl	None Detected
		Gray Non-fibrous Tightly Bound			35%	Calc Carb	
B221720.10B	Mastic	Heterogeneous			100%	Mastic	None Detected
		Yellow Non-fibrous Bound					
110 B221720.11A	Vft	Heterogeneous			65%	Vinyl	None Detected
		Gray Non-fibrous Tightly Bound			35%	Calc Carb	
B221720.11B	Mastic	Heterogeneous			100%	Mastic	None Detected
		Yellow Non-fibrous Bound					
111 B221720.12A	Sample Submitted for TEM Analysis						

ASBESTOS BULK ANALYSIS

By: POLARIZING LIGHT MICROSCOPY

Client: Crossroads Environmental
 1258 Boiling Springs Road
 Spartanburg, SC 29303

Lab Code: B221720
Date Received: 01-24-22
Date Analyzed: 01-24-22
Date Reported: 01-25-22

Project: Byrnes HS, 20759-IN

ASBESTOS BULK PLM, EPA 600 METHOD

Client ID Lab ID	Lab Description	Lab Attributes	NON-ASBESTOS COMPONENTS		ASBESTOS %
			Fibrous	Non-Fibrous	
B221720.12B	Sample Submitted for TEM Analysis				
112 Layer 1 B221720.13	Mud	Heterogeneous Green Non-fibrous Bound	5% 65% 28%	Paint Calc Carb Binder	2% Chrysotile
Layer 2 B221720.13	Block Filler	Heterogeneous Gray Non-fibrous Bound	85% 15%	Silicates Binder	None Detected
113 Layer 1 B221720.14	Mud	Heterogeneous White Non-fibrous Bound	5% 65% 30%	Paint Calc Carb Binder	None Detected
Layer 2 B221720.14	Block Filler	Heterogeneous Gray Non-fibrous Bound	85% 15%	Silicates Binder	None Detected
114 Layer 1 B221720.15	Mud	Heterogeneous White Non-fibrous Bound	5% 65% 30%	Paint Calc Carb Binder	None Detected
Layer 2 B221720.15	Block Filler	Heterogeneous Gray Non-fibrous Bound	85% 15%	Silicates Binder	None Detected
115 Layer 1 B221720.16	Mud	Heterogeneous White Non-fibrous Bound	5% 65% 30%	Paint Calc Carb Binder	None Detected

ASBESTOS BULK ANALYSIS

By: POLARIZING LIGHT MICROSCOPY

Client: Crossroads Environmental
 1258 Boiling Springs Road
 Spartanburg, SC 29303

Lab Code: B221720
Date Received: 01-24-22
Date Analyzed: 01-24-22
Date Reported: 01-25-22

Project: Byrnes HS, 20759-IN

ASBESTOS BULK PLM, EPA 600 METHOD

Client ID Lab ID	Lab Description	Lab Attributes	NON-ASBESTOS COMPONENTS		ASBESTOS %
			Fibrous	Non-Fibrous	
Layer 2 B221720.16	Block Filler	Heterogeneous Gray Non-fibrous Bound	85% 15%	Silicates Binder	None Detected
116 Layer 1 B221720.17	Mud	Heterogeneous White Non-fibrous Bound	5% 65% 30%	Paint Calc Carb Binder	None Detected
Layer 2 B221720.17	Block Filler	Heterogeneous Gray Non-fibrous Bound	85% 15%	Silicates Binder	None Detected
117 B221720.18	Covebase Adhesive	Heterogeneous Cream Non-fibrous Bound	100%	Mastic	None Detected
118 B221720.19	Covebase Adhesive	Heterogeneous Cream Non-fibrous Bound	100%	Mastic	None Detected
119 B221720.20	Sample Submitted for TEM Analysis				
120 B221720.21	Duct Mastic	Heterogeneous Gray Non-fibrous Bound	100%	Mastic	None Detected
121 B221720.22	Duct Mastic	Heterogeneous Gray Non-fibrous Bound	100%	Mastic	None Detected

ASBESTOS BULK ANALYSIS

By: POLARIZING LIGHT MICROSCOPY

Client: Crossroads Environmental
 1258 Boiling Springs Road
 Spartanburg, SC 29303

Lab Code: B221720
Date Received: 01-24-22
Date Analyzed: 01-24-22
Date Reported: 01-25-22

Project: Byrnes HS, 20759-IN

ASBESTOS BULK PLM, EPA 600 METHOD

Client ID Lab ID	Lab Description	Lab Attributes	NON-ASBESTOS COMPONENTS		ASBESTOS %
			Fibrous	Non-Fibrous	
122 B221720.23	Sample Submitted for TEM Analysis				
123 B221720.24	Lab Countertop	Heterogeneous Black Non-fibrous Bound	100%	Binder	None Detected
124 B221720.25	Lab Countertop	Heterogeneous Black Non-fibrous Bound	100%	Binder	None Detected
125 B221720.26	Sample Submitted for TEM Analysis				
126 B221720.27	Transite Sink	Heterogeneous Gray Non-fibrous Bound	85% 15%	Silicates Binder	None Detected
127 B221720.28	Transite Sink	Heterogeneous Gray Non-fibrous Bound	85% 15%	Silicates Binder	None Detected
128 B221720.29	Sample Submitted for TEM Analysis				
129 B221720.30A	Vft	Heterogeneous Blue, Gray Non-fibrous Tightly Bound	65% 35%	Vinyl Calc Carb	None Detected
B221720.30B	Mastic	Heterogeneous Yellow Non-fibrous Bound	100%	Mastic	None Detected



CEI

ASBESTOS BULK ANALYSIS

By: POLARIZING LIGHT MICROSCOPY

Client: Crossroads Environmental
1258 Boiling Springs Road
Spartanburg, SC 29303

Lab Code: B221720
Date Received: 01-24-22
Date Analyzed: 01-24-22
Date Reported: 01-25-22

Project: Byrnes HS, 20759-IN

ASBESTOS BULK PLM, EPA 600 METHOD

Client ID Lab ID	Lab Description	Lab Attributes	NON-ASBESTOS COMPONENTS		ASBESTOS %
			Fibrous	Non-Fibrous	
130 B221720.31A	Vft	Heterogeneous	65%	Vinyl	None Detected
		Blue, Gray Non-fibrous Tightly Bound	35%	Calc Carb	
B221720.31B	Mastic	Heterogeneous Yellow Non-fibrous Bound	100%	Mastic	None Detected
131 B221720.32A	Sample Submitted for TEM Analysis				
B221720.32B	Sample Submitted for TEM Analysis				
132 B221720.33	Mastic	Heterogeneous Black Fibrous Bound	90%	Mastic	10% Chrysotile
133 B221720.34	Sample Not Analyzed per COC				
134 B221720.35	Sample Not Analyzed per COC				
135 B221720.36	Duct Mastic	Heterogeneous White Non-fibrous Bound	95%	Mastic	5% Chrysotile
136 B221720.37	Sample Not Analyzed per COC				
137 B221720.38	Sample Not Analyzed per COC				

ASBESTOS BULK ANALYSIS

By: POLARIZING LIGHT MICROSCOPY

Client: Crossroads Environmental
 1258 Boiling Springs Road
 Spartanburg, SC 29303

Lab Code: B221720
Date Received: 01-24-22
Date Analyzed: 01-24-22
Date Reported: 01-25-22

Project: Byrnes HS, 20759-IN

ASBESTOS BULK PLM, EPA 600 METHOD

Client ID Lab ID	Lab Description	Lab Attributes	NON-ASBESTOS COMPONENTS				ASBESTOS %
			Fibrous		Non-Fibrous		
138 B221720.39	Carpet Glue	Heterogeneous Yellow Non-fibrous Bound			100% Mastic		None Detected
139 B221720.40	Carpet Glue	Heterogeneous Yellow Non-fibrous Bound			100% Mastic		None Detected
140 B221720.41	Sample Submitted for TEM Analysis						
141 Layer 1 B221720.42	Drywall	Heterogeneous White, Tan Fibrous Bound	25%	Cellulose	75%	Gypsum	None Detected
Layer 2 B221720.42	Joint Compound	Heterogeneous White Non-fibrous Bound			65% 33% 2%	Calc Carb Binder Paint	None Detected
142 Layer 1 B221720.43	Drywall	Heterogeneous White, Tan Fibrous Bound	25%	Cellulose	75%	Gypsum	None Detected
Layer 2 B221720.43	Joint Compound	Heterogeneous White Non-fibrous Bound			65% 33% 2%	Calc Carb Binder Paint	None Detected
143 Layer 1 B221720.44	Drywall	Heterogeneous White, Tan Fibrous Bound	25%	Cellulose	75%	Gypsum	None Detected

ASBESTOS BULK ANALYSIS

By: POLARIZING LIGHT MICROSCOPY

Client: Crossroads Environmental
 1258 Boiling Springs Road
 Spartanburg, SC 29303

Lab Code: B221720
Date Received: 01-24-22
Date Analyzed: 01-24-22
Date Reported: 01-25-22

Project: Byrnes HS, 20759-IN

ASBESTOS BULK PLM, EPA 600 METHOD

Client ID Lab ID	Lab Description	Lab Attributes	NON-ASBESTOS COMPONENTS		ASBESTOS %
			Fibrous	Non-Fibrous	
Layer 2 B221720.44	Joint Compound	Heterogeneous White Non-fibrous Bound	65% 33% 2%	Calc Carb Binder Paint	None Detected
144 B221720.45A	Vft	Heterogeneous Tan, Off-white Non-fibrous Tightly Bound	65% 35%	Vinyl Calc Carb	None Detected
B221720.45B	Mastic	Heterogeneous Black Non-fibrous Bound	97%	Mastic	3% Chrysotile
145 B221720.46A	Vft	Heterogeneous Tan, Off-white Non-fibrous Tightly Bound	65% 35%	Vinyl Calc Carb	None Detected
B221720.46B	Sample Not Analyzed per COC				
146 B221720.47A	Sample Submitted for TEM Analysis				
B221720.47B	Sample Not Analyzed per COC				
147 Layer 1 B221720.48	Cove Adhesive	Heterogeneous Brown Non-fibrous Bound	100%	Mastic	None Detected
Layer 2 B221720.48	Cove Adhesive	Heterogeneous Cream Non-fibrous Bound	100%	Mastic	None Detected

ASBESTOS BULK ANALYSIS

By: POLARIZING LIGHT MICROSCOPY

Client: Crossroads Environmental
 1258 Boiling Springs Road
 Spartanburg, SC 29303

Lab Code: B221720
Date Received: 01-24-22
Date Analyzed: 01-24-22
Date Reported: 01-25-22

Project: Byrnes HS, 20759-IN

ASBESTOS BULK PLM, EPA 600 METHOD

Client ID Lab ID	Lab Description	Lab Attributes	NON-ASBESTOS COMPONENTS		ASBESTOS %
			Fibrous	Non-Fibrous	
148 Layer 1 B221720.49	Cove Adhesive	Heterogeneous Brown Non-fibrous Bound	100%	Mastic	None Detected
Layer 2 B221720.49	Cove Adhesive	Heterogeneous Cream Non-fibrous Bound	100%	Mastic	None Detected
149 B221720.50	Sample Submitted for TEM Analysis				
150 B221720.51A	Vft	Heterogeneous Tan,Beige Non-fibrous Tightly Bound	65% 35%	Vinyl Calc Carb	None Detected
B221720.51B	Mastic	Heterogeneous Yellow Non-fibrous Bound	100%	Mastic	None Detected
B221720.51C	Vft	Heterogeneous Off-white Non-fibrous Tightly Bound	65% 35%	Vinyl Calc Carb	None Detected
B221720.51D	Mastic	Heterogeneous Yellow Non-fibrous Bound	100%	Mastic	None Detected
151 B221720.52A	Vft	Heterogeneous Tan,Beige Non-fibrous Tightly Bound	65% 35%	Vinyl Calc Carb	None Detected

ASBESTOS BULK ANALYSIS

By: POLARIZING LIGHT MICROSCOPY

Client: Crossroads Environmental
 1258 Boiling Springs Road
 Spartanburg, SC 29303

Lab Code: B221720
Date Received: 01-24-22
Date Analyzed: 01-24-22
Date Reported: 01-25-22

Project: Byrnes HS, 20759-IN

ASBESTOS BULK PLM, EPA 600 METHOD

Client ID Lab ID	Lab Description	Lab Attributes	NON-ASBESTOS COMPONENTS			ASBESTOS %	
			Fibrous	Non-Fibrous			
B221720.52B	Mastic	Heterogeneous Yellow Non-fibrous Bound	100%	Mastic		None Detected	
B221720.52C	Vft	Heterogeneous Off-white Non-fibrous Tightly Bound	65% 35%	Vinyl Calc Carb		None Detected	
B221720.52D	Mastic	Heterogeneous Yellow Non-fibrous Bound	100%	Mastic		None Detected	
152 B221720.53A	Sample Submitted for TEM Analysis						
B221720.53B	Sample Submitted for TEM Analysis						
B221720.53C	Sample Submitted for TEM Analysis						
B221720.53D	Sample Submitted for TEM Analysis						
153 B221720.54	Ceiling Tile	Heterogeneous Gray Fibrous Loosely Bound	35% 30%	Cellulose Fiberglass	32% 3%	Perlite Paint	None Detected
154 B221720.55	Ceiling Tile	Heterogeneous Gray Fibrous Loosely Bound	35% 30%	Cellulose Fiberglass	32% 3%	Perlite Paint	None Detected

ASBESTOS BULK ANALYSIS

By: POLARIZING LIGHT MICROSCOPY

Client: Crossroads Environmental
 1258 Boiling Springs Road
 Spartanburg, SC 29303

Lab Code: B221720
Date Received: 01-24-22
Date Analyzed: 01-24-22
Date Reported: 01-25-22

Project: Byrnes HS, 20759-IN

ASBESTOS BULK PLM, EPA 600 METHOD

Client ID Lab ID	Lab Description	Lab Attributes	NON-ASBESTOS COMPONENTS				ASBESTOS %
			Fibrous		Non-Fibrous		
155 B221720.56	Ceiling Tile	Heterogeneous	35%	Cellulose	32%	Perlite	None Detected
		Gray	30%	Fiberglass	3%	Paint	
		Fibrous Loosely Bound					
156 B221720.57A	Vft	Heterogeneous			65%	Vinyl	None Detected
		Gray			35%	Calc Carb	
		Non-fibrous Tightly Bound					
B221720.57B	Mastic	Heterogeneous			100%	Mastic	None Detected
		Black Non-fibrous Bound					
157 B221720.58A	Vft	Heterogeneous			65%	Vinyl	None Detected
		Gray			35%	Calc Carb	
		Non-fibrous Tightly Bound					
B221720.58B	Mastic	Heterogeneous			100%	Mastic	None Detected
		Black Non-fibrous Bound					
158 B221720.59A	Sample Submitted for TEM Analysis						
B221720.59B	Sample Submitted for TEM Analysis						
159 B221720.60	Carpet Glue	Heterogeneous			100%	Mastic	None Detected
		Yellow					
		Non-fibrous Bound					

ASBESTOS BULK ANALYSIS

By: POLARIZING LIGHT MICROSCOPY

Client: Crossroads Environmental
 1258 Boiling Springs Road
 Spartanburg, SC 29303

Lab Code: B221720
Date Received: 01-24-22
Date Analyzed: 01-24-22
Date Reported: 01-25-22

Project: Byrnes HS, 20759-IN

ASBESTOS BULK PLM, EPA 600 METHOD

Client ID Lab ID	Lab Description	Lab Attributes	NON-ASBESTOS COMPONENTS				ASBESTOS %
			Fibrous		Non-Fibrous		
160 B221720.61	Carpet Glue	Heterogeneous Yellow Non-fibrous Bound			100%	Mastic	None Detected
161 B221720.62	Sample Submitted for TEM Analysis						
162 B221720.63	Mastic	Heterogeneous Black Non-fibrous Bound	10%	Fiberglass	80%	Mastic	10% Chrysotile
163 B221720.64	Sample Not Analyzed per COC						
164 B221720.65	Sample Not Analyzed per COC						
165 B221720.66	Cove Adhesive	Heterogeneous Cream Non-fibrous Bound			100%	Mastic	None Detected
166 B221720.67	Cove Adhesive	Heterogeneous Cream Non-fibrous Bound			100%	Mastic	None Detected
167 B221720.68	Sample Submitted for TEM Analysis						
168 B221720.69	Cove Adhesive	Heterogeneous Brown Non-fibrous Bound	3%	Talc	97%	Mastic	None Detected

ASBESTOS BULK ANALYSIS

By: POLARIZING LIGHT MICROSCOPY

Client: Crossroads Environmental
 1258 Boiling Springs Road
 Spartanburg, SC 29303

Lab Code: B221720
Date Received: 01-24-22
Date Analyzed: 01-24-22
Date Reported: 01-25-22

Project: Byrnes HS, 20759-IN

ASBESTOS BULK PLM, EPA 600 METHOD

Client ID Lab ID	Lab Description	Lab Attributes	NON-ASBESTOS COMPONENTS				ASBESTOS %
			Fibrous		Non-Fibrous		
169 B221720.70	Cove Adhesive	Heterogeneous Brown Non-fibrous Bound	3%	Talc	97%	Mastic	None Detected
170 B221720.71	Sample Submitted for TEM Analysis						
171 B221720.72	Spray-applied Fireproofing	Heterogeneous Gray Fibrous Loosely Bound	90%	Fiberglass	10%	Binder	None Detected
172 B221720.73	Spray-applied Fireproofing	Heterogeneous Gray Fibrous Loosely Bound	90%	Fiberglass	10%	Binder	None Detected
173 B221720.74	Spray-applied Fireproofing	Heterogeneous Gray Fibrous Loosely Bound	90%	Fiberglass	10%	Binder	None Detected
174 B221720.75A	Vft	Heterogeneous Dark Gray Fibrous Tightly Bound			65%	Vinyl	None Detected
B221720.75B	Mastic	Heterogeneous Yellow Non-fibrous Loose			35%	Calc Carb	None Detected
175 B221720.76A	Vft	Heterogeneous Dark Gray Fibrous Tightly Bound			65%	Vinyl	None Detected
					35%	Calc Carb	None Detected

ASBESTOS BULK ANALYSIS

By: POLARIZING LIGHT MICROSCOPY

Client: Crossroads Environmental
 1258 Boiling Springs Road
 Spartanburg, SC 29303

Lab Code: B221720
Date Received: 01-24-22
Date Analyzed: 01-24-22
Date Reported: 01-25-22

Project: Byrnes HS, 20759-IN

ASBESTOS BULK PLM, EPA 600 METHOD

Client ID Lab ID	Lab Description	Lab Attributes	NON-ASBESTOS COMPONENTS		ASBESTOS %
			Fibrous	Non-Fibrous	
B221720.76B	Mastic	Heterogeneous Yellow Non-fibrous Loose	100%	Mastic	None Detected
176 B221720.77A	Sample Submitted for TEM Analysis				
B221720.77B	Sample Submitted for TEM Analysis				
177 B221720.78	Duct Mastic	Heterogeneous Tan Non-fibrous Bound	100%	Mastic	None Detected
178 B221720.79	Duct Mastic	Heterogeneous Tan Non-fibrous Bound	100%	Mastic	None Detected
179 B221720.80	Sample Submitted for TEM Analysis				

LEGEND: Non-Anth = Non-Asbestiform Anthophyllite
 Non-Trem = Non-Asbestiform Tremolite
 Calc Carb = Calcium Carbonate

METHOD: EPA 600 / R93 / 116 and EPA 600 / M4-82 / 020

REPORTING LIMIT: <1% by visual estimation

REPORTING LIMIT FOR POINT COUNTS: 0.25% by 400 Points or 0.1% by 1,000 Points

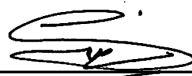
REGULATORY LIMIT: >1% by weight

Due to the limitations of the EPA 600 method, nonfriable organically bound materials (NOBs) such as vinyl floor tiles can be difficult to analyze via polarized light microscopy (PLM). EPA recommends that all NOBs analyzed by PLM, and found not to contain asbestos, be further analyzed by Transmission Electron Microscopy (TEM). Please note that PLM analysis of dust and soil samples for asbestos is not covered under NVLAP accreditation. *Estimated measurement of uncertainty is available on request.*

This report relates only to the samples tested or analyzed and may not be reproduced, except in full, without written approval by Eurofins CEI. Eurofins CEI makes no warranty representation regarding the accuracy of client submitted information in preparing and presenting analytical results. Interpretation of the analytical results is the sole responsibility of the client. Samples were received in acceptable condition unless otherwise noted. This report may not be used by the client to claim product endorsement by NVLAP or any other agency of the U.S. Government.

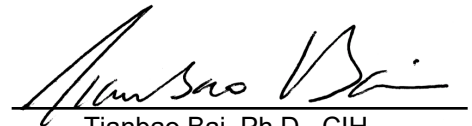
Information provided by customer includes customer sample ID and sample description.

ANALYST:



Saithya Painkal

APPROVED BY:



Tianbao Bai, Ph.D., CIH
Laboratory Director



CHAIN OF CUSTODY

80

730 S.E. Maynard Rd., Cary, NC 27511
 Tel: 919-481-1413; Fax: 919-481-1442

LAB USE ONLY:
CEI Lab Code: B221720
CEI Lab I.D. Range:

COMPANY CONTACT INFORMATION

Company: CROSSROADS ENVIRONMENTAL, LLC	Client #:
Address: 1258 BOILING SPRINGS RD.	Job Contact: Evans Harris
SPARTANBURG, SC 29303	Email: RESULTS@CROSSROADSENV.NET
	Tel: 864-541-8736
Project Name: Byrnes HS	Fax: 864-541-8776
Project ID #: 20759-IN	P.O. #:

ASBESTOS	METHOD	4 HR*	8 HR*	24 HR	2 DAY	3 DAY	5 DAY
PLM BULK	EPA 600			X			
TEM BULK	CHATFIELD			X			
PLM POINT COUNT (400)	EPA 600						
PLM POINT COUNT (1000)	EPA 600						
PLM GRAVIMETRIC	EPA 600						
PLM GRAV w POINT COUNT	EPA 600						
OTHER:							

POSITIVE STOP ANALYSIS	X
SOUTH CAROLINA SAMPLES	X
NORTH CAROLINA SAMPLES	

TEM INSTRUCTIONS	
BEGIN TEM ANALYSIS AFTER NEGATIVE PLM	X
ANALYZE TEM SAMPLES SIMULTANEOUSLY WITH PLM	

NO STOP POSITIVE ON SURFACING.

Accept Samples
 Reject Samples

Relinquished By:	Date/Time	Received By:	Date/Time
Evans Harris	1/21/22 @ 17:00	CB	1/24
			10:00

*Call to confirm RUSH analysis. Samples will be disposed of 30 days after analysis.



SAMPLING FORM

COMPANY CONTACT INFORMATION	
Crossroads Environmental, LLC	Job Contact: Evans Harris
Project Name: Byrnes HS	
Project ID #: 20759-IN	Tel: 864-541-8736

SAMPLE ID#	HA	DESCRIPTION / LOCATION	TEST			
			PLM		TEM	
			PLM		TEM	
100 /	01	12" Burnt Orange VFT	PLM	X	TEM	
101 /	01	12" Burnt Orange VFT	PLM	X	TEM	
102 /	01	12" Burnt Orange VFT	PLM		TEM	X
103 /	02	2' x 2' ceiling tile	PLM	X	TEM	
104 /	02	2' x 2' ceiling tile	PLM	X	TEM	
105 /	02	2' x 2' ceiling tile	PLM	X	TEM	
106 /	03	2' x 2' ceiling tile	PLM	X	TEM	
107 /	03	2' x 2' ceiling tile	PLM	X	TEM	
108 /	03	2' x 2' ceiling tile	PLM	X	TEM	
109 /	04	12" Gray VFT	PLM	X	TEM	
110 /	04	12" Gray VFT	PLM	X	TEM	
111 /	04	12" Gray VFT	PLM		TEM	X
112 /	05	Block filler	PLM	X	TEM	
113 /	05	Block filler	PLM	X	TEM	
114 /	05	Block filler	PLM	X	TEM	
115 /	05	Block filler	PLM	X	TEM	
116 /	05	Block filler	PLM	X	TEM	
117 /	06	Gray cove base adhesive (adhesive only)	PLM	X	TEM	
118 /	06	Gray cove base adhesive (adhesive only)	PLM	X	TEM	
119 /	06	Gray cove base adhesive (adhesive only)	PLM		TEM	X
120 /	07	Gray metal duct mastic	PLM	X	TEM	
121 /	07	Gray metal duct mastic	PLM	X	TEM	
122 /	07	Gray metal duct mastic	PLM		TEM	X
123 /	08	Lab countertop	PLM	X	TEM	
124 /	08	Lab countertop	PLM	X	TEM	
125 /	08	Lab countertop	PLM		TEM	X
126 /	09	Transite sink	PLM	X	TEM	
127 /	09	Transite sink	PLM	X	TEM	
128 /	09	Transite sink	PLM		TEM	X
129 /	10	12" Blue/Gray VFT	PLM	X	TEM	
130 /	10	12" Blue/Gray VFT	PLM	X	TEM	
131 /	10	12" Blue/Gray VFT	PLM		TEM	X

B221720



SAMPLING FORM

COMPANY CONTACT INFORMATION	
Crossroads Environmental, LLC	Job Contact: Evans Harris
Project Name: Byrnes HS	
Project ID #: 20759-IN	Tel: 864-541-8736

SAMPLE ID#	HA	DESCRIPTION / LOCATION	TEST			
			PLM	X	TEM	
132 ✓	11	Black mastic	PLM	X	TEM	
133 ✓	11	Black mastic	PLM	X	TEM	
134 ✓	11	Black mastic	PLM		TEM	X
135 ✓	12	White duct mastic	PLM	X	TEM	
136 ✓	12	White duct mastic	PLM	X	TEM	
137 ✓	12	White duct mastic	PLM		TEM	X
138 ✓	13	Carpet glue	PLM	X	TEM	
139 ✓	13	Carpet glue	PLM	X	TEM	
140 ✓	13	Carpet glue	PLM		TEM	X
141 ✓	14	Drywall and joint comp.	PLM	X	TEM	
142 ✓	14	Drywall and joint comp.	PLM	X	TEM	
143 ✓	14	Drywall and joint comp.	PLM	X	TEM	
144 ✓	16	12" Tan/Off-white VFT	PLM	X	TEM	
145 ✓	16	12" Tan/Off-white VFT	PLM	X	TEM	
146 ✓	16	12" Tan/Off-white VFT	PLM		TEM	X
147 ✓	17	4" Brown cove adhesive (adhesive only)	PLM	X	TEM	
148 ✓	17	4" Brown cove adhesive (adhesive only)	PLM	X	TEM	
149 ✓	17	4" Brown cove adhesive (adhesive only)	PLM		TEM	X
150 ✓	18	12" Tan/Beige VFT	PLM	X	TEM	
151 ✓	18	12" Tan/Beige VFT	PLM	X	TEM	
152 ✓	18	12" Tan/Beige VFT	PLM		TEM	X
153 ✓	19	2' x 4' ceiling tile	PLM	X	TEM	
154 ✓	19	2' x 4' ceiling tile	PLM	X	TEM	
155 ✓	19	2' x 4' ceiling tile	PLM	X	TEM	
156 ✓	20	12" Gray VFT	PLM	X	TEM	
157 ✓	20	12" Gray VFT	PLM	X	TEM	
158 ✓	20	12" Gray VFT	PLM		TEM	X
159 ✓	21	Carpet glue	PLM	X	TEM	
160 ✓	21	Carpet glue	PLM	X	TEM	
161 ✓	21	Carpet glue	PLM		TEM	X
162 ✓	22	Black mastic	PLM		TEM	
163 ✓	22	Black mastic	PLM		TEM	
164 ✓	22	Black mastic	PLM		TEM	X
165 ✓	23	Blue cove adhesive (adhesive only)	PLM		TEM	



SAMPLING FORM

COMPANY CONTACT INFORMATION	
Crossroads Environmental, LLC	Job Contact: Evans Harris
Project Name: Byrnes HS	
Project ID #: 20759-IN	Tel: 864-541-8736

SAMPLE ID#	HA	DESCRIPTION / LOCATION	TEST			
			PLM	X	TEM	
166 ✓	23	Blue cove adhesive (adhesive only)	PLM	X	TEM	
167 ✓	23	Blue cove adhesive (adhesive only)	PLM		TEM	X
168 ✓	24	4" Brown cove adhesive (adhesive only)	PLM	X	TEM	
169 ✓	24	4" Brown cove adhesive (adhesive only)	PLM	X	TEM	
170 ✓	24	4" Brown cove adhesive (adhesive only)	PLM		TEM	X
171 ✓	25	Spray-applied fireproofing	PLM	X	TEM	
172 ✓	25	Spray-applied fireproofing	PLM	X	TEM	
173 ✓	25	Spray-applied fireproofing	PLM	X	TEM	
174 ✓	26	12" x 12" Dark Gray VFT	PLM	X	TEM	
175 ✓	26	12" x 12" Dark Gray VFT	PLM	X	TEM	
176 ✓	26	12" x 12" Dark Gray VFT	PLM		TEM	X
177 ✓	27	Tan duct mastic	PLM	X	TEM	
178 ✓	27	Tan duct mastic	PLM	X	TEM	
179 ✓	27	Tan duct mastic	PLM		TEM	X
			PLM		TEM	
			PLM		TEM	
			PLM		TEM	
			PLM		TEM	
			PLM		TEM	
			PLM		TEM	
			PLM		TEM	
			PLM		TEM	
			PLM		TEM	
			PLM		TEM	
			PLM		TEM	
			PLM		TEM	
			PLM		TEM	
			PLM		TEM	
			PLM		TEM	
			PLM		TEM	

January 28, 2022

Crossroads Environmental
1258 Boiling Springs Road
Spartanburg, SC 29303

CLIENT PROJECT: Byrnes HS, 20759-IN
CEI LAB CODE: B222054

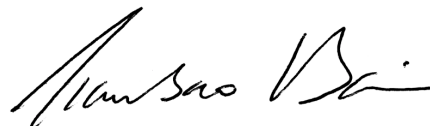
Dear Customer:

Enclosed are asbestos analysis results for PLM Bulk samples received at our laboratory on January 27, 2022. The samples were analyzed for asbestos using polarizing light microscopy (PLM) per the EPA 600 Method.

Sample results containing >1% asbestos are considered asbestos-containing materials (ACMs) per EPA regulatory requirements. The detection limit for the EPA 600 Method is <1% asbestos by weight as determined by visual estimation.

Thank you for your business and we look forward to continuing good relations.

Kind Regards,



Tianbao Bai, Ph.D., CIH
Laboratory Director



CEI

ASBESTOS ANALYTICAL REPORT

By: Polarized Light Microscopy

Prepared for

Crossroads Environmental

CLIENT PROJECT: Byrnes HS, 20759-IN

LAB CODE: B222054

TEST METHOD: EPA 600 / R93 / 116 and EPA 600 / M4-82 / 020

REPORT DATE: 01/28/22

TOTAL SAMPLES ANALYZED: 5

SAMPLES >1% ASBESTOS: 3



CEI

Asbestos Report Summary

By: POLARIZING LIGHT MICROSCOPY

PROJECT: Byrnes HS, 20759-IN

LAB CODE: B222054

METHOD: EPA 600 / R93 / 116 and EPA 600 / M4-82 / 020

Client ID	Layer	Lab ID	Color	Sample Description	ASBESTOS %
180	Layer 1	B27122	Black	Roof Field-tar	None Detected
	Layer 2	B27122	Black	Roof Field-felt	None Detected
	Layer 3	B27122	Black	Roof Field-felt	Chrysotile 10%
	Layer 4	B27122	White	Roof Field-gypsum	None Detected
	Layer 5	B27122	Brown	Roof Field-ceiling Tile	None Detected
181		B27123		Sample Not Analyzed per COC	
182		B27124		Sample Not Analyzed per COC	
183	Layer 1	B27125	Black	Perimeter Flashing	Chrysotile 10%
	Layer 2	B27125	Brown	Insulation	None Detected
184		B27126		Sample Not Analyzed per COC	
185		B27127		Sample Not Analyzed per COC	
186	Layer 1	B27128	Black	Mechanical Flashing	Chrysotile 10%
	Layer 2	B27128	Brown	Insulation	None Detected
187		B27129		Sample Not Analyzed per COC	
188		B27130		Sample Not Analyzed per COC	
189		B27131	Black	Shingle Material	None Detected
190		B27132	Black	Shingle Material	None Detected
191		B27133		Sample Submitted for TEM Analysis	

ASBESTOS BULK ANALYSIS

By: POLARIZING LIGHT MICROSCOPY

Client: Crossroads Environmental
 1258 Boiling Springs Road
 Spartanburg, SC 29303

Lab Code: B222054
Date Received: 01-27-22
Date Analyzed: 01-28-22
Date Reported: 01-28-22

Project: Byrnes HS, 20759-IN

ASBESTOS BULK PLM, EPA 600 METHOD

Client ID Lab ID	Lab Description	Lab Attributes	NON-ASBESTOS COMPONENTS				ASBESTOS %
			Fibrous		Non-Fibrous		
180 Layer 1 B27122	Roof Field-tar	Heterogeneous Black Fibrous Bound	15%	Cellulose	85%	Tar	None Detected
Layer 2 B27122	Roof Field-felt	Heterogeneous Black Fibrous Bound	80%	Cellulose	20%	Tar	None Detected
Layer 3 B27122	Roof Field-felt	Heterogeneous Black Fibrous Bound			90%	Tar	10% Chrysotile
Layer 4 B27122	Roof Field-gypsum	Heterogeneous White Fibrous Bound			100%	Gypsum	None Detected
Layer 5 B27122	Roof Field-ceiling Tile	Heterogeneous Brown Fibrous Loosely Bound	100%	Cellulose			None Detected
181 B27123	Sample Not Analyzed per COC						
182 B27124	Sample Not Analyzed per COC						
183 Layer 1 B27125	Perimeter Flashing	Heterogeneous Black Fibrous Bound	20%	Cellulose	70%	Tar	10% Chrysotile



CEI

ASBESTOS BULK ANALYSIS

By: POLARIZING LIGHT MICROSCOPY

Client: Crossroads Environmental
1258 Boiling Springs Road
Spartanburg, SC 29303

Lab Code: B222054
Date Received: 01-27-22
Date Analyzed: 01-28-22
Date Reported: 01-28-22

Project: Byrnes HS, 20759-IN

ASBESTOS BULK PLM, EPA 600 METHOD

Client ID Lab ID	Lab Description	Lab Attributes	NON-ASBESTOS COMPONENTS		ASBESTOS %
			Fibrous	Non-Fibrous	
Layer 2 B27125	Insulation	Heterogeneous Brown Fibrous Loosely Bound	100%	Cellulose	None Detected
184 B27126	Sample Not Analyzed per COC				
185 B27127	Sample Not Analyzed per COC				
186 Layer 1 B27128	Mechanical Flashing	Heterogeneous Black Fibrous Bound	90%	Tar	10% Chrysotile
Layer 2 B27128	Insulation	Heterogeneous Brown Fibrous Loosely Bound	100%	Cellulose	None Detected
187 B27129	Sample Not Analyzed per COC				
188 B27130	Sample Not Analyzed per COC				
189 B27131	Shingle Material	Heterogeneous Black Fibrous Bound	85%	Tar 15% Silicates	None Detected
190 B27132	Shingle Material	Heterogeneous Black Fibrous Bound	85%	Tar 15% Silicates	None Detected
191 B27133	Sample Submitted for TEM Analysis				

LEGEND: Non-Anth = Non-Asbestiform Anthophyllite
Non-Trem = Non-Asbestiform Tremolite
Calc Carb = Calcium Carbonate

METHOD: EPA 600 / R93 / 116 and EPA 600 / M4-82 / 020

REPORTING LIMIT: <1% by visual estimation

REPORTING LIMIT FOR POINT COUNTS: 0.25% by 400 Points or 0.1% by 1,000 Points

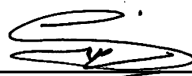
REGULATORY LIMIT: >1% by weight

Due to the limitations of the EPA 600 method, nonfriable organically bound materials (NOBs) such as vinyl floor tiles can be difficult to analyze via polarized light microscopy (PLM). EPA recommends that all NOBs analyzed by PLM, and found not to contain asbestos, be further analyzed by Transmission Electron Microscopy (TEM). Please note that PLM analysis of dust and soil samples for asbestos is not covered under NVLAP accreditation. *Estimated measurement of uncertainty is available on request.*

This report relates only to the samples tested or analyzed and may not be reproduced, except in full, without written approval by Eurofins CEI. Eurofins CEI makes no warranty representation regarding the accuracy of client submitted information in preparing and presenting analytical results. Interpretation of the analytical results is the sole responsibility of the client. Samples were received in acceptable condition unless otherwise noted. This report may not be used by the client to claim product endorsement by NVLAP or any other agency of the U.S. Government.

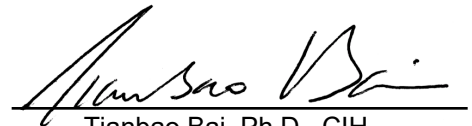
Information provided by customer includes customer sample ID and sample description.

ANALYST:



Saithya Paikal

APPROVED BY:



Tianbao Bai, Ph.D., CIH
Laboratory Director





730 S.E. Maynard Rd., Cary, NC 27511
 Tel: 919-481-1413; Fax: 919-481-1442

CHAIN OF CUSTODY

12

LAB USE ONLY:	
CEI Lab Code:	B222054
CEI Lab I.D. Range:	B27122- B27133

COMPANY CONTACT INFORMATION

Company: CROSSROADS ENVIRONMENTAL, LLC	Client #:
Address: 1258 BOILING SPRINGS RD.	Job Contact: Evans Harris
SPARTANBURG, SC 29303	Email: RESULTS@CROSSROADSENV.NET
	Tel: 864-541-8736
Project Name: Byrnes HS	Fax: 864-541-8776
Project ID #: 20759-IN	P.O. #:

ASBESTOS	METHOD	4 HR*	8 HR*	24 HR	2 DAY	3 DAY	5 DAY
PLM BULK	EPA 600			X			
TEM BULK	CHATFIELD			X			
PLM POINT COUNT (400)	EPA 600						
PLM POINT COUNT (1000)	EPA 600						
PLM GRAVIMETRIC	EPA 600						
PLM GRAV w POINT COUNT	EPA 600						
OTHER:							

POSITIVE STOP ANALYSIS	X
SOUTH CAROLINA SAMPLES	X
NORTH CAROLINA SAMPLES	

TEM INSTRUCTIONS	
BEGIN TEM ANALYSIS AFTER NEGATIVE PLM	X
ANALYZE TEM SAMPLES SIMULTANEOUSLY WITH PLM	

NO STOP POSITIVE ON SURFACING.

Accept Samples
 Reject Samples

Relinquished By:	Date/Time	Received By:	Date/Time
<i>Li Hous</i>	1/26/22	CB	1/27 10:00

*Call to confirm RUSH analysis.

Samples will be disposed of 30 days after analysis



SAMPLING FORM

COMPANY CONTACT INFORMATION	
Crossroads Environmental, LLC	Job Contact: Evans Harris
Project Name: Byrnes HS	
Project ID #: 20759-IN	Tel: 864-541-8736

SAMPLE ID#	HA	DESCRIPTION / LOCATION	TEST			
			PLM	X	TEM	
180	28	Roof Field	PLM	X	TEM	
181	28	Roof Field	PLM	X	TEM	
182	28	Roof Field	PLM		TEM	X
183	29	Perimeter Flashing	PLM	X	TEM	
184	29	Perimeter Flashing	PLM	X	TEM	
185	29	Perimeter Flashing	PLM		TEM	X
186	30	Mechanical Flashing	PLM	X	TEM	
187	30	Mechanical Flashing	PLM	X	TEM	
188	30	Mechanical Flashing	PLM		TEM	X
189	31	Black Shingle Material	PLM	X	TEM	
190	31	Black Shingle Material	PLM	X	TEM	
191	31	Black Shingle Material	PLM		TEM	X

January 26, 2022

Crossroads Environmental
1258 Boiling Springs Road
Spartanburg, SC 29303

CLIENT PROJECT: Byrnes HS, 20759-IN
LAB CODE: T220188

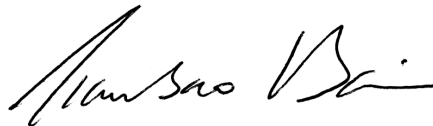
Dear Customer:

Enclosed are asbestos analysis results for TEM bulk samples received at our laboratory on January 25, 2022. The samples were analyzed for asbestos using transmission electron microscopy (TEM) per Chatfield/EPA 600/R-93/116 Sec. 2.5.5.1 method.

Sample results containing > 1% asbestos are considered asbestos-containing materials (ACMs) per the EPA regulatory requirements. The detection limit for the TEM Chatfield/EPA 600/R-93/116 Sec. 2.5.5.1 method is <1% depending on the processed weight and constituents of the sample.

Thank you for your business and we look forward to continuing good relations.

Kind Regards,



Tianbao Bai, Ph.D., CIH
Laboratory Director



CEI

ASBESTOS ANALYTICAL REPORT
By: Transmission Electron Microscopy

Prepared for

Crossroads Environmental

CLIENT PROJECT: Byrnes HS, 20759-IN

LAB CODE: T220188

TEST METHOD: Bulk Chatfield
EPA 600 / R93 / 116 Sec. 2.5.5.1

REPORT DATE: 01/26/22



CEI

ASBESTOS BULK ANALYSIS

By: TRANSMISSION ELECTRON MICROSCOPY

Client: Crossroads Environmental
1258 Boiling Springs Road
Spartanburg, SC 29303

Lab Code: T220188
Date Received: 01-25-22
Date Analyzed: 01-26-22
Date Reported: 01-26-22

Project: Byrnes HS, 20759-IN

TEM BULK CHATFIELD / EPA 600 / R93 / 116 Sec. 2.5.5.1

Client ID Lab ID	Material Description	Sample Weight (g)	Organic Material %	Acid Soluble Material %	Acid Insoluble Material %	Asbestos %
102 T35370	Orange VFT	0.743	16.4	81.7	1.9	None Detected
111 T35371	Gray VFT	0.936	16.9	36	47.1	None Detected
111 T35372	Yellow Mastic	0.215	62.3	22.3	15.4	<1% Chrysotile
119 T35373	Cream Covebase Adhesive	0.273	37.4	53.1	9.5	None Detected
122 T35374	Gray Duct Mastic	0.425	39.3	58.6	2.1	None Detected
125 T35375	Black Lab Countertop	0.242	27.3	1.2	71.5	None Detected
128 T35376	Gray Transite Sink	0.443	3.4	7.2	89.4	None Detected
131 T35377	Blue Gray VFT	01.091	17.4	80.3	2.3	None Detected
131 T35378	Yellow Mastic	0.207	44.9	14.5	40.6	None Detected
140 T35379	Yellow Carpet Glue	0.381	84.3	11.3	4.4	None Detected
146 T35380	Tan Off White VFT	0.61	17.4	80.3	2.3	<1% Chrysotile
149 T35382	Brown Covebase Adhesive	0.283	49.1	3.2	47.7	None Detected



CEI

ASBESTOS BULK ANALYSIS

By: TRANSMISSION ELECTRON MICROSCOPY

Client: Crossroads Environmental
1258 Boiling Springs Road
Spartanburg, SC 29303

Lab Code: T220188
Date Received: 01-25-22
Date Analyzed: 01-26-22
Date Reported: 01-26-22

Project: Byrnes HS, 20759-IN

TEM BULK CHATFIELD / EPA 600 / R93 / 116 Sec. 2.5.5.1

Client ID Lab ID	Material Description	Sample Weight (g)	Organic Material %	Acid Soluble Material %	Acid Insoluble Material %	Asbestos %
149 T35383	Cream Covebase Adhesive	0.291	31.6	61.9	6.5	None Detected
152 T35384	Tan Beige VFT	0.8193	18.9	80.7	.4	None Detected
152 T35385	Yellow Mastic	0.165	51.5	32.7	15.8	None Detected
152 T35386	Off White VFT	0.886	18.7	80.5	.8	None Detected
152 T35387	Yellow Mastic	0.21	51.9	8.6	39.5	None Detected
158 T35388	Gray VFT	01.027	15.8	83.9	.3	None Detected
158 T35389	Black Mastic	0.1724	37.1	62.3	.6	None Detected
161 T35390	Carpet Glue	0.2977	72.6	3.9	23.5	None Detected
167 T35391	Cream Covebase Adhesive	0.2779	51.1	20.1	28.8	None Detected
170 T35392	Brown Covebase Adhesive	0.6244	33	66.4	.6	None Detected
176 T35393	Dark Gray VFT	0.779	28.1	52.4	19.5	None Detected
176 T35394	Yellow Mastic	0.18	0	91.7	8.3	None Detected



CEI

ASBESTOS BULK ANALYSIS

By: TRANSMISSION ELECTRON MICROSCOPY

Client: Crossroads Environmental
1258 Boiling Springs Road
Spartanburg, SC 29303

Lab Code: T220188
Date Received: 01-25-22
Date Analyzed: 01-26-22
Date Reported: 01-26-22

Project: Byrnes HS, 20759-IN

TEM BULK CHATFIELD / EPA 600 / R93 / 116 Sec. 2.5.5.1

Client ID Lab ID	Material Description	Sample Weight (g)	Organic Material %	Acid Soluble Material %	Acid Insoluble Material %	Asbestos %
179 T35395	Tan Duct Mastic	0.2868	52	6.9	41.1	None Detected

LEGEND: None

METHOD: CHATFIELD & EPA/600/R-93/116 Sec. 2.5.5.1

LIMIT OF DETECTION: Varies with the weight and constituents of the sample (<1%)

REGULATORY LIMIT: >1% by weight

This report relates only to the samples tested or analyzed and may not be reproduced, except in full, without written approval by Eurofins CEI. Eurofins CEI makes no warranty representation regarding the accuracy of client submitted information in preparing and presenting analytical results. Interpretation of the analytical results is the sole responsibility of the client. *Estimated measurement of uncertainty is available on request.* Samples were received in acceptable condition unless otherwise noted.

Information provided by customer includes customer sample ID, location, volume and area as well as date and time of sampling.

ANALYST: Brunilda Gjoka
Brunilda Gjoka

APPROVED BY: Tianbao Bai
Tianbao Bai, Ph.D., CIH
Laboratory Director



730 S.E. Maynard Rd., Cary, NC 27511
 Tel: 919-481-1413; Fax: 919-481-1442

CHAIN OF CUSTODY

80

LAB USE ONLY:	T220188
CEI Lab Code:	B221720
CEI Lab I.D. Range:	T35370-395

26

COMPANY CONTACT INFORMATION

Company: CROSSROADS ENVIRONMENTAL, LLC	Client #:
Address: 1258 BOILING SPRINGS RD.	Job Contact: Evans Harris
SPARTANBURG, SC 29303	Email: RESULTS@CROSSROADSENV.NET
	Tel: 864-541-8736
Project Name: Byrnes HS	Fax: 864-541-8776
Project ID #: 20759-IN	P.O. #:

ASBESTOS	METHOD	4 HR*	8 HR*	24 HR	2 DAY	3 DAY	5 DAY
PLM BULK	EPA 600			X			
TEM BULK	CHATFIELD			X			
PLM POINT COUNT (400)	EPA 600						
PLM POINT COUNT (1000)	EPA 600						
PLM GRAVIMETRIC	EPA 600						
PLM GRAV w POINT COUNT	EPA 600						
OTHER:							

POSITIVE STOP ANALYSIS	X
SOUTH CAROLINA SAMPLES	X
NORTH CAROLINA SAMPLES	

TEM INSTRUCTIONS	
BEGIN TEM ANALYSIS AFTER NEGATIVE PLM	X
ANALYZE TEM SAMPLES SIMULTANEOUSLY WITH PLM	

NO STOP POSITIVE ON SURFACING.

Accept Samples
 Reject Samples

Relinquished By:	Date/Time	Received By:	Date/Time
Evans Harris	1/21/22 @ 17:00	CB	1/24
SP	1/21/22 11:33 am		1/24

*Call to confirm RUSH analysis. Samples will be disposed of 30 days after analysis.



SAMPLING FORM

COMPANY CONTACT INFORMATION	
Crossroads Environmental, LLC	Job Contact: Evans Harris
Project Name: Byrnes HS	
Project ID #: 20759-IN	Tel: 864-541-8736

SAMPLE ID#	HA	DESCRIPTION / LOCATION	TEST			
			PLM		TEM	
			PLM		TEM	
100 /	01	12" Burnt Orange VFT	PLM	X	TEM	
101 /	01	12" Burnt Orange VFT	PLM	X	TEM	
102 /	01	12" Burnt Orange VFT	PLM		TEM	X
103 /	02	2' x 2' ceiling tile	PLM	X	TEM	
104 /	02	2' x 2' ceiling tile	PLM	X	TEM	
105 /	02	2' x 2' ceiling tile	PLM	X	TEM	
106 /	03	2' x 2' ceiling tile	PLM	X	TEM	
107 /	03	2' x 2' ceiling tile	PLM	X	TEM	
108 /	03	2' x 2' ceiling tile	PLM	X	TEM	
109 /	04	12" Gray VFT	PLM	X	TEM	
110 /	04	12" Gray VFT	PLM	X	TEM	
111 /	04	12" Gray VFT	PLM		TEM	X
112 /	05	Block filler	PLM	X	TEM	
113 /	05	Block filler	PLM	X	TEM	
114 /	05	Block filler	PLM	X	TEM	
115 /	05	Block filler	PLM	X	TEM	
116 /	05	Block filler	PLM	X	TEM	
117 /	06	Gray cove base adhesive (adhesive only)	PLM	X	TEM	
118 /	06	Gray cove base adhesive (adhesive only)	PLM	X	TEM	
119 /	06	Gray cove base adhesive (adhesive only)	PLM		TEM	X
120 /	07	Gray metal duct mastic	PLM	X	TEM	
121 /	07	Gray metal duct mastic	PLM	X	TEM	
122 /	07	Gray metal duct mastic	PLM		TEM	X
123 /	08	Lab countertop	PLM	X	TEM	
124 /	08	Lab countertop	PLM	X	TEM	
125 /	08	Lab countertop	PLM		TEM	X
126 /	09	Transite sink	PLM	X	TEM	
127 /	09	Transite sink	PLM	X	TEM	
128 /	09	Transite sink	PLM		TEM	X
129 /	10	12" Blue/Gray VFT	PLM	X	TEM	
130 /	10	12" Blue/Gray VFT	PLM	X	TEM	
131 /	10	12" Blue/Gray VFT	PLM		TEM	X

024112



SAMPLING FORM

COMPANY CONTACT INFORMATION	
Crossroads Environmental, LLC	Job Contact: Evans Harris
Project Name: Byrnes HS	
Project ID #: 20759-IN	Tel: 864-541-8736

SAMPLE ID#	HA	DESCRIPTION / LOCATION	TEST			
			PLM	X	TEM	
132 ✓	11	Black mastic	PLM	X	TEM	
133 ✓	11	Black mastic	PLM	X	TEM	
134 ✓	11	Black mastic	PLM		TEM	X
135 ✓	12	White duct mastic	PLM	X	TEM	
136 ✓	12	White duct mastic	PLM	X	TEM	
137 ✓	12	White duct mastic	PLM		TEM	X
138 ✓	13	Carpet glue	PLM	X	TEM	
139 ✓	13	Carpet glue	PLM	X	TEM	
140 ✓	13	Carpet glue	PLM		TEM	X
141 ✓	14	Drywall and joint comp.	PLM	X	TEM	
142 ✓	14	Drywall and joint comp.	PLM	X	TEM	
143 ✓	14	Drywall and joint comp.	PLM	X	TEM	
144 ✓	16	12" Tan/Off-white VFT	PLM	X	TEM	
145 ✓	16	12" Tan/Off-white VFT	PLM	X	TEM	
146 ✓	16	12" Tan/Off-white VFT	PLM		TEM	X
147 ✓	17	4" Brown cove adhesive (adhesive only)	PLM	X	TEM	
148 ✓	17	4" Brown cove adhesive (adhesive only)	PLM	X	TEM	
149 ✓	17	4" Brown cove adhesive (adhesive only)	PLM		TEM	X
150 ✓	18	12" Tan/Beige VFT	PLM	X	TEM	
151 ✓	18	12" Tan/Beige VFT	PLM	X	TEM	
152 ✓	18	12" Tan/Beige VFT	PLM		TEM	X
153 ✓	19	2' x 4' ceiling tile	PLM	X	TEM	
154 ✓	19	2' x 4' ceiling tile	PLM	X	TEM	
155 ✓	19	2' x 4' ceiling tile	PLM	X	TEM	
156 ✓	20	12" Gray VFT	PLM	X	TEM	
157 ✓	20	12" Gray VFT	PLM	X	TEM	
158 ✓	20	12" Gray VFT	PLM		TEM	X
159 ✓	21	Carpet glue	PLM	X	TEM	
160 ✓	21	Carpet glue	PLM	X	TEM	
161 ✓	21	Carpet glue	PLM		TEM	X
162 ✓	22	Black mastic	PLM		TEM	
163 ✓	22	Black mastic	PLM		TEM	
164 ✓	22	Black mastic	PLM		TEM	X
165 ✓	23	Blue cove adhesive (adhesive only)	PLM		TEM	



SAMPLING FORM

COMPANY CONTACT INFORMATION	
Crossroads Environmental, LLC	Job Contact: Evans Harris
Project Name: Byrnes HS	
Project ID #: 20759-IN	Tel: 864-541-8736

SAMPLE ID#	HA	DESCRIPTION / LOCATION	TEST			
			PLM	X	TEM	
166 ✓	23	Blue cove adhesive (adhesive only)	PLM	X	TEM	
167 ✓	23	Blue cove adhesive (adhesive only)	PLM		TEM	X
168 ✓	24	4" Brown cove adhesive (adhesive only)	PLM	X	TEM	
169 ✓	24	4" Brown cove adhesive (adhesive only)	PLM	X	TEM	
170 ✓	24	4" Brown cove adhesive (adhesive only)	PLM		TEM	X
171 ✓	25	Spray-applied fireproofing	PLM	X	TEM	
172 ✓	25	Spray-applied fireproofing	PLM	X	TEM	
173 ✓	25	Spray-applied fireproofing	PLM	X	TEM	
174 ✓	26	12" x 12" Dark Gray VFT	PLM	X	TEM	
175 ✓	26	12" x 12" Dark Gray VFT	PLM	X	TEM	
176 ✓	26	12" x 12" Dark Gray VFT	PLM		TEM	X
177 ✓	27	Tan duct mastic	PLM	X	TEM	
178 ✓	27	Tan duct mastic	PLM	X	TEM	
179 ✓	27	Tan duct mastic	PLM		TEM	X
			PLM		TEM	
			PLM		TEM	
			PLM		TEM	
			PLM		TEM	
			PLM		TEM	
			PLM		TEM	
			PLM		TEM	
			PLM		TEM	
			PLM		TEM	
			PLM		TEM	

January 31, 2022

Crossroads Environmental
1258 Boiling Springs Road
Spartanburg, SC 29303

CLIENT PROJECT: Byrnes HS, 20759-IN
LAB CODE: T220249

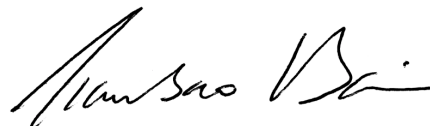
Dear Customer:

Enclosed are asbestos analysis results for TEM bulk samples received at our laboratory on January 28, 2022. The samples were analyzed for asbestos using transmission electron microscopy (TEM) per Chatfield/EPA 600/R-93/116 Sec. 2.5.5.1 method.

Sample results containing > 1% asbestos are considered asbestos-containing materials (ACMs) per the EPA regulatory requirements. The detection limit for the TEM Chatfield/EPA 600/R-93/116 Sec. 2.5.5.1 method is <1% depending on the processed weight and constituents of the sample.

Thank you for your business and we look forward to continuing good relations.

Kind Regards,



Tianbao Bai, Ph.D., CIH
Laboratory Director



CEI

ASBESTOS ANALYTICAL REPORT
By: Transmission Electron Microscopy

Prepared for

Crossroads Environmental

CLIENT PROJECT: Byrnes HS, 20759-IN

LAB CODE: T220249

TEST METHOD: Bulk Chatfield
EPA 600 / R93 / 116 Sec. 2.5.5.1

REPORT DATE: 01/31/22



CEI

ASBESTOS BULK ANALYSIS

By: TRANSMISSION ELECTRON MICROSCOPY

Client: Crossroads Environmental
1258 Boiling Springs Road
Spartanburg, SC 29303

Lab Code: T220249
Date Received: 01-28-22
Date Analyzed: 01-30-22
Date Reported: 01-31-22

Project: Byrnes HS, 20759-IN

TEM BULK CHATFIELD / EPA 600 / R93 / 116 Sec. 2.5.5.1

Client ID Lab ID	Material Description	Sample Weight (g)	Organic Material %	Acid Soluble Material %	Acid Insoluble Material %	Asbestos %
191 T35771	Black Shingle	0.427	96	3.3	.7	None Detected

LEGEND: None

METHOD: CHATFIELD & EPA/600/R-93/116 Sec. 2.5.5.1

LIMIT OF DETECTION: Varies with the weight and constituents of the sample (<1%)

REGULATORY LIMIT: >1% by weight

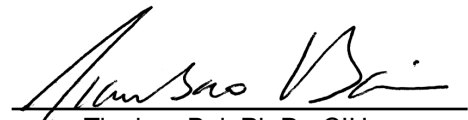
This report relates only to the samples tested or analyzed and may not be reproduced, except in full, without written approval by Eurofins CEI. Eurofins CEI makes no warranty representation regarding the accuracy of client submitted information in preparing and presenting analytical results. Interpretation of the analytical results is the sole responsibility of the client. *Estimated measurement of uncertainty is available on request.* Samples were received in acceptable condition unless otherwise noted.

Information provided by customer includes customer sample ID, location, volume and area as well as date and time of sampling.

ANALYST:


Brunilda Gjoka

APPROVED BY:


Tianbao Bai, Ph.D., CIH
Laboratory Director



730 S.E. Maynard Rd., Cary, NC 27511
 Tel: 919-481-1413; Fax: 919-481-1442

T220249
CHAIN OF CUSTODY

12

LAB USE ONLY:

CEI Lab Code: B222054

CEI Lab I.D. Range: B27122- B27133

COMPANY CONTACT INFORMATION

Company: CROSSROADS ENVIRONMENTAL, LLC	Client #:
Address: 1258 BOILING SPRINGS RD.	Job Contact: Evans Harris
SPARTANBURG, SC 29303	Email: RESULTS@CROSSROADSENV.NET
Project Name: Byrnes HS	Tel: 864-541-8736
Project ID #: 20759-IN	Fax: 864-541-8776
	P.O. #:

ASBESTOS	METHOD	4 HR*	8 HR*	24 HR	2 DAY	3 DAY	5 DAY
PLM BULK	EPA 600			X			
TEM BULK	CHATFIELD			X			
PLM POINT COUNT (400)	EPA 600						
PLM POINT COUNT (1000)	EPA 600						
PLM GRAVIMETRIC	EPA 600						
PLM GRAV w POINT COUNT	EPA 600						
OTHER:							

POSITIVE STOP ANALYSIS	X
SOUTH CAROLINA SAMPLES	X
NORTH CAROLINA SAMPLES	

TEM INSTRUCTIONS

BEGIN TEM ANALYSIS AFTER NEGATIVE PLM	X
ANALYZE TEM SAMPLES SIMULTANEOUSLY WITH PLM	

NO STOP POSITIVE ON SURFACING.

Accept Samples
 Reject Samples

Relinquished By:	Date/Time	Received By:	Date/Time
<i>Li Hua</i>	1/26/22	<i>CB</i>	1/27 10:00
<i>SP 1/28/22</i>		<i>9-27 SP 1/28/22</i> <i>9-127 am</i>	

*Call to confirm RUSH analysis.

Samples will be disposed of 30 days after analysis



SAMPLING FORM

COMPANY CONTACT INFORMATION

Crossroads Environmental, LLC	Job Contact: Evans Harris
Project Name: Byrnes HS	
Project ID #: 20759-IN	Tel: 864-541-8736

SAMPLE ID#	HA	DESCRIPTION / LOCATION	TEST			
			PLM	X	TEM	
180	28	Roof Field	PLM	X	TEM	
181	28	Roof Field	PLM	X	TEM	
182	28	Roof Field	PLM		TEM	X
183	29	Perimeter Flashing	PLM	X	TEM	
184	29	Perimeter Flashing	PLM	X	TEM	
185	29	Perimeter Flashing	PLM		TEM	X
186	30	Mechanical Flashing	PLM	X	TEM	
187	30	Mechanical Flashing	PLM	X	TEM	
188	30	Mechanical Flashing	PLM		TEM	X
189	31	Black Shingle Material	PLM	X	TEM	
190	31	Black Shingle Material	PLM	X	TEM	
191	31	Black Shingle Material	PLM		TEM	X



CEI

Asbestos Report Summary

By: POLARIZING LIGHT MICROSCOPY

PROJECT: Byrnes HS, 20759-IN

LAB CODE: B222054

METHOD: EPA 600 / R93 / 116 and EPA 600 / M4-82 / 020

Client ID	Layer	Lab ID	Color	Sample Description	ASBESTOS %
180	Layer 1	B27122	Black	Roof Field-tar	None Detected
	Layer 2	B27122	Black	Roof Field-felt	None Detected
	Layer 3	B27122	Black	Roof Field-felt	Chrysotile 10%
	Layer 4	B27122	White	Roof Field-gypsum	None Detected
	Layer 5	B27122	Brown	Roof Field-ceiling Tile	None Detected
181		B27123		Sample Not Analyzed per COC	
182		B27124		Sample Not Analyzed per COC	
183	Layer 1	B27125	Black	Perimeter Flashing	Chrysotile 10%
	Layer 2	B27125	Brown	Insulation	None Detected
184		B27126		Sample Not Analyzed per COC	
185		B27127		Sample Not Analyzed per COC	
186	Layer 1	B27128	Black	Mechanical Flashing	Chrysotile 10%
	Layer 2	B27128	Brown	Insulation	None Detected
187		B27129		Sample Not Analyzed per COC	
188		B27130		Sample Not Analyzed per COC	
189		B27131	Black	Shingle Material	None Detected
190		B27132	Black	Shingle Material	None Detected
191		B27133		Sample Submitted for TEM Analysis	

SP
1/28/22

ATTACHMENT III
SAMPLE LOCATION SKETCH AND/OR PHOTOS



Untitled Map

Write a description for your map.

Legend



183 190
187 186
188 189

181 184

188 182
185

Google Earth
Image Landsat / Copernicus

100 ft



**ATTACHMENT IV
ACCREDITATION(S)**

SCDHEC ISSUED

Asbestos ID Card

Evans Harris



AIRSAMPLER	AS-00383
CONSULTBI	BI-01224
CONSULTPD	PD-00149

Expiration Date:
07/21/22
07/22/22
11/11/22

SCDHEC ISSUED

Asbestos ID Card

Kay H Horton



AIRSAMPLER	ASB-23067
CONSULTPD	ASB-23184
CONSULTMP	ASB-23394

Expiration Date:
10/03/22
11/11/22
11/10/22

DOCUMENT 00 31 32 - GEOTECHNICAL DATA

1.1 GEOTECHNICAL DATA

- A. This Document with its referenced attachments is part of the Procurement and Contracting Requirements for Project. They provide Owner's information for Bidders' convenience and are intended to supplement rather than serve in lieu of Bidders' own investigations. They are made available for Bidders' convenience and information. This Document and its attachments are not part of the Contract Documents.
- B. Because subsurface conditions indicated by the soil borings are a sampling in relation to the entire construction area, and for other reasons, the Owner, the Architect, the Architect's consultants, and the firm reporting the subsurface conditions do not warranty the conditions below the depths of the borings or that the strata logged from the borings are necessarily typical of the entire site. Any party using the information described in the soil borings and geotechnical report shall accept full responsibility for its use.
- C. Soil-boring data for Project, obtained by S&ME, Inc. , dated September 19, 2014 , is available for viewing as appended to this Document.
- D. A geotechnical investigation report for Project, prepared by S&ME, Inc. , dated September 19, 2014 , is available for viewing as appended to this Document.
 - 1. The opinions expressed in this report are those of a geotechnical engineer and represent interpretations of subsoil conditions, tests, and results of analyses conducted by a geotechnical engineer. Owner is not responsible for interpretations or conclusions drawn from the data.
 - 2. Any party using information described in the geotechnical report shall make additional test borings and conduct other exploratory operations that may be required to determine the character of subsurface materials that may be encountered.
- E. Related Requirements:
 - 1. Document 002113 "Instructions to Bidders" for the Bidder's responsibilities for examination of Project site and existing conditions.
 - 2. Document 003119 "Existing Condition Information" for information about existing conditions that is made available to bidders.
 - 3. Document 003126 "Existing Hazardous Material Information" for hazardous materials reports that are made available to bidders.

END OF DOCUMENT 00 31 32

GEOTECHNICAL SERVICES
J.F. BYRNES HIGH SCHOOL REDEVELOPEMENT
DUNCAN, SOUTH CAROLINA
S&ME Project No. 1426-14-105

Prepared For:

McMillan Pazdan Smith Architecture
127 Dunbar Street
Spartanburg, South Carolina 29306

Prepared By:



301 Zima Park Drive
Spartanburg, South Carolina 29301

September 19, 2014



September 19, 2014

McMillan Pazdan Smith Architecture
127 Dunbar Street
Spartanburg, S.C. 29306

Attention: Ms. Donza Mattison, AIA, Principal
(dmattison@mcmillanpazdansmith.com)

Reference: Geotechnical Services
J.F. Byrnes High School Redevelopment
150 E. Main Street
Duncan, South Carolina
S&ME Project No. 1426-14-105

Ladies and Gentlemen:

S&ME, Inc. (S&ME) has completed the subsurface exploration and geotechnical engineering evaluation for the proposed J.F. Byrnes High School Redevelopment (Phase I and II) in Duncan, South Carolina. The work was performed in general accordance with S&ME Proposal No. 14-1400504 dated June 27, 2014. The purposes of the subsurface exploration are to help determine subsurface conditions in the area of the Phase I and II additions, analyze these conditions and prepare geotechnical engineering recommendations regarding site grading, foundation support, retaining wall parameters, and seismic site class. The following report presents a brief description of the proposed project, the exploration procedures and findings, and recommendations regarding the above considerations.

It is our pleasure to work with McMillan Pazdan Smith Architecture. Should you have any questions regarding this report, we will be pleased to discuss them with you.

Sincerely,
S&ME, Inc.

Frank Morris, EI
Project Professional
fmorris@smeinc.com



Mike Revis, PE
Senior Engineer
mrevis@smeinc.com



FM/MR

S:\GEO TECH\2014\1426-14-105 (Byrnes HS Redev)\report

TABLE OF CONTENTS

<u>SECTION</u>	<u>PAGE</u>
1. PROJECT INFORMATION.....	1
1.1 PHASE I CONSTRUCTION.....	1
1.2 PHASE II CONSTRUCTION.....	1
2. EXPLORATION PROGRAM.....	2
2.1 FIELD WORK.....	2
2.2 LABORATORY.....	2
3. SITE CONDITIONS.....	3
3.1 SURFACE FEATURES.....	3
3.2 AREA GEOLOGY.....	4
3.3 SOIL STRATIGRAPHY.....	4
3.3.1 Surface Material.....	4
3.3.2 Strata I: Undocumented Existing Fill.....	5
3.3.3 Strata II: Residuum.....	5
3.3.4 Strata III: Partially Weathered Rock.....	5
3.3.5 Strata IV: Refusal Material.....	6
3.3.6 Subsurface Water.....	6
4. CONCLUSIONS AND RECOMMENDATIONS.....	6
4.1 SITE PREPARATION AND SHORING.....	7
4.1.1 Underground Storage Tank.....	7
4.1.2 Existing Fill.....	7
4.1.3 Silty and Micaceous Soils.....	7
4.1.4 Proofrolling.....	7
4.1.5 Underground Utility Lines.....	8
4.1.6 Shoring & Underpinning.....	8
4.2 FILL PLACEMENT AND COMPACTION.....	8
4.2.1 Use of Excavated Soils as Fill.....	9
4.2.2 Use of Off-Site Borrow Materials as Fill.....	9
4.2.3 Use of Excavated PWR.....	9
4.2.4 Silt and Micaceous Soils.....	9
4.3 EXCAVATION.....	10
4.3.1 Excavation Regulations.....	11
4.4 SUBGRADE REPAIR AND IMPROVEMENT METHODS.....	11
5. FOUNDATION RECOMMENDATIONS.....	11
5.1 DESIGN RECOMMENDATIONS.....	11
5.1.1 Phase I Foundations.....	11
5.1.2 Phase II Foundations.....	11
5.1.3 Foundation Construction Procedures/Observations.....	12
5.1.4 Floor Slab Support.....	12
5.2 SITE SEISMIC COEFFICIENT.....	13
5.3 RETAINING WALLS.....	13
5.3.1 Cast-in-Place Retaining Walls.....	13
5.3.2 Tie-Back Walls.....	14
5.4 CONSTRUCTION NEAR EXISTING BUILDINGS.....	14
6. PRE-CONSTRUCTION MEETING.....	14
7. LIMITATIONS OF REPORT.....	15

Important Information About Your Geotechnical Engineering Report

TABLES (Report)

Table 1 – Phase I Finished Floor Elevations

Table 2 – Provided Loading Schedule for Phase I Construction

Table 3 – Phase II Finished Floor Elevations

Table 4 – Surface Materials

Table 5 – CIP Retaining Wall Design Parameters

FIGURES

Figure 1 – Boring Location Plan

Figure 2 – Shear Wave Velocity Profile SW-1

PROFILES

Profile 1 – B-1, B-2, B-4, B-5, B-6, B-7, B-8, B-9

Profile 2 – B-3, B-5, B-4, B-12, B-13

APPENDIX

Legend to Soil Classification and Symbols

Boring Logs (13)

Field Testing Procedures

1. PROJECT INFORMATION

Based on our June 12, 2014 meeting with Ms. Donza Mattison with McMillan Pazdan Smith (MPS), we understand that two (2) J.F. Byrnes High School additions will be constructed in separate phases (I and II) by redeveloping the current campus.

1.1 Phase I Construction

Phase I of the project will include a multi-story classroom building (classroom tower) that will adjoin the area of the old gymnasium and existing classroom wing. The proposed building will be a two- to three-story structure with partial basement. A portion of the proposed structure will be separated by a basement/retaining wall with the lower level containing mechanical facilities. In order to construct this building, demolition to the old weight room and a portion of the existing main building (annex) will be required. Finished floor elevations (FFE) were provided by Ms. Mattison in an August 28, 2014 email correspondence (Refer to Table 1).

Table 1. Phase I Finished Floor Elevations

Level	FFE (ft.)
Main Level	871.16
Ground Level	856.83
Basement Level	843.40

Based on the recent site survey provided by Blackwood Associates, Inc., current grades close to the main building (annex), are approximately El. 869 ft. Therefore, a temporary shoring system (tie-back wall) is planned for constructing the below grade structures. Based on existing grades and the proposed finished basement floor elevation, a maximum cut of approximately 29 ft. will be required for footing construction. Shallow fill placement of about 5 ft. will likely be required in some areas to achieve subgrade elevation for the ground level of the building.

Structural loading has been provided by Mr. Paul Gurley with Bailey and Son Engineering, Inc. in an email correspondence dated August 27, 2014. Mr. Gurley confirmed the following loading schedule as summarized in Table 2.

Table 2. Provided Loading Schedule for Phase I Construction

ITEM	Maximum Column Load (kips)	Maximum Wall Load (kips/l.f.)
Classroom Tower	100	9.16

Floors live loads were not provided but are estimated to be 150 pounds per square foot.

1.2 Phase II Construction

Phase II construction will include a three-story classroom building, which will adjoin the main building and be separated by a basement/retaining wall. This will require demolition of a portion of the main building, namely the two annexes east of Phase I construction. The lower level of this structure will be subterranean and require a

basement/retaining wall for separation from the existing structure. The FFE for the Phase II structures are provided in Table 3 (per MSP).

Table 3. Phase II Finished Floor Elevations

Level	FFE (ft.)
Upper Level	886.83
Main Level	871.16
Ground Level	856.83

Based on the provided topographic information, maximum surface elevations adjacent to the main building are approximately El. 871 ft. Thus, a 17 ft. cut will be required for footing construction. A temporary shoring system or benched cut will likely be required. Shallow fill placement of about 5 ft. or less will likely be required in portions of the grade supported main level. Structural loads for the Phase II structure are not provided because the project is within the early planning phase. Structural loading is assumed to be similar to the Phase I facility. Additionally, Phase II will include replacement of the visitor's bleachers for the football stadium. Loading information for the stadium improvements is not known.

2. EXPLORATION PROGRAM

2.1 Field Work

The field exploration program included an on-site meeting with Mr. Bill Chumley, Director of Operations and Maintenance with District 5, site reconnaissance and boring layout by a Geotechnical Engineer, the performance of thirteen (13) soil test borings (B-1 through B-13) within both Phase I and II regions, and a shear wave velocity profile using a multichannel analysis of surface waves (MASW) method. The boring locations were established in the field by S&ME under the direction of Mr. Bill Chumley. The approximate boring locations and MASW transverse are shown on Figure 1 - Boring Location Plan.

The soil test borings were performed with an all-terrain mounted drill rig (CME 750 with an auto hammer) using hollow-stem augers to advance the hole. Standard Penetration Resistance (N) values and split-spoon samples were generally obtained in the borings at 2.5-ft. intervals. One (1) undisturbed sample was extracted from boring B-4 between 10 and 12 ft. below the surface. Three (3) bulk soil samples were retrieved from borings located within excavation or cut areas of the project site. Two (2) of the deepest borings, B-4 and B-5, were left open overnight so that stabilized water table measurements could be performed. Following completion of the borings and attempts to measure subsurface water, the borings were backfilled with cuttings brought to the surface by the augers. Borings performed in asphalt and concrete were patched with appropriate material.

2.2 Laboratory

The split-spoon soil samples routinely obtained in the borings were visually and manually classified in the field and/or laboratory by the Geotechnical Engineer in general accordance with the Unified Soil Classification System (USCS). Details of the

subsurface conditions encountered by the borings are shown on Boring Logs in the Appendix. These Logs represent our interpretation of the subsurface conditions based on the test data. Stratification lines on the Boring Logs represent approximate boundaries between soil types; however, the actual transition may be gradual and the thicknesses of the strata will vary across the site. Ground surface elevations shown on the boring logs were interpolated from the topographic information prepared by Blackwood Associates, Inc. and should be considered approximate.

Undisturbed and bulk soil samples were obtained as part of the field work. However, based on our meetings/conversations with MPS, it was agreed that laboratory testing was not required at this stage of the project. These samples will be retained in our laboratory 90 days from the date of this report for possible future testing. After which time they will be discarded unless instructed otherwise.

3. SITE CONDITIONS

3.1 Surface Features

Phase I additions will span between the existing old gymnasium and classroom wings, adjacent to the field house. The area is currently a driveway to the back of the campus and athletic fields. Site topography across Phase I is sloping from south to north. The average slope across the Phase I portion of the site is 4.5% (100 ft. horizontal: 4.5 ft. vertical). Ground cover primarily consists of asphalt and grass. Overhead utilities exist between the existing old gymnasium and main building (annex) as well as north of the main building. Existing underground utilities are present in a number of areas. Two (2) water lines parallel the driveway on the north side, one (1) of which feeds the existing old gymnasium and one (1) that spans north directly through the proposed Phase I addition area and feeds the field house. Storm drains are present throughout the entire site, which run downhill toward the football facility. A gas line spans between the existing old gymnasium and main building (annex). Telecommunication cables exist within the driveway and sidewalks.

The area for the Phase II additions building will abut the main building. The area is currently a driveway to the back of the campus and athletic fields. Site topography for the classroom addition, abutting the main building, is relatively flat. In addition, Phase II includes replacing the old visitor's bleachers for the football stadium. The existing visitor's bleachers are built into a 3H:1V (horizontal to vertical) slope. Ground cover primarily consists of concrete, asphalt, and grass. Existing underground utilities are present in a number of both areas. A water line spans beside the main building annexes for the entire length of the proposed addition. Underground power and sewer lines traverses through the current driveway beside the main building annexes. Storm drains exist within the driveway area. According to Mr. Bill Chumley, an underground storage tank is present within the east end of the Phase II construction, abutting the main building (annexes). We think boring B-9 confirmed the existence of the underground storage tank in this area, for an obstruction was encountered during auger advancement at approximately 18 ft. below the surface. Auger advancement was immediately stopped, and the boring was terminated at 18 ft. once the obstruction was encountered.

3.2 Area Geology

J.F. Byrnes High School is in the Piedmont Physiographic Province of South Carolina. The Piedmont Physiographic Province is a relatively broad strip extending from central Alabama across Georgia and the Carolinas into Virginia. The rock types are primarily metamorphic gneiss and schist with some granite intrusions.

The major portion of the bedrock in the Piedmont is covered with a varying thickness of residual soil, which has been derived by chemical decomposition and physical weathering of the underlying rock. The residual soils, developed during the weathering of this bedrock, consist predominately of micaceous silty sands and sandy silts which can grade to micaceous clayey silts and silty clays with nearness to the ground surface.

The boundary between the residual soil and the underlying bedrock is not sharply defined. Generally, a transition zone consisting of very hard soil and soft rock appropriately classified as “partially weathered rock” (PWR) is found. Within the transition zone, large boulders or lenses of relatively fresh rock often exist, which are generally much harder than the surrounding material. The irregular bedrock surface is basically a consequence of differential weathering of the various minerals and joint patterns of the rock mass.

It should be noted that the natural geological profile at the site has been modified by past grading activities that have resulted in the placement of fill. Existing fill can vary in composition and consistency, and the engineering characteristics of existing fill can be difficult to predict.

3.3 Soil Stratigraphy

The following is a brief and general description of subsurface conditions encountered. More detailed information is provided on the individual Boring Logs included in the Appendix supported by a Legend to Soil Classification and Symbols.

3.3.1 Surface Material

Surface materials varied across the project site and are summarized in Table 4 below.

Table 4. Surface Materials

Boring ID	Surface Material Type (Thickness)
B-1	Topsoil (6")
B-2	Topsoil (6")
B-3	Topsoil (6")
B-4	Topsoil (10")
B-5	Asphalt (3.5") & Crushed Stone (6")
B-6	Concrete (7") & Crushed Stone (4")
B-7	Concrete (9") & Crushed Stone (4")
B-8	Topsoil (6")
B-9	Asphalt (3")
B-10	Topsoil (4")
B-11	Topsoil (6")
B-12	Topsoil (4")
B-13	Topsoil (4")

Note that surface material type and thickness will vary in unexplored areas.

3.3.2 Strata I: Undocumented Existing Fill

Undocumented existing fill was encountered in all borings except for boring B-12. Fill depths varied across the site, ranging from 3 ft. to 18 ft. below site grades (El. 865 ft. to El. 852 ft.). Deep fill was encountered in borings B-4, B-7, B-8, and B-9. Deep fill depths extend from 11 ft. to 18 ft. below existing site grades. The borings with deep fill span along the driveway, abutting the main building (annexes), which is primarily Phase II construction. The fill consisted of sandy elastic silt (USCS Classification “MH”), clayey sand (SC), sandy lean clay (CL) and silty sand (SM). The sampled fill did not contain organic matter; however, trace amounts of crushed stone and asphalt fragments were present in several samples. Standard Penetration (“N”) values ranged from 3 to 22 blows per foot (bpf), which generally indicate a very low to moderately high, but erratic degree of compaction.

Boring B-9 was terminated in existing fill at a depth of 18 ft. (El. 852 ft.) below the surface.

Fill soils tend to become wet due to rainwater runoff infiltrating these soils and becoming trapped or “perched” above layers of higher consistency materials, such as residual soil, PWR or mass rock. Due to the historical site development, additional fill will be present in unexplored areas, especially near underground utility lines. The depth and composition of fill in unexplored areas will vary and could be deeper, erratically compacted, and/or contain excessive organic matter or other deleterious debris.

3.3.3 Strata II: Residuum

Residual materials of the type common to the Spartanburg County area were encountered beneath the topsoil layer in boring B-12 and below existing fill in the remaining borings, with the exception of boring B-9. The residual soils predominantly consist of sandy silt (ML) or silty sand (SM) with varying amounts of mica. However, an upper zone of elastic silt was present in borings B-7 and B-10. Standard Penetration (“N”) values ranged from 6 to 71 bpf, indicating a firm to very hard consistency for silt and a loose to very dense relative density for sand.

Borings B-1, B-2, B-7, B-8, B-10, B-11 and B-13 were terminated in residuum at 15 ft. to 30 ft. (El. 845.5 ft. to 829 ft.) below existing site grades.

3.3.4 Strata III: Partially Weathered Rock

Partially weathered rock (PWR) was encountered directly above refusal in borings B-3, B-4, B-5, B-6, and B-12. The partially weathered rock (PWR) soil layer ranges from 18 ft. (El. 853 ft.) to 36 ft. (El. 831.5 ft.) below existing site grades. Partially weathered rock is defined as a transitional material between very hard soil and rock that has a Standard Penetration Resistance value of at least of 50 blows per 6 inches. This material contains some boulders or layers of relatively fresh rock.

Boring B-6 was terminated in PWR at a depth of 35ft. (El. 836 ft.) below the existing ground surface.

3.3.5 Strata IV: Refusal Material

Refusal to auger advancement (AR) was encountered in borings B-3, B-4, B-5, and B-12. Auger refusal prematurely terminated four (4) soil borings, defining the top elevation of mass rock. Mass rock ranges from 20.5 ft. (El. 837 ft.) to 36 ft. (El. 831 ft.) below existing site grades. Refusal is a designation applied to any material having a resistance in excess of the penetrating capacity of the drilling equipment.

3.3.6 Subsurface Water

Subsurface water was not encountered in any of the borings. While subsurface water levels will fluctuate during the year, we would not expect subsurface water to be within the levels of the proposed construction.

4. CONCLUSIONS AND RECOMMENDATIONS

The boring data indicates the explored areas are adaptable to support the column and wall loads of the proposed structures, with some subgrade improvements. Because both structures will be multi-story structures with below grade partial basements, both cut and fill will be required to achieve subgrade levels. Areas adjacent to existing structures will require significant excavation, while the main levels will require shallow fill placement. As previously discussed, both phases are underlain by erratically compacted fill, which is unsuitable for building support. Accordingly, existing fill should be undercut from within building areas and replaced with well-compacted fill. Because of the deep basement excavations required, a majority of the existing fill will be removed. However, some additional undercutting will be required and budgeted. Based on the provided finished floor elevations, Phase I footings will bear on new, well-compacted fill structural fill, residual soils or PWR, while Phase II footings will fluctuate between bearing on new fill and residual. A possible underground storage tank lies beneath proposed FFE levels at boring B-9. Subsurface water is not expected to be encountered for excavations; however, elevated moisture with depth should be expected.

Due to the basement excavations extending up to about 29 feet below the finished floor level of the existing buildings, a temporary shoring and underpinning system will be required. A specialty geotechnical contractor will likely be required to design and construct the temporary underpinning and shoring system that will be required until the permanent basement wall is constructed.

The following presents our geotechnical recommendations regarding site grading and foundations. When reviewing this information, please remember portions of the site have been previously graded. Our experience with sites such as this indicates that unexpected conditions will be encountered. Unexpected conditions can include such things as buried debris, unsuitable fill, and/or abandoned utility lines. This can normally be handled by field engineering evaluations during construction.

4.1 Site Preparation and Shoring

Site preparation for Phase I and II construction should include the removal of topsoil, root systems, asphalt pavement, remnants of previous site development and any unsuitable materials. These recommendations should extend at least 10 feet outside building limits and 5 feet outside other area limits, where practical.

4.1.1 Underground Storage Tank

As previously discussed, an existing underground storage tank is present within the Phase II building footprint. The underground storage tank should be removed and any contaminated soils (if present) undercut and disposed of in an approved landfill. An S&ME environmental engineer should be present during underground storage tank removal to help determine if surrounding soils have not been contaminated. Temporary shoring will most likely be required for tank removal.

4.1.2 Existing Fill

As previously discussed, existing fill was present throughout the site to depths of 3 to 18 ft. below existing grade. Documentation on how the existing fill material was placed was not available to us. The fill soils encountered by the borings appear to have received a low degree of compaction and generally appear unsuitable for supporting wall and column foundations, and grade slabs. Accordingly, all existing fill should be undercut and replaced with well compacted structural fill. Because of proposed finished elevations, a majority of the existing fill will be removed from the Phase I and II construction areas to accommodate the partial building basement levels. However, existing fill will still remain below footings near borings B-4 and B-9 (after basement excavations) and other areas beneath the main/ground level foundations, and should be undercut.

Due to previous grading and site development, existing fill will be present throughout the site. In addition, soils near the fill/residuum interface could be unstable. To help evaluate the need for additional undercutting, building areas should be thoroughly evaluated as discussed in Section 4.1.4. Additional undercutting and/or stabilization should be expected and budgeted.

4.1.3 Silty and Micaceous Soils

For areas of the site requiring excavation, the borings indicate very silty and micaceous soils will be encountered/exposed in some areas. Based on our experience, these types of soils tend to “rebound” or “fluff” when the overburden soils are removed. This could require some scarifying and recompacting, particularly if grading occurs in other than hot and dry weather. Another option would be to over excavate the area and replace the undercut area with crushed stone. This would be especially beneficial during wet weather conditions and for confined excavations.

4.1.4 Proofrolling

Following site preparation and excavation to design subgrade, the exposed subgrade should be thoroughly proofrolled with a heavily loaded tandem-axle dump truck or similar rubber-tired equipment under the observation of the Geotechnical Engineer. The

proofrolling will help reveal the presence of unstable or otherwise unsuitable surface materials. Areas that are unstable should be undercut as recommended by the Geotechnical Engineer. Further evaluation with backhoe excavated test pits could also be required if unexpected conditions are encountered.

In some areas, especially near the existing building and possibly parts of the drainage swales, proofrolling may not be feasible. If this is the case, the subgrade should be evaluated by a geotechnical professional using hand auger borings with dynamic cone penetrometer testing.

4.1.5 Underground Utility Lines

As previously discussed, underground utility lines are present within the expansion areas. We recommend these lines be relocated outside the new expansion limits. Our past experience indicates the backfill soils for existing utility lines are generally poorly compacted. Subsequently, utility lines that are to be relocated should be removed, and the trenches cleaned and backfilled with well compacted structural fill as discussed in Section 4.2.

4.1.6 Shoring & Underpinning

As previously discussed, the proposed basement excavation will extend up to 29 feet below the finished floor level of the existing buildings. During excavation, several of the existing building foundations will be exposed and will require partial removal. Thus, underpinning of the building will be required along with shoring of the exposed soils beneath existing footings. A specialty geotechnical contractor, such as Wurster Engineering & Construction, should be retained to provide design and construction of the system.

4.2 Fill Placement and Compaction

After excavation and undercutting unstable existing fill and near-surface soils, areas requiring fill placement should be raised to the design subgrade elevation with soil free of deleterious materials and rock fragments should not be greater than 4 inches in diameter. The fill material should be placed in uniform, horizontal lifts that are no more than 8 in. in loose thickness. Lifts should be compacted to at least 95 percent of the soil's maximum dry density as determined by the standard proctor compaction test (ASTM D698). The moisture content of structural fill soils at compaction should be within +/- 3 percent of the optimum moisture content, as determined by the standard proctor compaction test.

Fill placement should be monitored by a qualified Materials Technician working under the direction of the Geotechnical Engineer. In addition to this visual evaluation, the Technician should perform a sufficient amount of in-place field density tests to confirm that the required degree of compaction is being attained. The following minimum testing requirements are suggested:

1. At least one field density test should be performed per each 2,500 square feet for each lift of soil in large area fills, with a minimum of 1 tests per every other lift.

2. At least one field density test should be conducted per each 150 cubic feet of fill placed in confined areas such as isolated undercuts and in trenches or behind walls, with a minimum of 1 test per lift.
3. At least one field density test should be conducted for each 250 linear feet of road or pavement backfill, with a minimum of 1 test per lift per section.

4.2.1 Use of Excavated Soils as Fill

The residual soils on site appear generally adaptable for use as well-compacted structural fill. The exploration indicates the in-situ moisture content of these soils was generally near to slightly above optimum for compaction at the time the exploration was performed. The moisture content of these soils will fluctuate with prevailing weather conditions prior to and at the time of grading. If the soils are stockpiled, they should be protected from precipitation. Some moisture adjustment (wetting or drying) could be required to achieve the recommended degree of compaction.

The existing fill appears suitable for reuse as structural fill with proper moisture conditioning. However, based on our experience with existing fills, we recommend existing fill be evaluated by the Geotechnical Engineer at the time of excavation to determine suitability for reuse.

4.2.2 Use of Off-Site Borrow Materials as Fill

Fill placed beneath building foundations and floor slabs should be considered structural fill. The material should, in general, contain less than three (3) percent (by weight) fibrous, organic materials, and have a plasticity index (PI) of less than 25 and a liquid limit (LL) of no greater than 50. Representative samples of proposed fill materials should be collected and tested to determine its moisture-density relationship and other index properties (percent fines, plasticity, etc.) prior to its use on site.

4.2.3 Use of Excavated PWR

PWR will also be suitable for use as structural fill if properly placed and compacted. This material is typically excavated in the form of blocks. Normally, heavy sheepsfoot type compaction equipment can suitably pulverize these blocks into soil size particles.

4.2.4 Silt and Micaceous Soils

As previously mentioned, a consideration for this site is that some soils present on-site have a high silt and mica content. These soils provide suitable structural support, but they are extremely sensitive to moisture during grading. This can require close moisture control, particularly if grading is performed during unfavorable weather.

This past winter the Upstate of South Carolina experienced higher than normal rainfall and sites graded during this time period have had many setbacks due to heavy rainfall. A project with this magnitude of grading should be scheduled for the summer months, if practical. This should be discussed with potential contractors during the bidding process.

4.3 Excavation

Based on the boring data and furnished grading plans, excavation for the project will mainly extend through low to high consistency fill and residual soils, and PWR. Excavation will extend to within a few feet of the upper surface of mass rock near boring B-5. We would like to point out that our experience indicates rock in a weathered, boulder, and massive form varies erratically in depth and location in the Piedmont Geologic Province. Therefore, there is always a potential these materials could be encountered in pinnacled form at shallow depths between the boring locations and/or unexplored areas.

The following presents our comments regarding excavation of the other various type materials expected to be encountered on site based on our experience.

Low to High Consistency Soils

These materials can be excavated by routine earthmoving equipment. That is, mass excavation can be accomplished by a bulldozer, moderately heavy front end loader, or bulldozer pushed scraper. Local excavation for shallow utility trenches and foundations can be accomplished by a heavy backhoe or tracked excavator.

Partially Weathered Rock

This material can normally be excavated by a heavy tracked excavator with difficulty. Some light blasting (if allowed), excavation with a rock breaker tool mounted on a heavy excavator, or hand excavation with pneumatic tools could be required where boulders or rock lenses are present, particularly in confined excavations. Our experience indicates that as the "N" values increase to between 50/2" and 50/0", the ability to excavate decreases, and rock excavation measures could be required.

Massive Rock

Excavation below the refusal level of the borings is anticipated to typically require blasting (if allowed) or other rock excavation measures.

We suggest that the following clauses for rock definition be considered for use in preparing project specifications:

Massive Rock Excavation - Any material that cannot be excavated with a single tooth ripper drawn by a crawler tractor having a minimum flywheel power rated at not less than 305 horse power (Caterpillar D-8N or equivalent), occupying an original volume of at least one cubic yard or more, and requires blasting.

Trench Excavation - Any material which cannot be excavated with a Caterpillar 345 or equivalent, occupying an original volume of at least 1/2 cubic yard or more, and which requires blasting or other rock excavation methods.

Groundwater was not encountered in any of the borings. Therefore, excavations to the anticipated depths for this project should be achievable without the need for temporary dewatering. Note that groundwater fluctuations will occur seasonally.

4.3.1 Excavation Regulations

All excavations should be sloped or shored in accordance with local, state, and federal regulations, including OSHA (29 CFR Part 1926) excavation trench safety standards. The contractor is solely responsible for site safety. This information is provided only as a service and under no circumstances should S&ME be assumed to be responsible for construction site safety.

4.4 Subgrade Repair and Improvement Methods

The exposed subgrade soil of cut areas can deteriorate when exposed to construction activity and environmental changes such as freezing, erosion, softening from ponded rainwater, and rutting from construction traffic. We recommend the exposed subgrade surfaces that have deteriorated be properly repaired by scarifying and recompacting immediately prior to construction. If this has to be performed during wet weather conditions, it would be worthwhile to consider undercutting the deteriorated soil and replacing it with crushed stone.

Drainage from the site should be provided and maintained to reduce the potential for ponding of water on exposed subgrades. Rainwater should not be allowed to pond on subgrade. This will be particularly important for the basement excavations, which could require sumps to remove ponded rainwater.

5. FOUNDATION RECOMMENDATIONS

5.1 Design Recommendations

The site is generally satisfactory for supporting spread footings, assuming the recommendations in Section 4.1 and 4.2 are completed. Continuous wall footings should not be less than 24 inches wide and isolated column footings should not be less than 30 inches wide. This recommendation is made to help prevent a “localized” or “punching” shear failure condition which could exist with very narrow footings. All foundations should bear at least 18 inches below grade so they will not be adversely affected by frost penetration and to develop the design bearing pressure. Where the new foundations interface with footings of the existing building, we recommend the new footings bear at the same elevation to match (or at least 18 inches, whichever is greater).

5.1.1 Phase I Foundations

The footings for Phase I, bearing between el. 838 ft. and el. 841 ft. can be designed based on a maximum net allowable soil bearing pressure of 3,000 pounds per square foot (psf). This pressure may be increased by 1/3 for transient loads (such as earthquake or wind). Relative to Phase I footings, we expect total settlement and differential settlement to be less than 1 in. and ½ in., respectively.

5.1.2 Phase II Foundations

The footings for Phase II, bearing between El. 852 ft. and El. 855 ft. in well-compacted structural fill and/or residuum can be designed for a uniform net maximum allowable bearing pressure of 3,000 psf is recommended for sizing footings for column loads up to

200 kips. This pressure may be increased by 1/3 for transient loads (such as earthquake or wind). The actual magnitude of settlement that will occur beneath the foundation would depend upon the variations within the subsurface profile, the amount of new fill, the actual structural loading conditions, the embedment depth of footings, and the quality of earthwork operations. Once the project is further advanced, we will be happy to evaluate settlement and bearing for the Phase II building.

5.1.3 Foundation Construction Procedures/Observations

Proper foundation construction procedures can enhance long-term foundation performance. We recommend the following procedures for use during construction:

1. All footing bearing surfaces should be cleaned of wet, loose or soft soils prior to the placement of concrete or rebar in the footings;
2. The footing bearing surfaces must be observed and evaluated by our Geotechnical Engineer prior to concrete placement. Often, footing excavation results in disturbance to the bearing soils. Also, unsuitable soil not detected by the proofrolling evaluation could underlie footing excavations. Some localized undercutting or stabilization of low consistency soil with crushed stone could be necessary in some footing excavations, or the footings could be lowered through the low consistency soils. The Engineer should identify such areas and can make recommendations for the appropriate repair/stabilization/lowering;
3. Foundation concrete should be placed in the excavation the same day the foundations are excavated. If an excavation is to remain open overnight, or if rain is imminent, a 3- to 4-in. thick mud mat of lean (2,000 psi) concrete should be placed in the bottom of the excavation to protect the bearing soils. This will help limit the potential for additional excavation of wet, softened soils which often results when footings excavations are exposed to inclement weather;
4. Undercut footing excavations should be backfilled with ASTM No. 57 crushed stone under the observation of the Geotechnical Engineer. It should be placed in maximum 1-foot thick lifts and tamped thoroughly using a “Wacker Packer” or vibrating sled style compactor;
5. Foundation excavations should be “clean cut” and concrete should be placed “neat”, without the use of forms, where possible.

5.1.4 Floor Slab Support

The concrete floor slabs may be soil supported, provided the recommendations discussed in Sections 4.1 and 4.2 of this report are followed. We recommend a 6-inch thick layer of crushed stone be used to separate floor slabs from the subgrade soils. This layer will help provide uniform support for the floor slab. The crushed stone should consist of Macadam Base Course (SCDOT Standard Specifications) compacted to at least 100 percent of its standard Proctor maximum dry density. A modulus of subgrade reaction of 140 pci may be used for floor slab design.

We suggest grade slabs be jointed around columns and along footing supported walls so the slabs and foundations can settle differentially without damage. Joints containing dowels are recommended in areas subject to large live loads to transfer loads and to help reduce rotational movement between parts of the slab without developing sharp vertical displacements.

A plastic vapor barrier separating the slab from the subgrade materials is not required from a groundwater standpoint. However, it could be necessary in deeper excavation areas because of elevated moisture. Installation of the vapor barrier will be dependent upon the floor usage and the local building code.

5.2 Site Seismic Coefficient

The expected Seismic Site Class for the project has been calculated using MASW method. The average shear wave velocity over the upper 100 ft. of soil depth yielded 1375 ft./s (See Figure 2). Therefore, the property is a Seismic Site Class C, according to Table 1613.5.5 of the International Building Code (IBC). The subsurface soils should not be susceptible to liquefaction.

5.3 Retaining Walls

5.3.1 Cast-in-Place Retaining Walls

A Cast-in-place (CIP) retaining wall will be required for the proposed interior basement wall for the Phase I and II buildings. CIP walls must be capable of resisting lateral earth pressures that will be imposed on them. Lateral earth pressures to be resisted by the walls will be partially dependent upon the method of construction. Assuming that the walls are relatively rigid and structurally braced against rotation, they should be designed for a condition approaching the “at-rest” lateral pressure. However, in the event that the walls are free to deflect during backfilling, (about ½ to 1 in. for a 10-ft. high wall) as for any exterior walls that are not restrained or rigidly braced, the “active” pressure conditions will be applicable for design. The following lateral earth pressure parameters are recommended for design. These parameters assume a level backfill, a frictionless wall, and no hydrostatic pressure.

Table 5 - CIP Retaining Wall Design Parameters

Lateral Earth Pressure Condition	Coefficient		Equivalent Fluid Pressure (γ_{Eq})
At-Rest Condition	(K_o) =	0.53	61 psf/ft
Active Condition	(K_A) =	0.36	41 psf/ft
Passive Condition	(K_P) =	2.8	n/a
UNIT WEIGHT OF SOIL (MOIST)	115 pcf		
FRICITION FACTOR FOR FOUNDATIONS AND BEARING SOILS	0.35		

The recommended lateral earth pressure coefficients do not consider the development of hydrostatic pressure behind the earth retaining wall structures. As such, positive wall

drainage must be provided for all earth retaining structures. These drainage systems can be constructed of open-graded washed stone isolated from the soil backfill with a geosynthetic filter fabric and drained by perforated pipe, or several wall drainage products are made specifically for this application. Lateral earth pressures arising from surcharge loading should be added to the above earth pressures to determine the total lateral pressure.

The soil backfill placed behind retaining walls should be compacted to a similar requirement recommended in Section 4.2. We caution that operating compaction equipment directly behind the retaining structures can create lateral earth pressures far in excess of those recommended for design. Therefore, bracing of the walls may be needed during backfilling.

5.3.2 Tie-Back Walls

A temporary tie-back wall is necessary for basement construction of Phase I and Phase II. Tie-back wall maximum height is planned to be 29 feet near the existing old gymnasium and main building (annex). The tie-back wall system is comprised of a retaining wall with anchors installed in a top-down construction. Anchors are grout injected through the back side of the active wall and the face shotcreted. The tie-back wall system is designed and installed by a specialty contractor that will determine the depth of embedment, tie horizontal span, tie spacing, and connection design. Our geotechnical report can be provided to the specialty contractor for their use in completing the design.

5.4 Construction Near Existing Buildings

Care should be used during construction near the existing buildings, particularly during excavation and fill compaction. In no case should the existing foundations be undermined, unless approved by the Structural Engineer. As previously discussed, underpinning of the existing building and shoring will be required until the new basement walls are constructed.

The loads from the new additions will create some additional stress beneath the existing foundations and possibly cause some settlement. Our past experience indicates this settlement should not adversely affect the performance of the structures. However, with construction near existing structures, there is always a potential some small cracks could develop.

6. PRE-CONSTRUCTION MEETING

Because of the complexity of this project and the numerous recommendations presented in this report, it is recommended that a pre-construction meeting be conducted with MPS, the Civil Engineer, the Contractor, Grading Contractor, and a representative of our firm. During this meeting, the recommendations in this report should be discussed with the most suitable methods determined. This meeting would be for the purpose of discussing our recommendations and making modifications to accommodate specific requirements of the civil/structural design and construction requirements.

7. LIMITATIONS OF REPORT

This report has been prepared in accordance with generally accepted geotechnical engineering practice for specific application to this project. The conclusions and recommendations contained in this report were based on the applicable standards of our profession at the time this report was prepared. No other warranty, express or implied, is made.

The analyses and recommendations submitted in this report are based, in part, upon the data obtained from the subsurface exploration. The nature and extent of variations between the borings will not become evident until construction. If variations appear evident, then it will be necessary to re-evaluate the recommendations of this report. In the event that any changes in the nature, design, or location of the additions occur, the conclusions and recommendations contained in this report will not be considered valid unless the changes are reviewed and conclusions of the report modified or verified in writing.

It is recommended that S&ME be provided the opportunity for a general review of final design and specifications in order that site-grading and foundation support recommendations are properly interpreted and implemented.

Environmental assessment of soils, water, wetland, and endangered species was not included in our scope of services for this project.



Important Information About Your Geotechnical Engineering Report

Variations in subsurface conditions can be a principal cause of construction delays, cost overruns and claims. The following information is provided to assist you in understanding and managing the risk of these variations.

Geotechnical Findings Are Professional Opinions

Geotechnical engineers cannot specify material properties as other design engineers do. Geotechnical material properties have a far broader range on a given site than any manufactured construction material, and some geotechnical material properties may change over time because of exposure to air and water, or human activity.

Site exploration identifies subsurface conditions at the time of exploration and only at the points where subsurface tests are performed or samples obtained. Geotechnical engineers review field and laboratory data and then apply their judgment to render professional opinions about site subsurface conditions. Their recommendations rely upon these professional opinions. Variations in the vertical and lateral extent of subsurface materials may be encountered during construction that significantly impact construction schedules, methods and material volumes. While higher levels of subsurface exploration can mitigate the risk of encountering unanticipated subsurface conditions, no level of subsurface exploration can eliminate this risk.

Scope of Geotechnical Services

Professional geotechnical engineering judgment is required to develop a geotechnical exploration scope to obtain information necessary to support design and construction. A number of unique project factors are considered in developing the scope of geotechnical services, such as the exploration objective; the location, type, size and weight of the proposed structure; proposed site grades and improvements; the construction schedule and sequence; and the site geology.

Geotechnical engineers apply their experience with construction methods, subsurface conditions and exploration methods to develop the exploration scope. The scope of each exploration is unique based on available project and site information. Incomplete project information or constraints on the scope of exploration increases the risk of variations in subsurface conditions not being identified and addressed in the geotechnical report.

Services Are Performed for Specific Projects

Because the scope of each geotechnical exploration is unique, each geotechnical report is unique. Subsurface conditions are explored and recommendations are made for a specific project. Subsurface information and recommendations may not be adequate for other uses. Changes in a proposed structure location, foundation loads, grades, schedule, etc. may require additional geotechnical exploration, analyses, and consultation. The geotechnical engineer should be consulted to determine if additional services are required in response to changes in proposed construction, location, loads, grades, schedule, etc.

Geo-Environmental Issues

The equipment, techniques, and personnel used to perform a geo-environmental study differ significantly from those used for a geotechnical exploration. Indications of environmental contamination may be encountered incidental to performance of a geotechnical exploration but go unrecognized. Determination of the presence, type or extent of environmental contamination is beyond the scope of a geotechnical exploration.

Geotechnical Recommendations Are Not Final

Recommendations are developed based on the geotechnical engineer's understanding of the proposed construction and professional opinion of site subsurface conditions. Observations and tests must be performed during construction to confirm subsurface conditions exposed by construction excavations are consistent with those assumed in development of recommendations. It is advisable to retain the geotechnical engineer that performed the exploration and developed the geotechnical recommendations to conduct tests and observations during construction. This may reduce the risk that variations in subsurface conditions will not be addressed as recommended in the geotechnical report.

FIGURES

Figure 1 – Boring Location Plan (Aerial)

Figure 2 – Shear Wave Velocity Profile SW-1



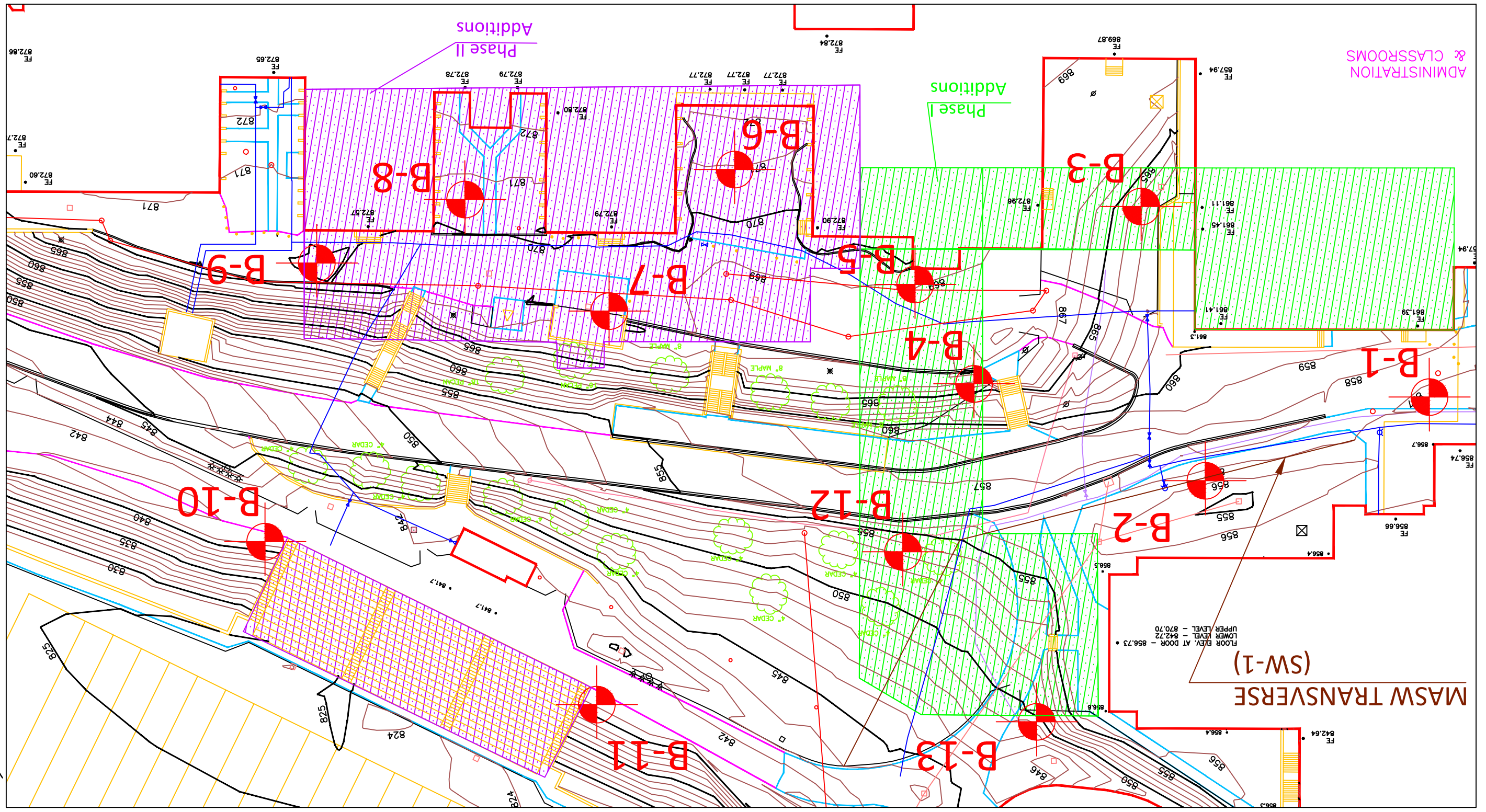
S&ME, Inc.
281 FAIRFOREST WAY, GREENVILLE, SC 29607
301 ZIMA PARK DRIVE, SPARTANBURG, SC 29301
NC PE FIRM LICENSE NO. F-0176

864.232.8987 Greenville
864.574.2360 Spartanburg
864.576.8730 Fax
www.smeinc.com

SOURCE:
EXISTING SITE TOPOGRAPHY WAS
PREPARED BY BLACKWOOD AND
ASSOCIATES, INC. ON JULY 15, 2014.

APPROXIMATE SOIL TEST BORING LOCATION

LEGEND



ADMINISTRATION
& CLASSROOMS

Phase I
Additions

Phase II
Additions

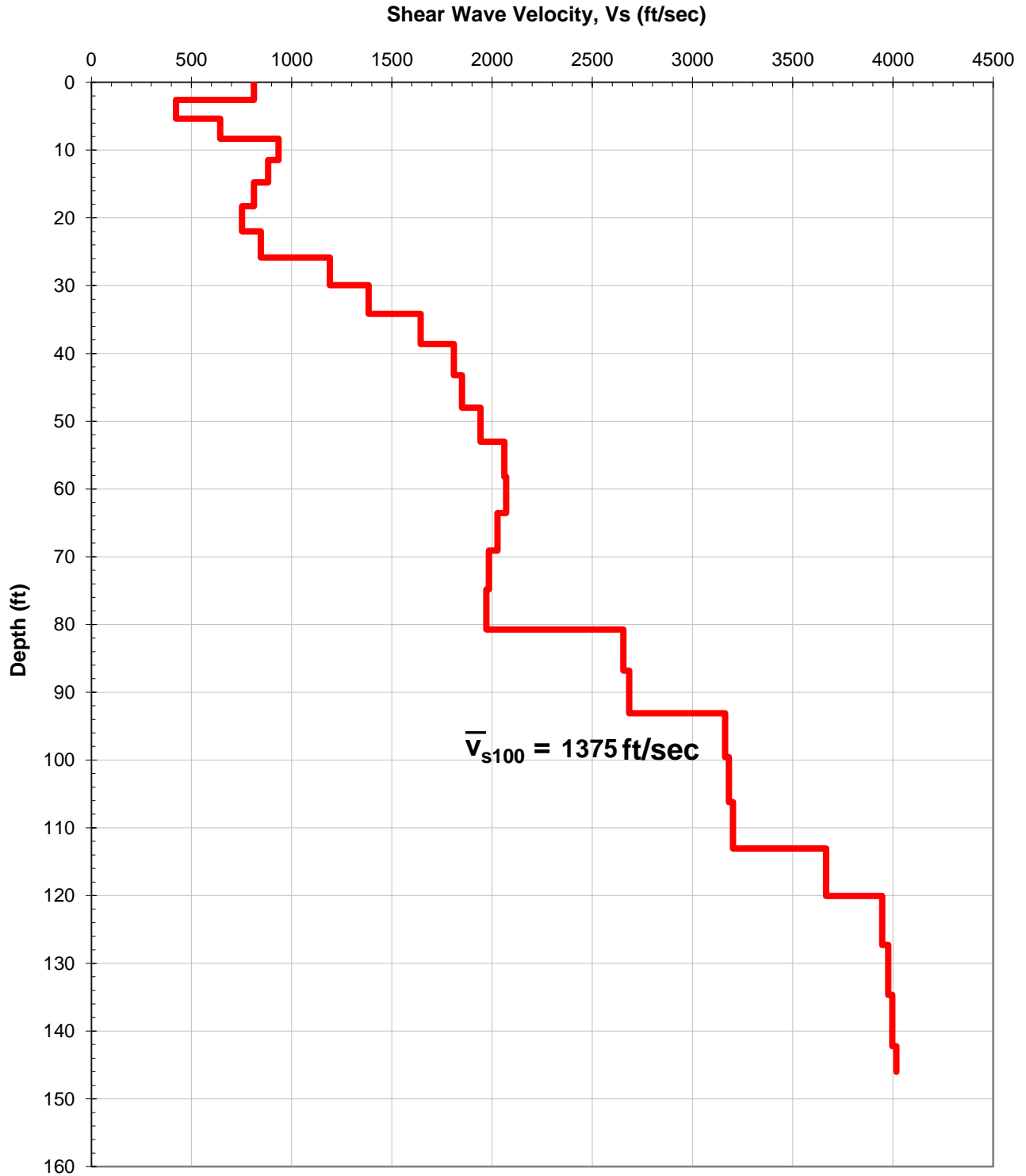
MASW TRANSVERSE
(SW-1)

FLOOR ELEV. AT DOOR - 856.73
LOWER LEVEL - 842.72
UPPER LEVEL - 870.70

N



Figure 2 - Shear Wave Velocity Profile SW-1
Byrnes High School
Duncan, South Carolina
1426-14-105



GENERALIZED PROFILES

Profile 1 – B-1, B-2, B-4, B-5, B-6, B-7, B-8, B-9

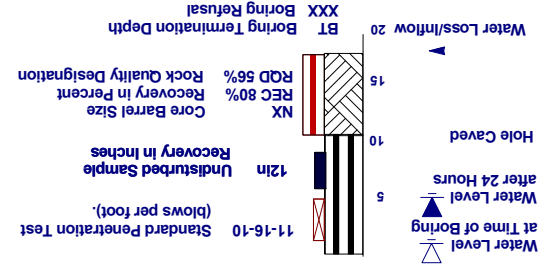
Profile 2 – B-3, B-5, B-4, B-12, B-13



DATE: 9/19/14
JOB NO: 1426-14-105

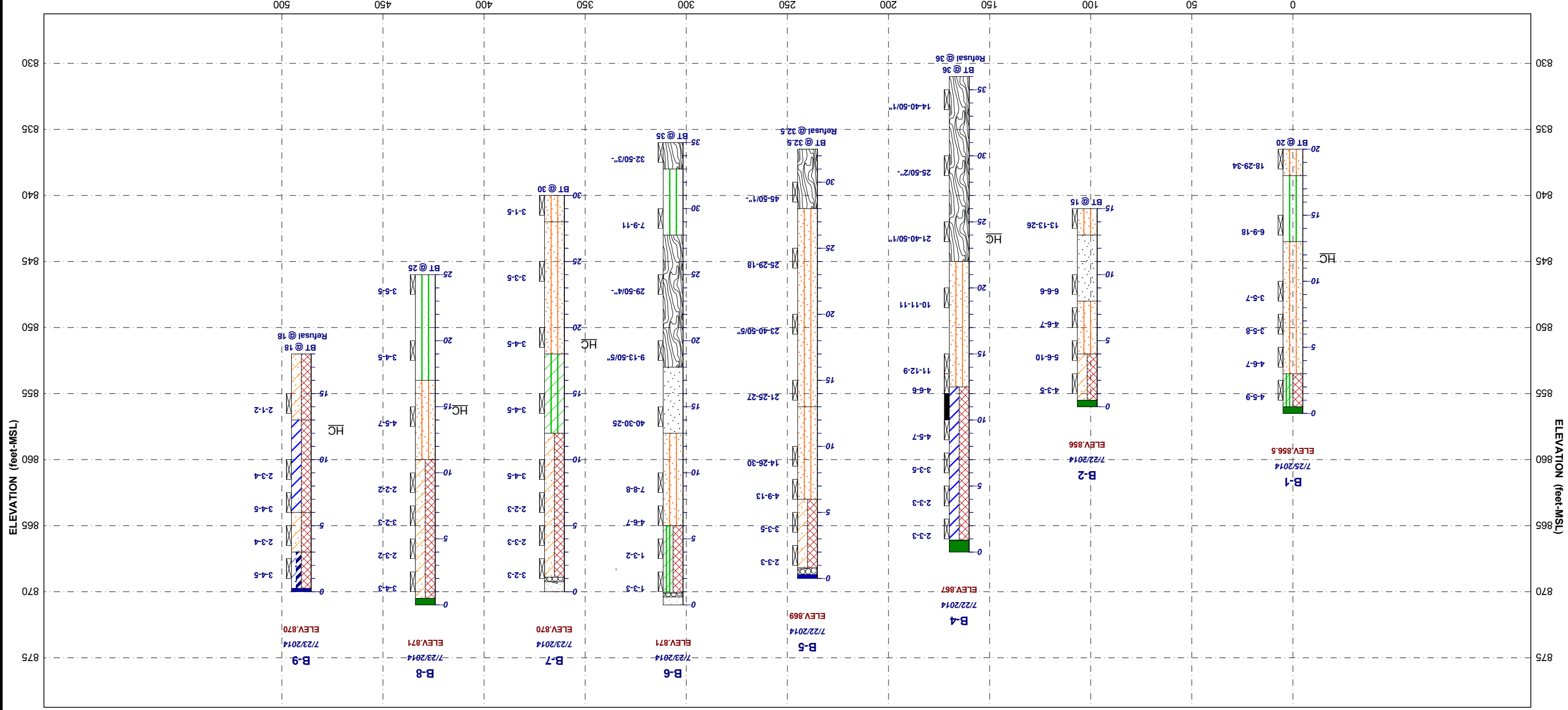
PROJECT: J.F. Byrnes High School Redevelopment
LOCATION: Duncan, SC

The depicted stratigraphy is shown for illustrative purposes only and is not warranted. Separations between different strata may be gradual and likely vary considerably from those shown. Profiles between nearby borings have been estimated using reasonable engineering care and judgment. The actual subsurface conditions will vary between boring locations.



LEGEND OF MATERIAL GRAPHICS FOR SOIL TEST BORINGS

Topsoil	Silty Sand	Sandy Silt	Partially Weathered Rock	Asphalt
SP, Poorly-graded Sand	Clayey Sand	Concrete	Aggregate	Sand
Clayey Silt	Very Sandy Clay	Clay	Base Course	Aggregate



SOIL TEST BORINGS
B-3 Boring Number
123.0 Elevation at GS

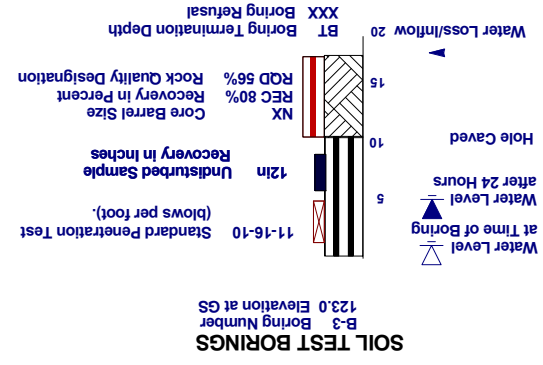
LEGEND OF MATERIAL GRAPHICS FOR SOIL TEST BORINGS



JOB NO: 1426-14-105
DATE: 9/19/14

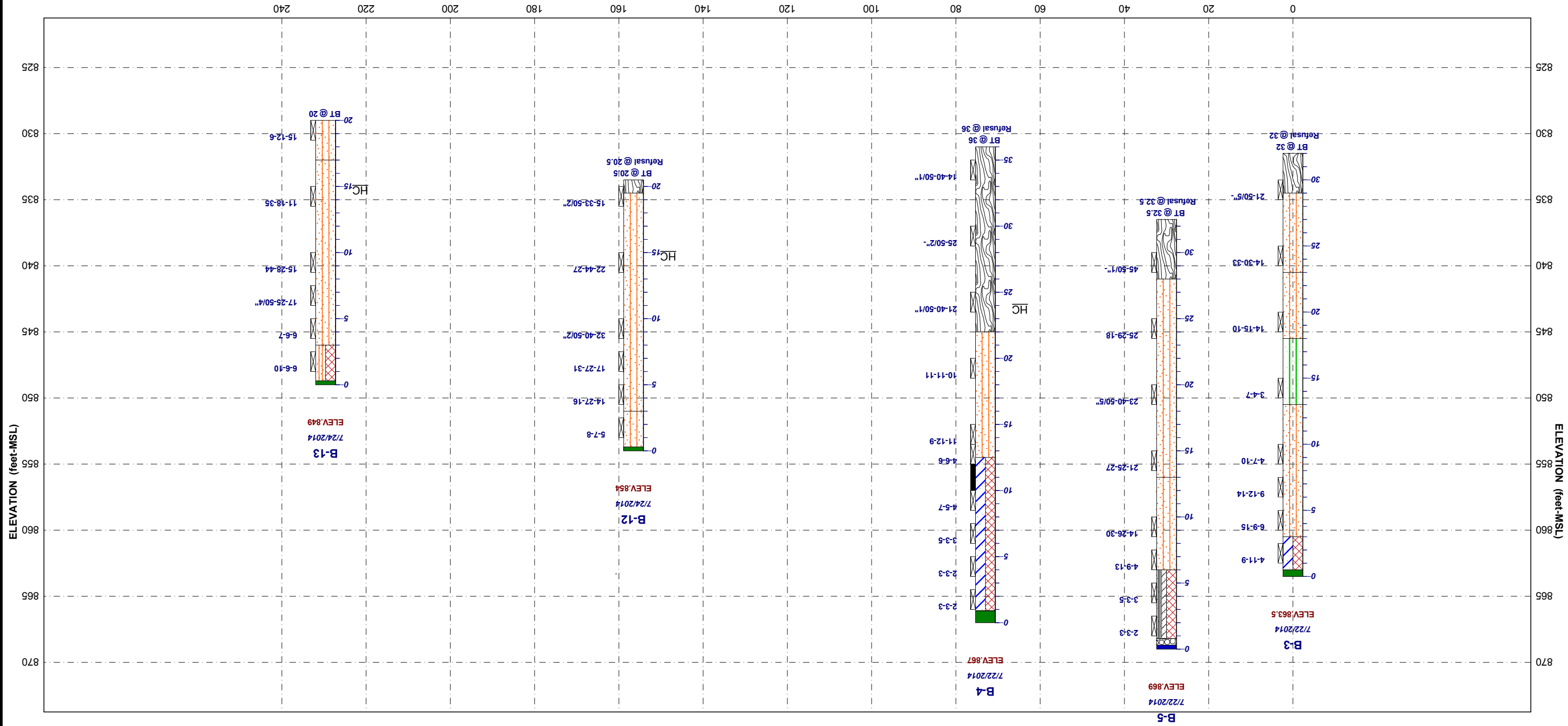
PROJECT: J.F. Byrnes High School Redevelopment
LOCATION: Duncan, SC

The depicted stratigraphy is shown for illustrative purposes only and is not warranted. Separations between different strata may be gradual and likely vary considerably from those shown. Profiles between nearby borings have been estimated using reasonable engineering care and judgment. The actual subsurface conditions will vary between boring locations.



LEGEND OF MATERIAL GRAPHICS FOR SOIL TEST BORINGS

Topsoil	Sandy Clay	Asphalt	Rock	Partially Weathered	Sandy Silt
Silty Sand	Aggregate	Base Course	Aggregate	Weathered	Sandy Silt
Sandy Clay	Aggregate	Base Course	Aggregate	Weathered	Sandy Silt
Asphalt	Aggregate	Base Course	Aggregate	Weathered	Sandy Silt
Rock	Aggregate	Base Course	Aggregate	Weathered	Sandy Silt
Partially Weathered	Aggregate	Base Course	Aggregate	Weathered	Sandy Silt
Sandy Silt	Aggregate	Base Course	Aggregate	Weathered	Sandy Silt
Sandy Silt	Aggregate	Base Course	Aggregate	Weathered	Sandy Silt



















APPENDIX

Legend to Soil Classification and Symbols
Boring Logs (B-1 to B-13)
Field Testing Procedures

LEGEND TO SOIL CLASSIFICATION AND SYMBOLS




SOIL TYPES (USCS CLASSIFICATION)

(Shown in Graphic Log)

	Fill
	Asphalt
	Concrete
	Topsoil
	Gravel (GW, GM, GP)
	Sand (SW, SP)
	Silt (ML)
	Clay (CL, CH)
	Organic (OL, OH)
	Silty Sand (SM)
	Clayey Sand (SC)
	Sandy Silt (ML)
	Clayey Silt (MH)
	Sandy Clay (CL, CH)
	Silty Clay (CL, CH)
	Partially Weathered Rock
	Cored Rock

WATER LEVELS

(Shown in Water Level Column)

-  = Water Level At Termination of Boring
-  = Water Level Taken After 24 Hours
-  = Loss of Drilling Water
- HC = Hole Cave

CONSISTENCY OF COHESIVE SOILS





<u>CONSISTENCY</u>	<u>STD. PENETRATION RESISTANCE BLOWS/FOOT</u>
Very Soft	0 to 2
Soft	3 to 4
Firm	5 to 8
Stiff	9 to 15
Very Stiff	16 to 30
Hard	31 to 50
Very Hard	Over 50

RELATIVE DENSITY OF COHESIONLESS SOILS

<u>RELATIVE DENSITY</u>	<u>STD. PENETRATION RESISTANCE BLOWS/FOOT</u>
Very Loose	0 to 4
Loose	5 to 10
Medium Dense	11 to 30
Dense	31 to 50
Very Dense	Over 50

SAMPLER TYPES

(Shown in Samples Column)

-  Shelby Tube
-  Split Spoon
-  Rock Core
-  No Recovery

TERMS

Standard Penetration Resistance - The Number of Blows of 140 lb. Hammer Falling 30 in. Required to Drive 1.4 in. I.D. Split Spoon Sampler 1 Foot. As Specified in ASTM D-1586.

REC - Total Length of Rock Recovered in the Core Barrel Divided by the Total Length of the Core Run Times 100%.

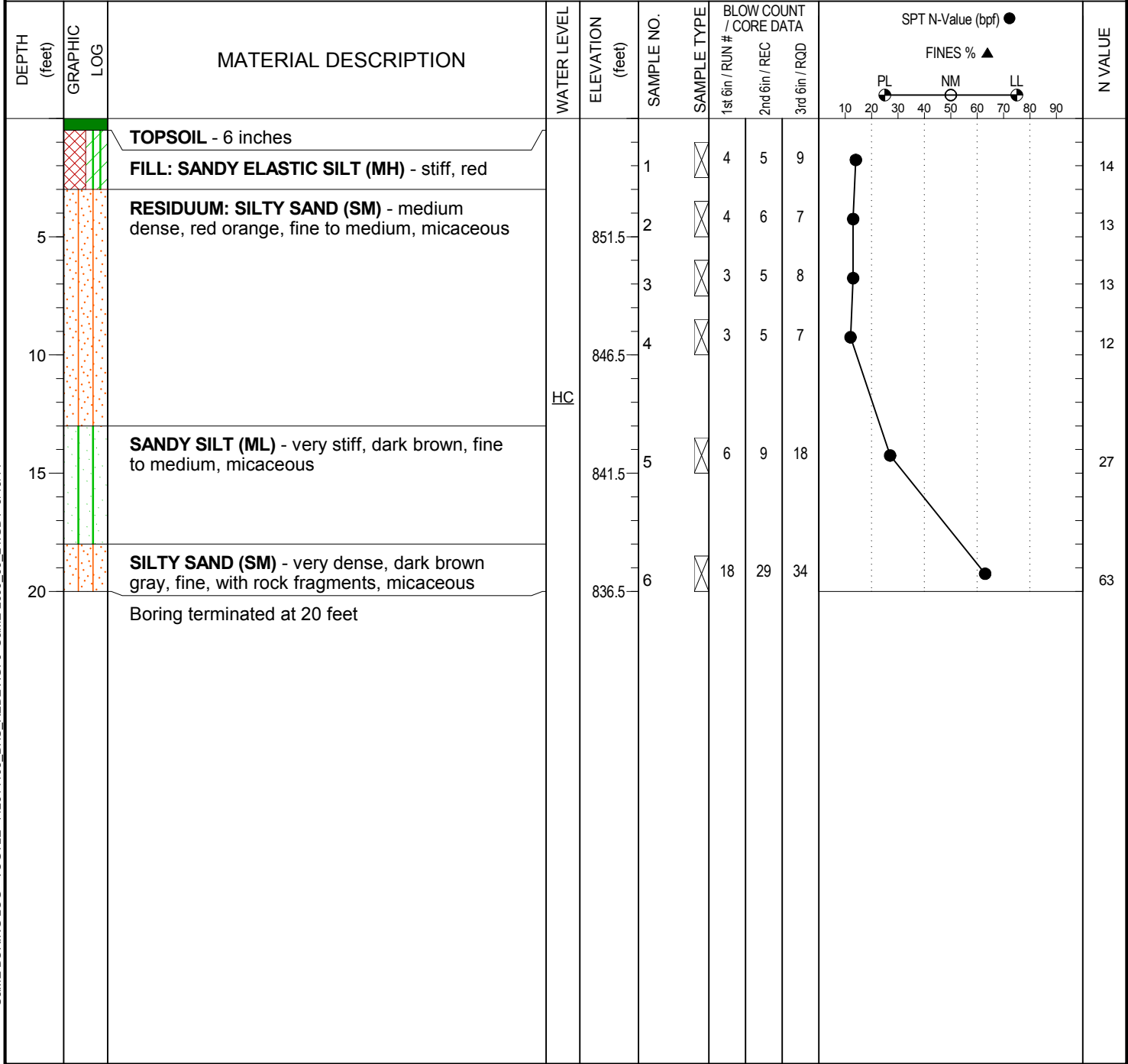
RQD - Total Length of Sound Rock Segments Recovered that are Longer Than or Equal to 4" (mechanical breaks excluded) Divided by the Total Length of the Core Run Times 100%.



CLIENT: McMillan Pazdan Smith Architecture	ELEVATION: 856.5 ft	NOTES: Elevations are estimated based on the provided topography from Blackwood Associates Inc. and are approximate
DATE DRILLED: 7/25/14	BORING DEPTH: 20.0 ft	
DRILL RIG: ATV	WATER LEVEL: Not Encountered at TOB	
DRILLER: Costello & Giles	CAVE-IN DEPTH: 12'	
HAMMER TYPE: Automatic	LOGGED BY: F. Morris	

SAMPLING METHOD: **Split Spoon**

DRILLING METHOD: **3 1/4" H.S.A.**



S&ME BORING LOG - VOGTLE 142614105_BHS_REDEV.GPJ S&ME 2009_09_24.GDT 9/19/14

NOTES:

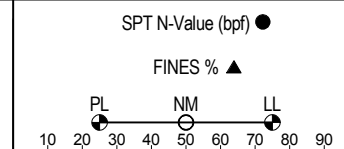
1. THIS LOG IS ONLY A PORTION OF A REPORT PREPARED FOR THE NAMED PROJECT AND MUST ONLY BE USED TOGETHER WITH THAT REPORT.
2. BORING, SAMPLING AND PENETRATION TEST DATA IN GENERAL ACCORDANCE WITH ASTM D-1586.
3. STRATIFICATION AND GROUNDWATER DEPTHS ARE NOT EXACT.
4. WATER LEVEL IS AT TIME OF EXPLORATION AND WILL VARY.



PROJECT: J.F. Byrnes High School Redevelopment Duncan, SC S&ME Project No. 1426-14-105		BORING LOG B-2	
CLIENT: McMillan Pazdan Smith Architecture	ELEVATION: 856.0 ft	NOTES: Elevations are estimated based on the provided topography from Blackwood Associates Inc. and are approximate	
DATE DRILLED: 7/22/14	BORING DEPTH: 15.0 ft		
DRILL RIG: ATV	WATER LEVEL: Not Encountered at TOB		
DRILLER: Costello & Giles	CAVE-IN DEPTH: N/A		
HAMMER TYPE: Automatic	LOGGED BY: F. Morris		
SAMPLING METHOD: Split Spoon			

DEPTH (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT / CORE DATA			SPT N-Value (bpf)		N VALUE
							1st 6in / RUN #	2nd 6in / REC	3rd 6in / RGD	PL	LF	
		TOPSOIL - 6 inches										
		FILL: CLAYEY SAND (SC) - loose, red, fine to medium, with crushed stone			1	⊗	4	3	5			8
5		RESIDUUM: SILTY SAND (SM) - medium dense, dark brown red tan, fine		851.0	2	⊗	5	6	10			16
					3	⊗	4	6	7			13
10		POORLY GRADED SAND (SP) - medium dense, dark gray tan, fine to medium, with quartz stone, trace silt and clay		846.0	4	⊗	6	6	6			12
					5	⊗	13	13	26			39
15		SILTY SAND (SM) - dense, dark brown, fine to medium, with rock fragments		841.0								
		Boring terminated at 15 feet										

S&ME BORING LOG - VOGTLE 142614105_BHS_REDEV.GPJ S&ME 2009_09_24.GDT 9/17/14



NOTES:

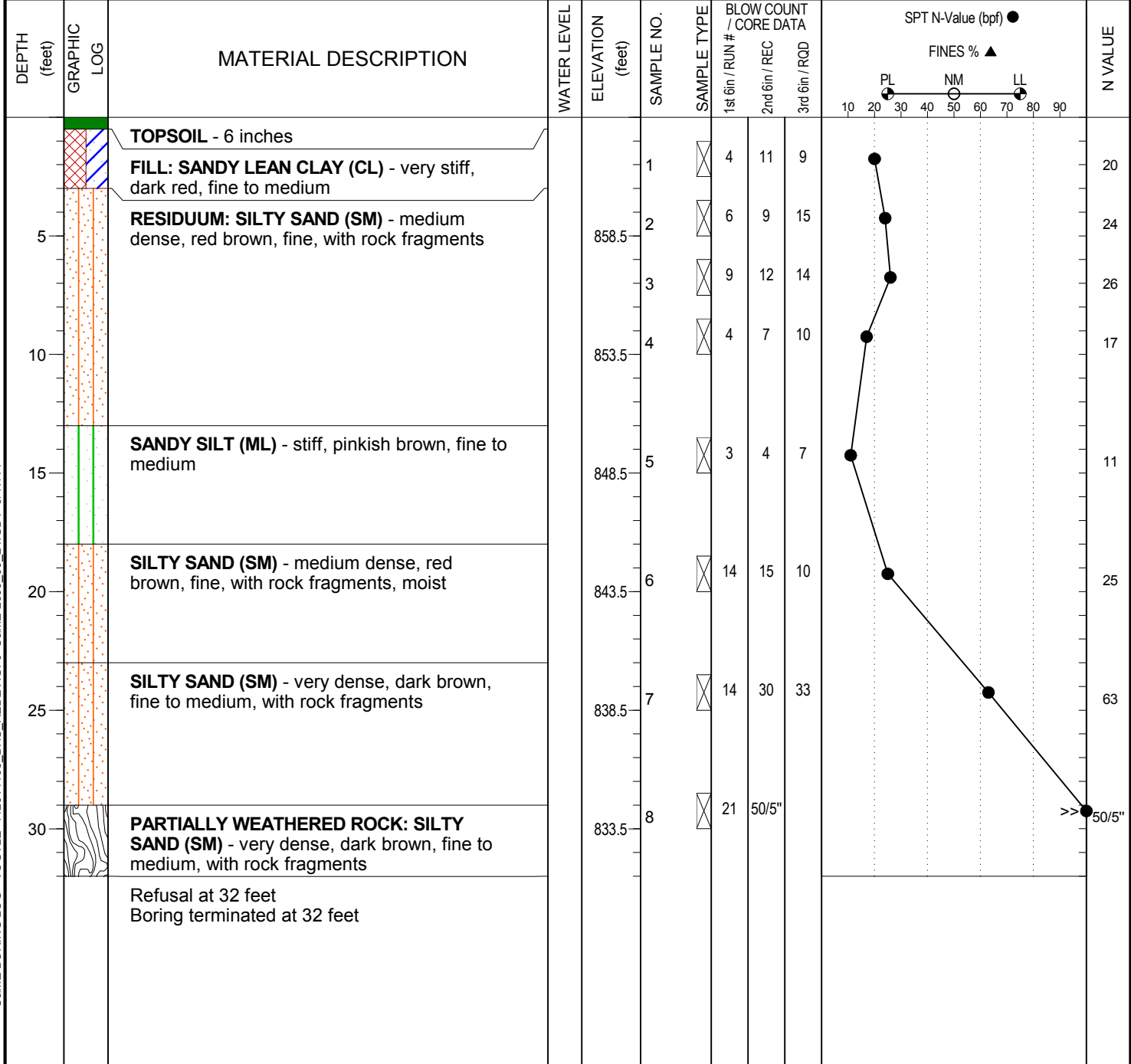
1. THIS LOG IS ONLY A PORTION OF A REPORT PREPARED FOR THE NAMED PROJECT AND MUST ONLY BE USED TOGETHER WITH THAT REPORT.
2. BORING, SAMPLING AND PENETRATION TEST DATA IN GENERAL ACCORDANCE WITH ASTM D-1586.
3. STRATIFICATION AND GROUNDWATER DEPTHS ARE NOT EXACT.
4. WATER LEVEL IS AT TIME OF EXPLORATION AND WILL VARY.



CLIENT: McMillan Pazdan Smith Architecture	ELEVATION: 863.5 ft	NOTES: Elevations are estimated based on the provided topography from Blackwood Associates Inc. and are approximate
DATE DRILLED: 7/22/14	BORING DEPTH: 32.0 ft	
DRILL RIG: ATV	WATER LEVEL: Not Encountered at TOB	
DRILLER: Costello & Giles	CAVE-IN DEPTH: N/A	
HAMMER TYPE: Automatic	LOGGED BY: F. Morris	

SAMPLING METHOD: **Split Spoon**

DRILLING METHOD: **3 1/4" H.S.A.**



S&ME BORING LOG - VOGTLE 142614105_BHS_REDEV.GPJ S&ME 2009_09_24.GDT 9/17/14

NOTES:

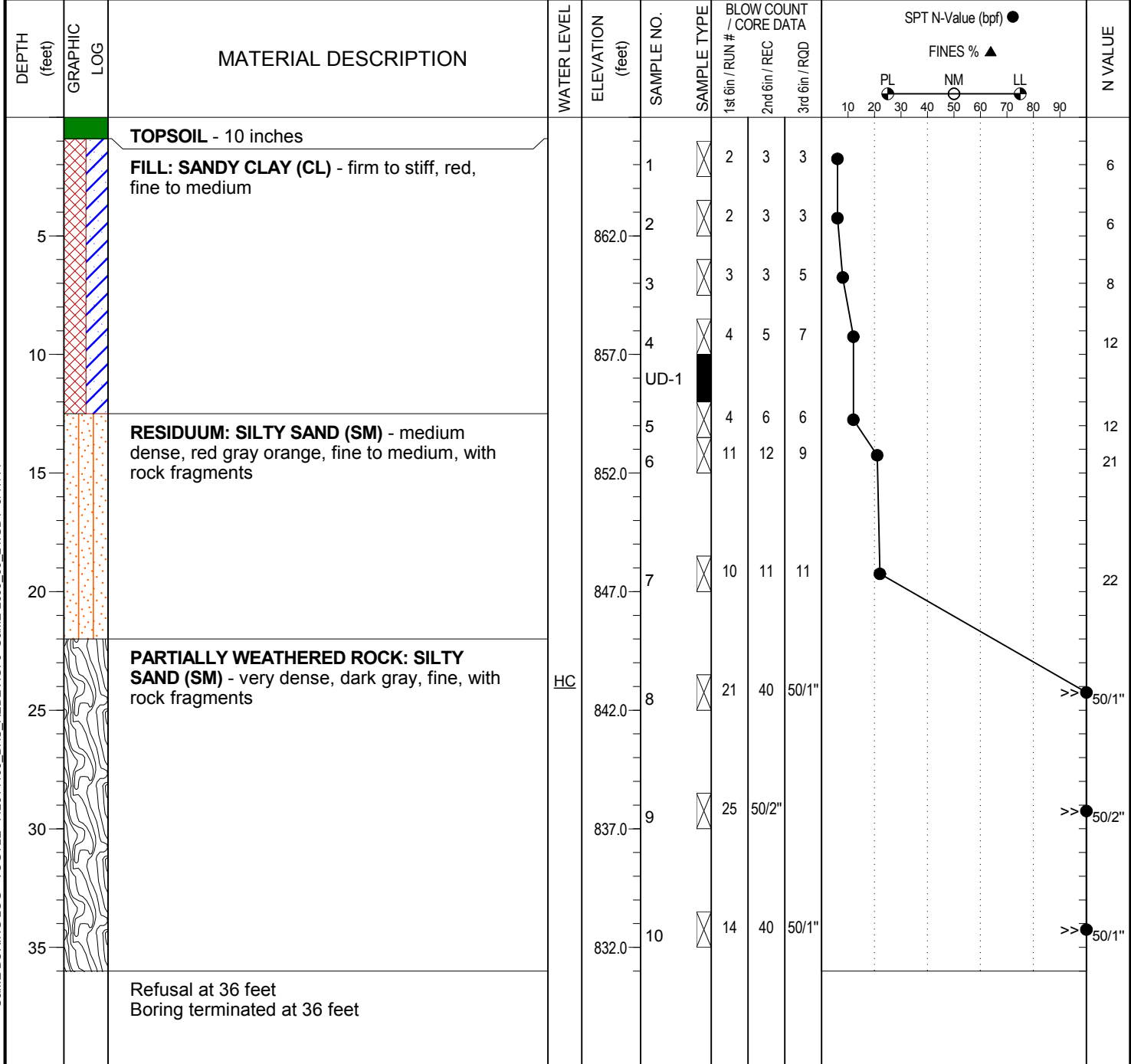
1. THIS LOG IS ONLY A PORTION OF A REPORT PREPARED FOR THE NAMED PROJECT AND MUST ONLY BE USED TOGETHER WITH THAT REPORT.
2. BORING, SAMPLING AND PENETRATION TEST DATA IN GENERAL ACCORDANCE WITH ASTM D-1586.
3. STRATIFICATION AND GROUNDWATER DEPTHS ARE NOT EXACT.
4. WATER LEVEL IS AT TIME OF EXPLORATION AND WILL VARY.



CLIENT: McMillan Pazdan Smith Architecture	ELEVATION: 867.0 ft	NOTES: Elevations are estimated based on the provided topography from Blackwood Associates Inc. and are approximate UD sample obtained from 10 to 12 ft. Bulk sample obtained from 20 to 30 ft
DATE DRILLED: 7/22/14	BORING DEPTH: 36.0 ft	
DRILL RIG: ATV	WATER LEVEL: Not Encountered at TOB	
DRILLER: Costello & Giles	CAVE-IN DEPTH: 24'	
HAMMER TYPE: Automatic	LOGGED BY: F. Morris	

SAMPLING METHOD: **Split Spoon**

DRILLING METHOD: **3 1/4" H.S.A.**



S&ME BORING LOG - VOGTLE 142614105_BHS_REDEV.GPJ S&ME 2009_09_24.GDT 9/17/14

NOTES: Page 1 of 1

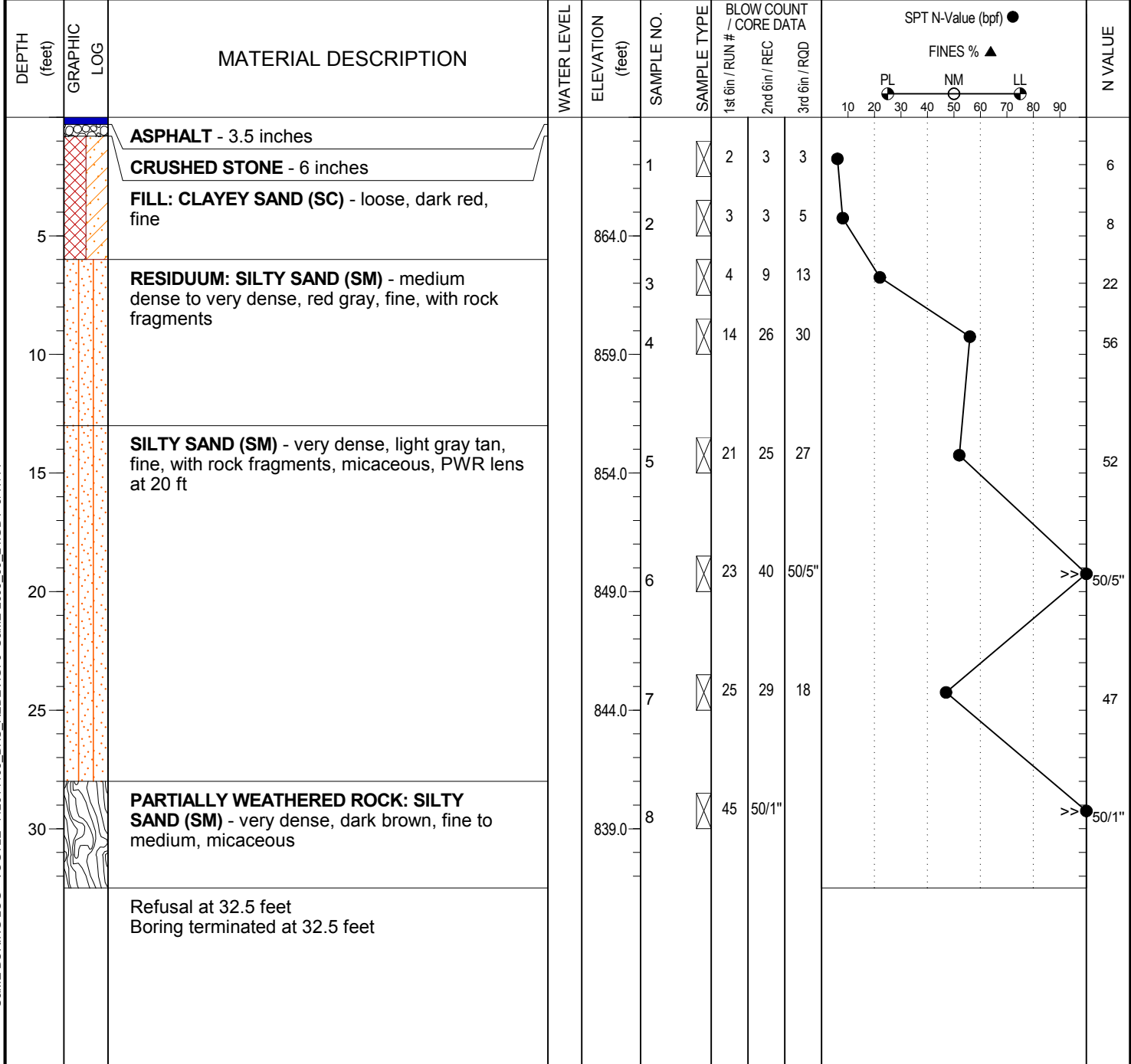
1. THIS LOG IS ONLY A PORTION OF A REPORT PREPARED FOR THE NAMED PROJECT AND MUST ONLY BE USED TOGETHER WITH THAT REPORT.
2. BORING, SAMPLING AND PENETRATION TEST DATA IN GENERAL ACCORDANCE WITH ASTM D-1586.
3. STRATIFICATION AND GROUNDWATER DEPTHS ARE NOT EXACT.
4. WATER LEVEL IS AT TIME OF EXPLORATION AND WILL VARY.



CLIENT: McMillan Pazdan Smith Architecture	ELEVATION: 869.0 ft	NOTES: Elevations are estimated based on the provided topography from Blackwood Associates Inc. and are approximate
DATE DRILLED: 7/22/14	BORING DEPTH: 32.5 ft	
DRILL RIG: ATV	WATER LEVEL: Not Encountered at 24-hr.	
DRILLER: Costello & Giles	CAVE-IN DEPTH: N/A	
HAMMER TYPE: Automatic	LOGGED BY: F. Morris	

SAMPLING METHOD: **Split Spoon**

DRILLING METHOD: **3 1/4" H.S.A.**



S&ME BORING LOG - VOGTLE 142614105_BHS_REDEV.GPJ S&ME 2009_09_24.GDT 9/17/14

NOTES:

1. THIS LOG IS ONLY A PORTION OF A REPORT PREPARED FOR THE NAMED PROJECT AND MUST ONLY BE USED TOGETHER WITH THAT REPORT.
2. BORING, SAMPLING AND PENETRATION TEST DATA IN GENERAL ACCORDANCE WITH ASTM D-1586.
3. STRATIFICATION AND GROUNDWATER DEPTHS ARE NOT EXACT.
4. WATER LEVEL IS AT TIME OF EXPLORATION AND WILL VARY.



PROJECT: J.F. Byrnes High School Redevelopment Duncan, SC S&ME Project No. 1426-14-105		BORING LOG B-6																	
CLIENT: McMillan Pazdan Smith Architecture	ELEVATION: 871.0 ft	NOTES: Elevations are estimated based on the provided topography from Blackwood Associates Inc. and are approximate																	
DATE DRILLED: 7/23/14	BORING DEPTH: 35.0 ft																		
DRILL RIG: ATV	WATER LEVEL: Not Encountered at 24-hr.																		
DRILLER: Costello & Giles	CAVE-IN DEPTH: N/A																		
HAMMER TYPE: Automatic	LOGGED BY: F. Morris																		
SAMPLING METHOD: Split Spoon																			
DRILLING METHOD: 3 1/4" H.S.A.																			
DEPTH (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT / CORE DATA			SPT N-Value (bpf)			N VALUE						
							1st 6in / RUN #	2nd 6in / REC	3rd 6in / RGD	PL	NM	LF							
										10	20	30	40	50	60	70	80	90	
		CONCRETE - 7 inches			1	⊗	1	3	3										6
		CRUSHED STONE - 4 inches			2	⊗	1	3	2										5
5		FILL: SANDY ELASTIC SILT (MH) - firm, dark red, micaceous		866.0	2	⊗	1	3	2										5
		RESIDUUM: SILTY SAND (SM) - medium dense, red orange, fine, with rock fragments			3	⊗	4	6	7										13
10				861.0	4	⊗	7	8	8										16
		POORLY GRADED SAND (SP) - very dense, light gray, fine to medium, with rock fragments, trace silt and clay			5	⊗	40	30	25										55
15				856.0	5	⊗	40	30	25										55
		PARTIALLY WEATHERED ROCK: SILTY SAND (SM) - very dense, dark gray, fine, with rock fragments, micaceous			6	⊗	9	13	50/5"										>> 50/5"
20				851.0	6	⊗	9	13	50/5"										>> 50/5"
		SANDY SILT (ML) - very stiff, light gray, fine, micaceous			7	⊗	29	50/4"											>> 50/4"
25				846.0	7	⊗	29	50/4"											>> 50/4"
		PARTIALLY WEATHERED ROCK: SILTY SAND (SM) - very dense, dark brown gray, fine, micaceous			8	⊗	7	9	11										20
30				841.0	8	⊗	7	9	11										20
		PARTIALLY WEATHERED ROCK: SILTY SAND (SM) - very dense, dark brown gray, fine, micaceous			9	⊗	32	50/3"											>> 50/3"
35				836.0	9	⊗	32	50/3"											>> 50/3"
		Boring terminated at 35 feet																	

S&ME BORING LOG - VOGTLE 142614105_BHS_REDEV.GPJ S&ME 2009_09_24.GDT 9/17/14

NOTES:

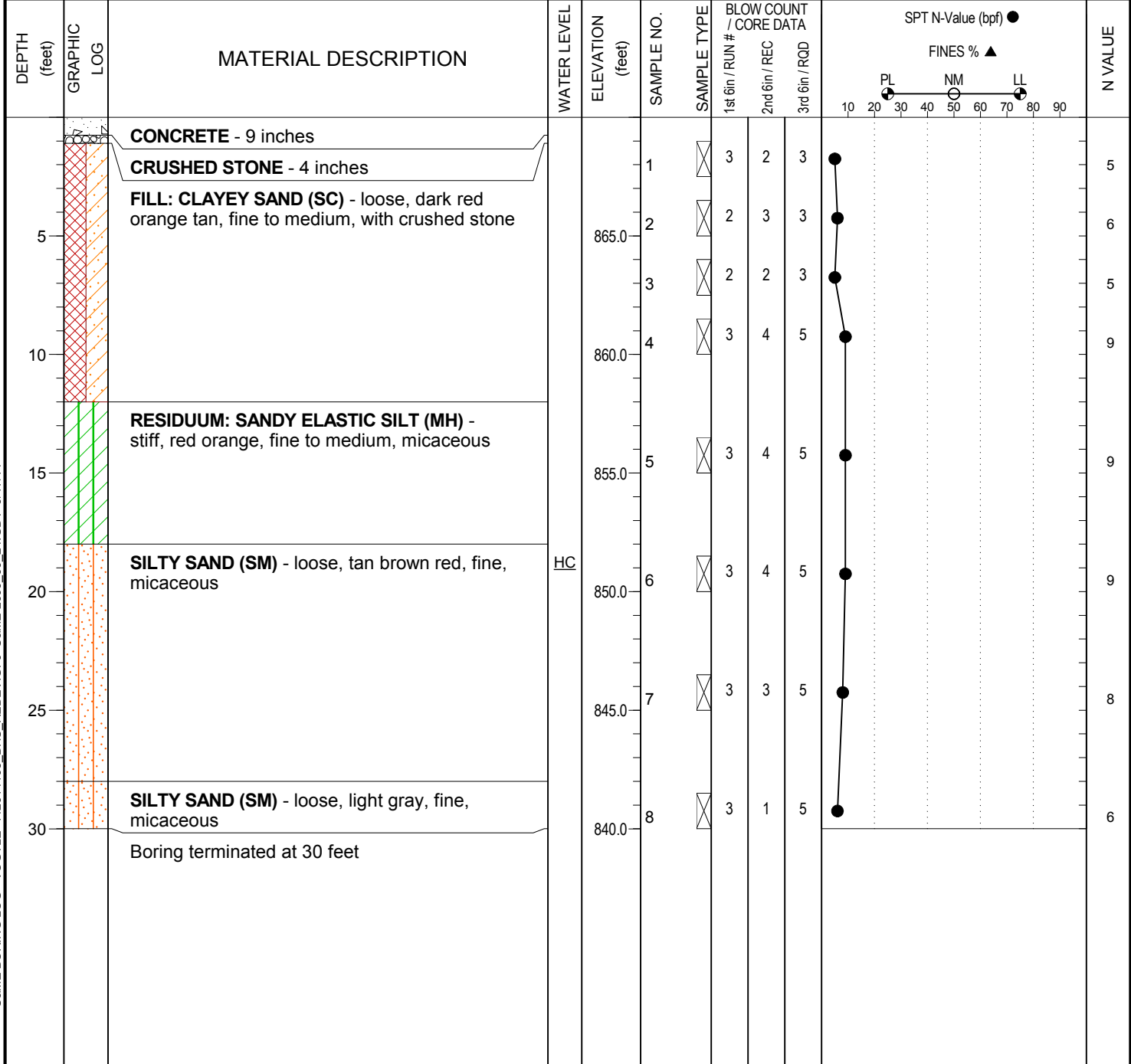
1. THIS LOG IS ONLY A PORTION OF A REPORT PREPARED FOR THE NAMED PROJECT AND MUST ONLY BE USED TOGETHER WITH THAT REPORT.
2. BORING, SAMPLING AND PENETRATION TEST DATA IN GENERAL ACCORDANCE WITH ASTM D-1586.
3. STRATIFICATION AND GROUNDWATER DEPTHS ARE NOT EXACT.
4. WATER LEVEL IS AT TIME OF EXPLORATION AND WILL VARY.



CLIENT: McMillan Pazdan Smith Architecture	ELEVATION: 870.0 ft	NOTES: Elevations are estimated based on the provided topography from Blackwood Associates Inc. and are approximate
DATE DRILLED: 7/23/14	BORING DEPTH: 30.0 ft	
DRILL RIG: ATV	WATER LEVEL: Not Encountered at TOB	
DRILLER: Costello & Giles	CAVE-IN DEPTH: 19'	
HAMMER TYPE: Automatic	LOGGED BY: F. Morris	

SAMPLING METHOD: **Split Spoon**

DRILLING METHOD: **3 1/4" H.S.A.**



S&ME BORING LOG - VOGTLE 142614105_BHS_REDEV.GPJ S&ME 2009_09_24.GDT 9/17/14

NOTES:

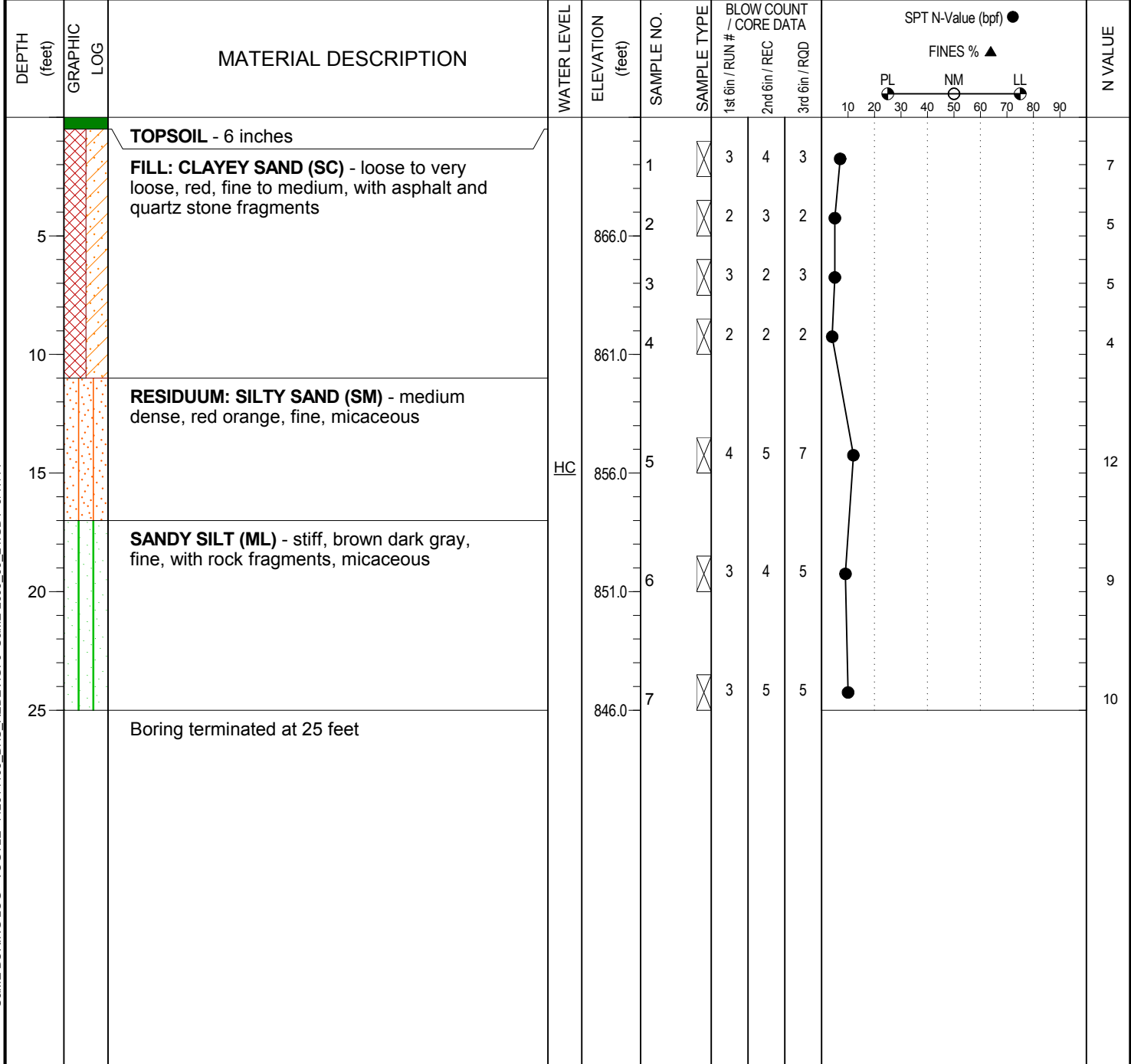
1. THIS LOG IS ONLY A PORTION OF A REPORT PREPARED FOR THE NAMED PROJECT AND MUST ONLY BE USED TOGETHER WITH THAT REPORT.
2. BORING, SAMPLING AND PENETRATION TEST DATA IN GENERAL ACCORDANCE WITH ASTM D-1586.
3. STRATIFICATION AND GROUNDWATER DEPTHS ARE NOT EXACT.
4. WATER LEVEL IS AT TIME OF EXPLORATION AND WILL VARY.



CLIENT: McMillan Pazdan Smith Architecture	ELEVATION: 871.0 ft	NOTES: Elevations are estimated based on the provided topography from Blackwood Associates Inc. and are approximate
DATE DRILLED: 7/23/14	BORING DEPTH: 25.0 ft	
DRILL RIG: ATV	WATER LEVEL: Not Encountered at TOB	
DRILLER: Costello & Giles	CAVE-IN DEPTH: 15'	
HAMMER TYPE: Automatic	LOGGED BY: F. Morris	

SAMPLING METHOD: Split Spoon

DRILLING METHOD: 3/4" H.S.A.



S&ME BORING LOG - VOGTLE 142614105_BHS_REDEV.GPJ S&ME 2009_09_24.GDT 9/17/14

NOTES: Page 1 of 1

1. THIS LOG IS ONLY A PORTION OF A REPORT PREPARED FOR THE NAMED PROJECT AND MUST ONLY BE USED TOGETHER WITH THAT REPORT.
2. BORING, SAMPLING AND PENETRATION TEST DATA IN GENERAL ACCORDANCE WITH ASTM D-1586.
3. STRATIFICATION AND GROUNDWATER DEPTHS ARE NOT EXACT.
4. WATER LEVEL IS AT TIME OF EXPLORATION AND WILL VARY.



CLIENT: McMillan Pazdan Smith Architecture	ELEVATION: 870.0 ft	NOTES: Obstruction was encountered at 18-ft. below ground surface and boring was terminated. Elevations are estimated based on the provided topography from Blackwood Associates Inc. and are approximate.
DATE DRILLED: 7/23/14	BORING DEPTH: 18.0 ft	
DRILL RIG: ATV	WATER LEVEL: Not Encountered at TOB	
DRILLER: Costello & Giles	CAVE-IN DEPTH: 12.5'	
HAMMER TYPE: Automatic	LOGGED BY: F. Morris	

SAMPLING METHOD: **Split Spoon**

DRILLING METHOD: **3 1/4" H.S.A.**

DEPTH (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT / CORE DATA			SPT N-Value (bpf)					N VALUE
							1st 6in / RUN #	2nd 6in / REC	3rd 6in / RGD	PL	NM	LF	FINES %		
	ASPHALT	ASPHALT - 3 inches													
	FILL	FILL: SANDY CLAY (CL) - stiff, dark red, fine to medium													
5	FILL	FILL: CLAYEY SAND (SC) - loose, red, fine to medium, with crushed stone, moist		865.0	2	SC	2	3	4						7
	FILL	FILL: SANDY LEAN CLAY (CL) - stiff to firm, dark red, fine to medium			3	CL	3	4	5						9
10	FILL	FILL: SANDY LEAN CLAY (CL) - stiff to firm, dark red, fine to medium		860.0	4	CL	2	3	4						7
	FILL	FILL: CLAYEY SAND (SC) - very loose, red, fine to medium	HC		5	SC	2	1	2						3
15		Refusal at 18 feet Boring terminated at 18 feet													

S&ME BORING LOG - VOGTLE 142614105_BHS_REDEV.GPJ S&ME 2009_09_24.GDT 9/17/14

NOTES: Page 1 of 1

1. THIS LOG IS ONLY A PORTION OF A REPORT PREPARED FOR THE NAMED PROJECT AND MUST ONLY BE USED TOGETHER WITH THAT REPORT.
2. BORING, SAMPLING AND PENETRATION TEST DATA IN GENERAL ACCORDANCE WITH ASTM D-1586.
3. STRATIFICATION AND GROUNDWATER DEPTHS ARE NOT EXACT.
4. WATER LEVEL IS AT TIME OF EXPLORATION AND WILL VARY.



CLIENT: McMillan Pazdan Smith Architecture	ELEVATION: 841.0 ft	NOTES: Elevations are estimated based on the provided topography from Blackwood Associates Inc. and are approximate
DATE DRILLED: 7/24/14	BORING DEPTH: 35.0 ft	
DRILL RIG: ATV	WATER LEVEL: Not Encountered at TOB	
DRILLER: Costello & Giles	CAVE-IN DEPTH: 23'	
HAMMER TYPE: Automatic	LOGGED BY: F. Morris	

SAMPLING METHOD: **Split Spoon**

DRILLING METHOD: **3 1/4" H.S.A.**

DEPTH (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT / CORE DATA			SPT N-Value (bpf)			N VALUE
							1st 6in / RUN #	2nd 6in / REC	3rd 6in / RGD	PL	NM	LF	
0 - 4		TOPSOIL - 4 inches											
4 - 5		FILL: SANDY ELASTIC SILT (MH) - stiff, red			1	⊗	3	6	8				14
5 - 10		RESIDUUM: SANDY ELASTIC SILT (MH) - stiff to very stiff, red orange, micaceous		836.0	2	⊗	5	8	8				16
10 - 15		SANDY ELASTIC SILT (MH) - stiff, red orange, micaceous		831.0	3	⊗	4	5	7				12
15 - 20		SANDY ELASTIC SILT (MH) - stiff, red orange, micaceous		831.0	4	⊗	3	5	5				10
20 - 25		POORLY GRADED SAND (SP) - medium dense, white tan, fine to coarse, with rock fragments, trace silt and clay		826.0	5	⊗	3	5	6				11
25 - 30		SANDY SILT (ML) - stiff to very stiff, gray brown, fine to medium, with rock fragments, micaceous		821.0	6	⊗	5	5	8				13
30 - 35		SANDY SILT (ML) - stiff to very stiff, gray brown, fine to medium, with rock fragments, micaceous	HC	816.0	7	⊗	5	7	11				18
35 - 38		SILTY SAND (SM) - loose, red orange, fine		811.0	8	⊗	3	3	5				8
38 - 35		SILTY SAND (SM) - medium dense, white tan, fine to medium		806.0	9	⊗	6	6	8				14
		Boring terminated at 35 feet											

S&ME BORING LOG - VOGTLE 142614105_BHS_REDEV.GPJ S&ME 2009_09_24.GDT 9/17/14

NOTES:

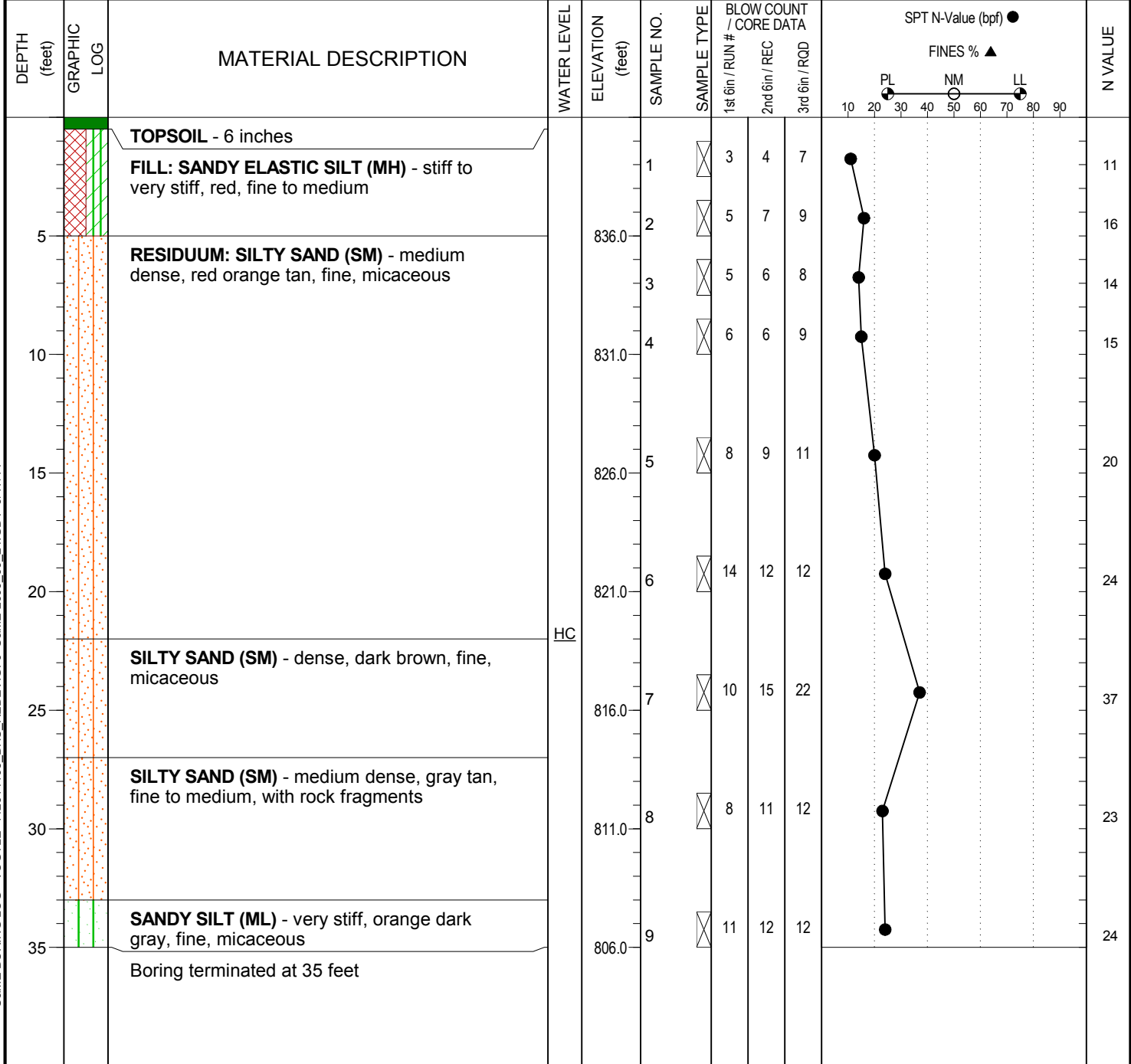
1. THIS LOG IS ONLY A PORTION OF A REPORT PREPARED FOR THE NAMED PROJECT AND MUST ONLY BE USED TOGETHER WITH THAT REPORT.
2. BORING, SAMPLING AND PENETRATION TEST DATA IN GENERAL ACCORDANCE WITH ASTM D-1586.
3. STRATIFICATION AND GROUNDWATER DEPTHS ARE NOT EXACT.
4. WATER LEVEL IS AT TIME OF EXPLORATION AND WILL VARY.



CLIENT: McMillan Pazdan Smith Architecture	ELEVATION: 841.0 ft	NOTES: Elevations are estimated based on the provided topography from Blackwood Associates Inc. and are approximate
DATE DRILLED: 7/25/14	BORING DEPTH: 35.0 ft	
DRILL RIG: ATV	WATER LEVEL: Not Encountered at TOB	
DRILLER: Costello & Giles	CAVE-IN DEPTH: 22'	
HAMMER TYPE: Automatic	LOGGED BY: F. Morris	

SAMPLING METHOD: **Split Spoon**

DRILLING METHOD: **3 1/4" H.S.A.**



S&ME BORING LOG - VOGTLE 142614105_BHS_REDEV.GPJ S&ME 2009_09_24.GDT 9/17/14

NOTES:

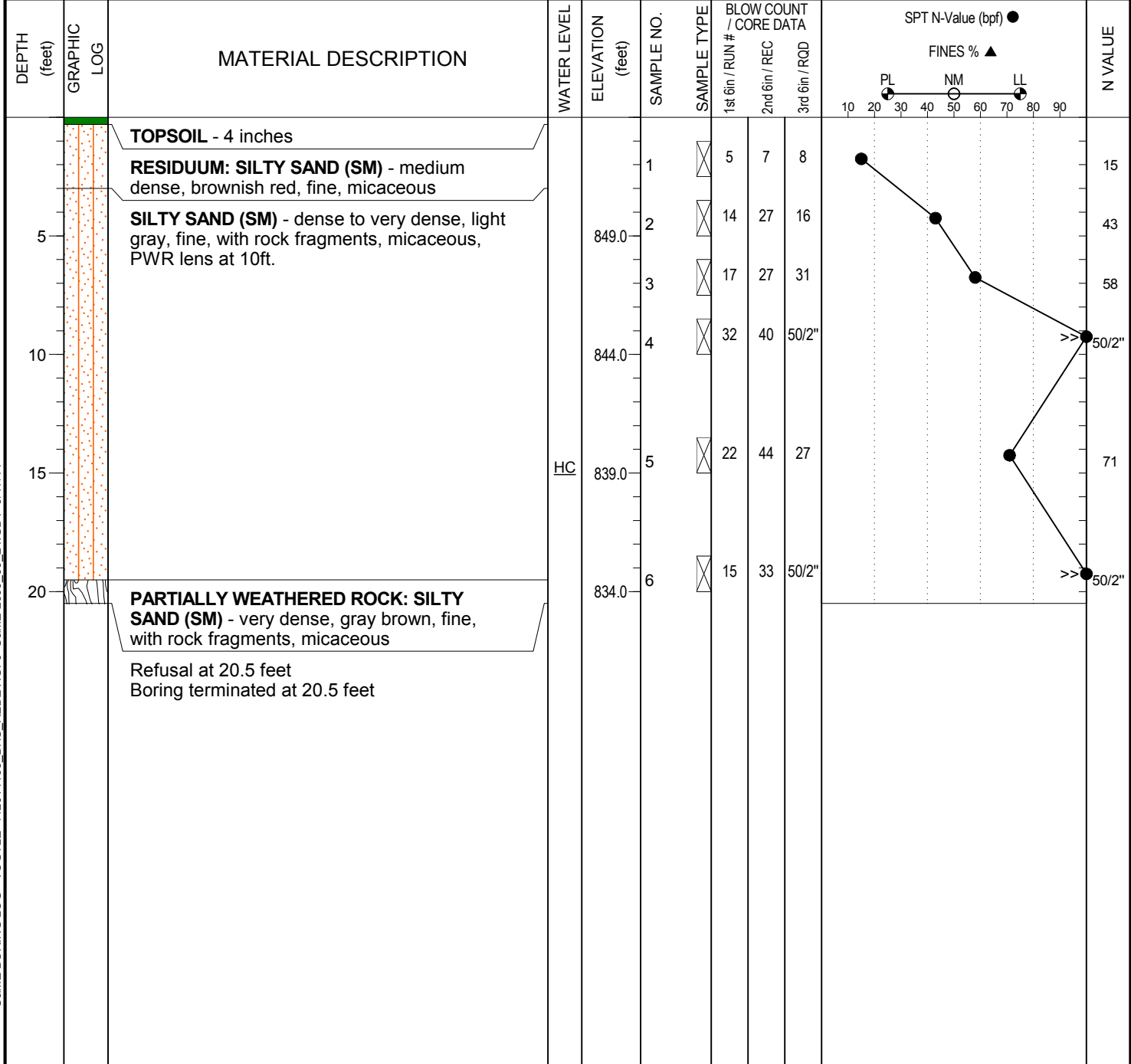
1. THIS LOG IS ONLY A PORTION OF A REPORT PREPARED FOR THE NAMED PROJECT AND MUST ONLY BE USED TOGETHER WITH THAT REPORT.
2. BORING, SAMPLING AND PENETRATION TEST DATA IN GENERAL ACCORDANCE WITH ASTM D-1586.
3. STRATIFICATION AND GROUNDWATER DEPTHS ARE NOT EXACT.
4. WATER LEVEL IS AT TIME OF EXPLORATION AND WILL VARY.



CLIENT: McMillan Pazdan Smith Architecture	ELEVATION: 854.0 ft	NOTES: Elevations are estimated based on the provided topography from Blackwood Associates Inc. and are approximate Bulk sample collected from 10 to 15 ft
DATE DRILLED: 7/24/14	BORING DEPTH: 20.5 ft	
DRILL RIG: ATV	WATER LEVEL: Not Encountered at TOB	
DRILLER: Costello & Giles	CAVE-IN DEPTH: 15'	
HAMMER TYPE: Automatic	LOGGED BY: F. Morris	

SAMPLING METHOD: **Split Spoon**

DRILLING METHOD: **3 1/4" H.S.A.**



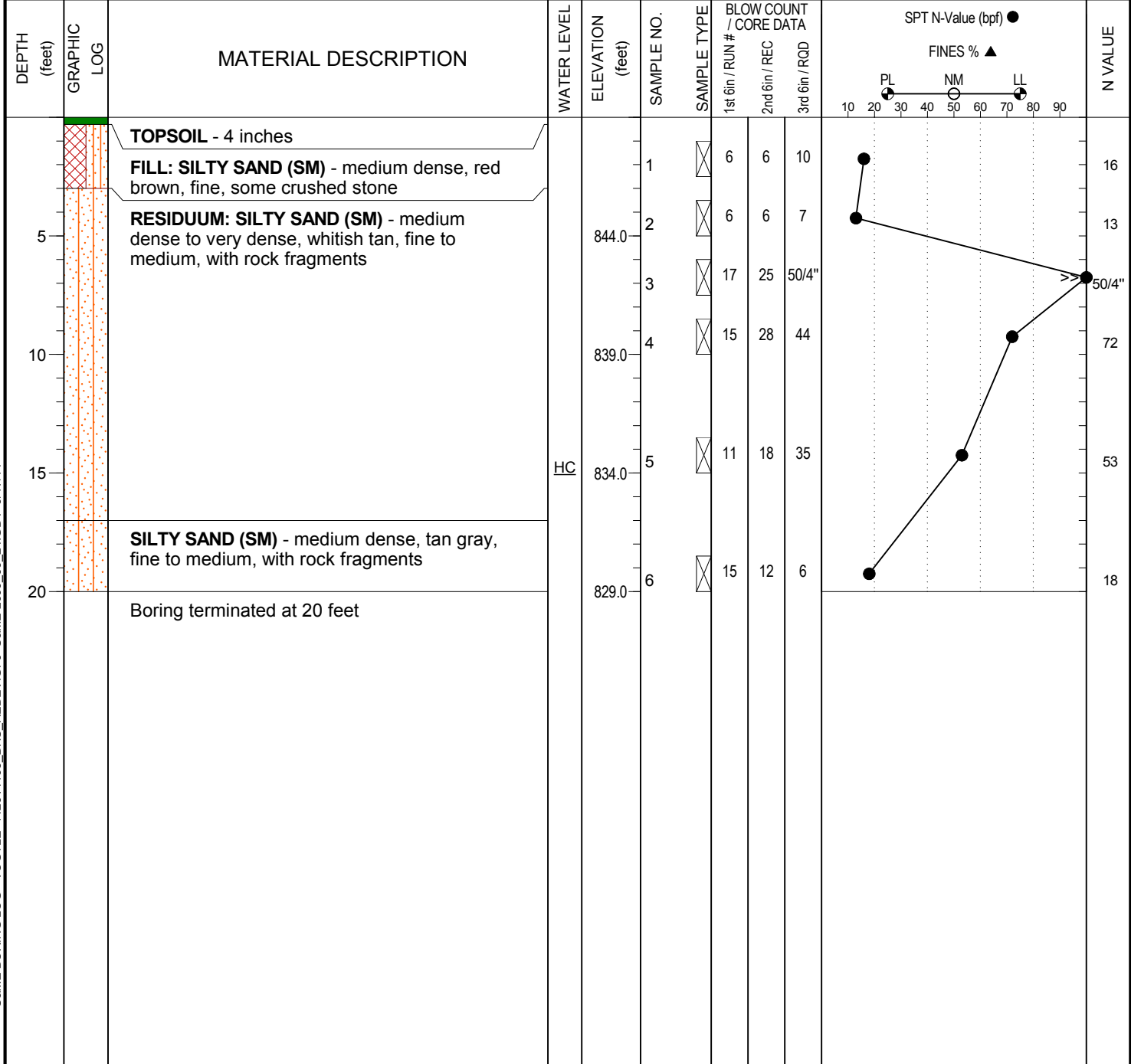
S&ME BORING LOG - VOGTLE 142614105_BHS_REDEV.GPJ S&ME 2009_09_24.GDT 9/17/14

- NOTES:**
1. THIS LOG IS ONLY A PORTION OF A REPORT PREPARED FOR THE NAMED PROJECT AND MUST ONLY BE USED TOGETHER WITH THAT REPORT.
 2. BORING, SAMPLING AND PENETRATION TEST DATA IN GENERAL ACCORDANCE WITH ASTM D-1586.
 3. STRATIFICATION AND GROUNDWATER DEPTHS ARE NOT EXACT.
 4. WATER LEVEL IS AT TIME OF EXPLORATION AND WILL VARY.



CLIENT: McMillan Pazdan Smith Architecture	ELEVATION: 849.0 ft	NOTES: Elevations are estimated based on the provided topography from Blackwood Associates Inc. and are approximate Bulk sample obtained from 0 to 10 ft
DATE DRILLED: 7/24/14	BORING DEPTH: 20.0 ft	
DRILL RIG: ATV	WATER LEVEL: Not Encountered at TOB	
DRILLER: Costello & Giles	CAVE-IN DEPTH: 15'	
HAMMER TYPE: Automatic	LOGGED BY: F. Morris	
SAMPLING METHOD: Split Spoon		

DRILLING METHOD: **3/4" H.S.A.**



S&ME BORING LOG - VOGTLE 142614105_BHS_REDEV.GPJ S&ME 2009_09_24.GDT 9/17/14

NOTES:

1. THIS LOG IS ONLY A PORTION OF A REPORT PREPARED FOR THE NAMED PROJECT AND MUST ONLY BE USED TOGETHER WITH THAT REPORT.
2. BORING, SAMPLING AND PENETRATION TEST DATA IN GENERAL ACCORDANCE WITH ASTM D-1586.
3. STRATIFICATION AND GROUNDWATER DEPTHS ARE NOT EXACT.
4. WATER LEVEL IS AT TIME OF EXPLORATION AND WILL VARY.



FIELD TESTING PROCEDURES

SOIL TEST BORINGS

All borings and sampling were conducted in accordance with ASTM D-1586 test method. Initially, the borings were advanced by either mechanically augering or wash boring through the overburden soils. When necessary, a heavy drilling fluid is used below the water table to stabilize the sides and bottom of the borehole. At regular intervals, soil samples were obtained with a standard 1.4-inch I.D., 2-inch O.D., split-barrel or split-spoon sampler. The sampler was first seated 6 inches to penetrate any loose cuttings and then driven an additional foot with blows of a 140-pound hammer falling 30 inches. The number of hammer blows required to drive the sampler the final foot is designated as the "Standard Penetration Resistance" or N-value. The penetration resistance, when properly evaluated, can be correlated to consistency, relative density, strength and compressibility of the sampled soils.

WATER LEVEL READINGS

Water level readings are normally taken in conjunction with borings and are recorded on the Boring Logs following termination of drilling (designated by ∇) and at a period of 24 hours following termination of drilling (designated by ∇). These readings indicate the approximate location of the hydrostatic water table at the time of our field exploration. The groundwater table may be dependent upon the amount of precipitation at the site during a particular period of time. Fluctuations in the water table should also be expected with variations in surface run-off, evaporation, construction activity and other factors.

Occasionally the boreholes sides will cave, preventing the water level readings from being obtained or trapping drilling water above the cave-in zone. In these instances, the hole cave-in depth (designated by HC) is measured and recorded on the Boring Logs. Water level readings taken during the field operations do not provide information on the long-term fluctuations of the water table. When this information is required, piezometers are installed to prevent the boreholes from caving.

DOCUMENT 00 43 73 - PROPOSED SCHEDULE OF VALUES FORM

1.1 BID FORM SUPPLEMENT

1.2 PROPOSED SCHEDULE OF VALUES FORM

- A. Proposed Schedule of Values Form: Provide a breakdown of the bid amount, including alternates, in enough detail to facilitate continued evaluation of bid. Coordinate with the Project Manual table of contents. Provide multiple line items for principal material and subcontract amounts in excess of five percent of the Contract Sum.
- B. Arrange schedule of values using AIA Document G703-1992 .
 - 1. Copies of AIA standard forms may be obtained from the American Institute of Architects; [https://www.aiacontracts.org/ library](https://www.aiacontracts.org/library); (800) 942-7732.

END OF DOCUMENT 00 43 73

**SECTION 00 43 73 - PROPOSED SCHEDULE OF
VALUES FORM**

Page 1 of 1

SECTION 00 60 00 - PROJECT FORMS

1.1 FORM OF AGREEMENT AND GENERAL CONDITIONS

- A. The following form of Owner/Contractor Agreement and form of the General Conditions shall be used for Project:
 - 1. AIA Document A133-2009 "Standard Form of Agreement between Owner and Construction Manager as Constructor Where the Basis of Payment is the Cost of the Work Plus a Fee with a Guaranteed Maximum Price."
 - a. The General Conditions for Project are AIA Document A201-2017 "General Conditions of the Contract for Construction."
 - 2. The General Conditions are incorporated by reference.
 - 3. The Supplementary Conditions for Project are separately prepared and included in the Project Manual.
 - 4. Owner's document(s) bound following this Document.

1.2 ADMINISTRATIVE FORMS

- A. Administrative Forms: Additional administrative forms are specified in Division 01 General Requirements.
- B. Copies of AIA standard forms may be obtained from the American Institute of Architects; www.aiacontractdocsaicontracts.org; (800) 942-7732.
- C. Preconstruction Forms:
 - 1. Form of Performance Bond and Labor and Material Bond: AIA Document A312-2010 "Performance Bond and Payment Bond."
 - 2. Form of Certificate of Insurance: AIA Document G715-2017 "Supplemental Attachment for ACORD Certificate of Insurance 25."
- D. Information and Modification Forms:
 - 1. Form for Requests for Information (RFIs): AIA Document G716-2004 "Request for Information (RFI)."
 - 2. Form of Request for Proposal: AIA Document G709-2018 "Proposal Request."
 - 3. Change Order Form: AIA Document G701-2017 "Change Order."
 - 4. Form of Architect's Memorandum for Minor Changes in the Work: AIA Document G710-2017 "Architect's Supplemental Instructions."
 - 5. Form of Change Directive: AIA Document G714-2017 "Construction Change Directive."
- E. Payment Forms:
 - 1. Schedule of Values Form: AIA Document G703-1992 "Continuation Sheet."

SECTION 00 60 00 - PROJECT FORMS

2. Payment Application: AIA Document G702-1992/703-1992 "Application and Certificate for Payment and Continuation Sheet."
3. Form of Contractor's Affidavit: AIA Document G706-1994 "Contractor's Affidavit of Payment of Debts and Claims."
4. Form of Affidavit of Release of Liens: AIA Document G706A-1994 "Contractor's Affidavit of Payment of Release of Liens."
5. Form of Consent of Surety: AIA Document G707-1994 "Consent of Surety to Final Payment."

END OF DOCUMENT 00 60 00

SECTION 00 60 01 - SUPPLEMENTARY CONDITIONS

PART 1 - GENERAL

1.1 SUMMARY

- A. These Supplementary Conditions amend and supplement the General Conditions and other provisions of the Contract Documents as indicated below. Provisions that are not so amended or supplemented remain in full force and effect.
- B. The terms used in these Supplementary Conditions that are defined in the General Conditions have the meanings assigned to them in the General Conditions.

1.2 RELATED DOCUMENTS

- A. Section 00 60 00 – Project Forms.

1.3 MODIFICATIONS TO GENERAL CONDITIONS

A. ARTICLE 7 CHANGES IN THE WORK

- 1. 7.3.4 _Add item ".6" Limitations to General Contractor and Sub-contractor's mark-up for profit and overhead:
 - a. General Contractor and 1st Tier Sub-Contractor's mark-up for overhead and fees for work perform with their own forces - 10%.
 - b. General Contractor's mark-up for overhead and fees for work perform by 1st Tier sub-contractor's forces - 5%.
 - c. Sub-Contractor's mark-up for overhead and fees for work perform by 2nd Tier sub-sub-contractor's forces - 2.5%.

B. ARTICLE 8 TIME

- 1. 8.2.4 shall be added as follows:
 - a. 8.2.4 The Contractor is subject to liquidated damages, as specified in the Agreement if the Work is not completed by the date of Substantial Completion.

C. ARTICLE 9 PAYMENTS AND COMPLETION

- 1. Add Article 9.3.1.A: Retainage shall be 10% each payment until 50% complete; then be reduced to 5% until final payment.
- 2. Add Article 9.5.1.6.A: Liquidated Damages @ \$400.00 per calendar day necessary to achieve Substantial Completion beyond the date set forth in the AIA Owner-Contractor Agreement.

D. ARTICLE 11 INSURANCE AND BONDS

1. 11.1.1.1 shall be added as follows:
 - a. 11.1.1.1 The insurance required by subparagraph 11.1.1 shall be written for not less than the following limits, or greater if required by law:
 - 1) Worker's Compensation:
 - a) State Statutory
 - b) Applicable Federal Statutory
 - c) Employer's Liability
 - (1) \$500,000 Each Accident
 - (2) \$500,000 Disease, Policy Limit
 - (3) \$500,000 Disease, Each Employee
 - 2) Commercial General Liability (including premises/operations, independent contractors, products and completed operations, and broad form property damage):
 - a) Bodily Injury & Property Damage (combined single limit):
 - (1) \$1,000,000 Each Occurrence
 - (2) \$2,000,000 Aggregate
 - b) Products and completed operations to be maintained for one (1) year after Final Payment.
 - 3) Contractual Liability (Hold Harmless Coverage):
 - a) Bodily Injury & Property Damage (combined single limit):
 - (1) \$1,000,000 Each Occurrence
 - (2) \$2,000,000 Aggregate
 - 4) Personal Injury, with employment exclusion deleted:
 - a) \$1,000,000 Aggregate
 - 5) Comprehensive Automotive Liability (owned, non-owned and hired):
 - a) Bodily Injury & Property Damage (combined single limit):
 - (1) \$1,000,000 Each Accident
 - 6) Excess Liability (umbrella): Minimum Limits
 - a) \$3,000,000 Over Primary Insurance
 - b) Policies must follow the form of the base policies
2. 11.1.2.1 shall be added as follows:
 - a. 11.1.2.1 Payment and Performance Bonds are required.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION - NOT USED

END OF DOCUMENT 00 60 01

Supplementary Conditions

The following supplements modify the "General Conditions of the Contract for Construction", AIA Document A201, 2017 Edition. Where a portion of the General Conditions is modified, or deleted by these supplementary conditions, the unaltered portions of the General Conditions shall remain in effect.

Delete Subparagraph 2.2.5 and substitute the following:

2.2.5 The contractor will be furnished free of charge 15 copies of drawings and project manuals. Additional sets will be furnished at the cost of reproduction, postage and handling.

Replace the existing subparagraph 3.9.1 with the following new subparagraphs 3.9.1, 3.9.1.1 and 3.9.1.2.

3.9.1 Prior to starting Work, the Contractor shall designate the Project Manager, Superintendent, and other key individuals who shall be assigned to the Project through and including Final Completion. The Superintendent shall be in attendance at the Project Site throughout the Work, including completion of the punchlist. The Superintendent shall be approved by the Owner in its sole discretion. Said representative shall be qualified and experienced in the type of Work to be undertaken and shall not be changed during the course of construction without the prior written consent of the Owner. Should a representative leave the Contractor's employ, the Contractor shall promptly designate a new representative that is acceptable to the Owner. The Owner shall have the right at any time to direct a change in the Contractor's representatives if their performance is unsatisfactory. In the event of such demand, the Contractor shall, within seven calendar days after notification thereof, replace said representative with a representative acceptable to the Owner. The Contractor shall continue to submit representatives until an acceptable representative is approved. The superintendent shall representative the Contractor, and communications given to the Superintendent shall be as binding as if given to the Contractor. The Owner shall have no obligation to direct or monitor the Contractors employees.

3.9.1.1 The superintendent employed shall have a minimum of five years experience as a superintendent on projects of similar size, scope, and complexity. The Owner may request verification of this experience.

3.9.1.2 The Contractor shall not change the Superintendent without the prior written consent of the Owner, which consent shall not be unreasonably withheld. The Superintendent shall be present at the Project until final completion including the punchlist.

Subparagraph 3.10.1 – Delete in its entirety and substitute the following:

"The General Contractor is responsible for the sequencing, scheduling and coordinating the Work, for monitoring the progress of the Work, and for taking appropriate action to keep the Work, including Work performed by all subcontractors, on schedule. Within seven (7) working days after signing the Contract, unless otherwise extended by the Owner at the time of the signing of the Contract, the Contractor shall prepare and submit directly to the Architect a preliminary plan and construction schedule for substantially completing the Work based upon the date of Substantial Completion. The construction schedule submittal shall be complete in every respect and shall include all subcontract Work activities, phase milestone dates, and be signed by the Contract.

- 3.10.1.1 The Construction Schedule shall describe in narrative form the sequence of activities and their duration required to complete the Work and allow for work Completion sufficiently in advance of the dates established for each phase of the Project to permit correction of "punch list" items. No changes shall be made to the phase milestone dates of the date of Substantial Completion without the Owner and Architect's prior review and approval.
- 3.10.1.2 The Construction Schedule shall be in graphic form and shall show start and end dates of every phase of the Work and all construction activities, logic relationships and dependencies, predecessor and successor relationship of all activities to each other, critical path milestones, submittal schedules (that allow two (2) weeks time for Architect and Owner review and Architect approval), including date of submittal, date required to be returned after review, and date of supply or fabrication lead time, dollar value of each activity and percentage of Work to be completed each month and the manpower/staffing required to complete the Work on each activity in the time given. The Progress Schedule shall be updated monthly, showing actual progress versus the anticipated progress. The most current schedule update shall be submitted with each monthly Application for Payment and shall clearly show the planned original scheduled progress along with the actual work progress.
- 3.10.1.3 If the Contractor establishes or has reason to believe that the delivery of an item of material or equipment, the shortage of qualified labor, delays or other occurrences may cause a delay in the execution of the Work in accordance with the established Construction Progress Schedule, he shall so notify the Architect immediately.
- 3.10.1.4 The Owner's or Architect's silence as to a submitted schedule that exceeds time limits current under the Contract Documents shall not relieve the Contractor of its obligation to meet those time limits, nor shall it make the Owner or Architect liable for any of Contractor's damages incurred as a result of increased construction time or not meeting those time limits. Similarly, the Owner's or Architect's silence as to a Contractor's schedule showing performance in advance of such time limits shall not create or infer any rights in favor of the Contractor for performance in advance of such time limits.

Add the following new subparagraphs:

- 3.10.4 No progress payment will be payable to the Contractor until after it has submitted a preliminary construction schedule which is acceptable to the Owner. Neither the second progress payment nor any subsequent payment shall be payable to the Contractor until a fully complete progress schedule agreed to by all Primes has been submitted, and approved by the Architect and Owner.
- 3.10.5 The responsibility for Construction planning and the effective efficient implementation of such, or the converse, to meet the date of Substantial Completion, are the total responsibility of the Contractor, and such responsibility shall not transfer to the Owner and Architect. Review of the original accepted Construction Progress Schedule, and subsequent modifications thereto, by the Owner and/or the Architect shall be limited to the general clarifications set out above. Such review shall not operate to imply the agreement of the Owner/Architect to the Contractor's planned procedures, coordination, critical path scheduling, etc., as being appropriate or reasonable."

Add the following new subparagraph 3.15.3 to Article 3.15

3.15.3 Daily Cleanup: The Contractor shall comply with the following daily cleanup requirements:

- .1. Do not allow trash, debris, waste, defective materials, and unused materials, equipment and tools to collect in the work areas, areas objectionable to the Owner, or in areas that will be unsightly to passersby. Remove these items on a regular schedule, and dispose of in approved manner and container.
- .2. Keep work area clean and free of clutter.
- .3. Secure all materials, equipment, and tools to prevent movement during windy conditions. Do not allow material or debris to become airborne.
- .5. Cover all materials, equipment, and tools completely at the end of each day to prevent water entry and so that covers will not loosen or separate during windy conditions.
- .6. Promptly remove all unused or unneeded sharp or pointed objects, including sheet metal, that may puncture cause injury or damage to the Work.
- .7. Keep all fasteners, anchors, etc, including screws and nails, in rigid storage containers until ready for use. Put all used or defective mechanical fasteners in a designated rigid container that is clearly marked, **SCRAP**. Do not allow used or defective fasteners to mix with new fasteners.
- .8. Correct all defects not corrected during normal operations by end of each workday.

Add the following subparagraphs 5.3.2 and 5.3.3 to Paragraph 5.3:

5.3.2 Excluding the usual reduction or reassignment of a work force when a subcontractor's portion of the Work nears completion, a subcontractor shall not take any measures that will interrupt, impede, or delay the progress of his portion of the Work or the overall Project without notifying the Architect and without written approval from the Contractor. These measures include ceasing or slowing progress of the Work, reducing the assigned work force, or redirecting or reassigning the work force to another project. Failure to provide the following information in requesting approval from the Contractor may result in disapproval of the request:

- .1 Effective Date
- .2 Nature of the request
- .3 Reason for the request
- .4 Impact on the project schedule
- .5 Name of person making the request
- .6 Date of resuming normal operations

5.3.3 If a subcontractor fails to assign and maintain an adequate work force so as to diligently make consistent and uninterrupted progress in his portion of the Work, or the subcontractor ceases work, reduces the assigned work force, or redirects or reassigns the work force to another project, then the Contractor shall notify the subcontractor, in writing, to resume or continue work. If, within seven calendar days from date of notification to resume or continue work, the subcontractor fails to resume or continue work or to provide the Contractor and the Architect with an acceptable reason for not resuming or continuing work, then the Contractor may, at his option, reassign the uncompleted portion of the subcontractor's Work to another subcontractor that is acceptable to the Owner and the Architect. All costs associated with the Contractor's reassignment of the subcontractor's uncompleted Work, including project delays and correcting the subcontractor's unacceptable work, shall be the responsibility of the original subcontractor. On reassignment of the original subcontractor's uncompleted portion of the Work, the original subcontractor shall promptly invoice the Contractor for all acceptable work completed prior to the reassignment of the uncompleted portion of the Work. If the Contractor chooses not to reassign the uncompleted portion of the subcontractor's work to another subcontractor, then the Contractor shall notify the Owner and the Architect as to what action shall be taken, and the impact, if any, on the Contract.

Article 7 - Changes in Work

7.2 Change Orders

Add the following Subparagraphs 7.2.3 and 7.2.4 to Paragraph 7.2:

"7.2.3 A change order, when issued, shall be full compensation, or credit, for the extra work included, omitted, or substituted plus the Contractor's fee as determined in subparagraph 7.2.4. It shall show on its face, the adjustment in time for completion of the project as a result of the change in the work. Each change order shall include all costs directly related to the Work, including all overhead, miscellaneous expenses, and incidentals. The Contractor shall submit a written and detailed itemized proposal for each Change Order under consideration (Change Proposal Requests) within 21 days of receipt of a pricing request. Cost of work shall mean the sum of all costs that can be directly related to the Work and are paid by the Contractor in the proper execution of the approved Change Order. Such costs shall be no higher than the prevailing costs in the locality of the Project. All costs shall be completely and accurately itemized and shall be fully and accurately substantiated by receipts, vouchers, invoices, certified affidavits, etc.

7.2.4 The allowance for the Contractor's fee percentage to cover overhead and profit shall be in accordance with the following schedule:

- .1 For costs incurred under subparagraphs 7.3.6.1 and 7.3.6.2 using the Contractor's own workforces: Fifteen (15) percent; Deductive Changes: 5 percent
- .2 For costs incurred under subparagraphs 7.3.6.3 through 7.3.6.5: Zero (0) percent.
- .3 For Work performed by the Contractor's Subcontractor, 7.5 percent of the amount due the Subcontractor.
- .4 The amount of credit to be allowed by the Contractor to the Owner for changes that result in a net decrease in the cost will be in the amount of the actual net decrease plus the Contractor's fee which shall be equal to ten (10) percent of the net decrease.
- .5 When both additions and credits are involved in the same change order, the adjustment in the Contractor's fee shall be computed on the net change in accordance with subparagraphs 7.2.4.1 through 7.2.4.4.

Add the following subparagraph .6 to subparagraph 7.3.6

- .6 Payments made by the Contractor for Work performed by subcontractors. If a subcontractor is to be paid on the basis of a Cost of The Work Plus A Fee subcontract, then the subcontractor's cost of work shall be determined in the same manner as for the Contractor.

8.2 Progress and Completion

Add the following sentence to the end of subparagraph 8.2.1.

The date for substantial completion of the project is set forth in the Agreement.

9.2 SCHEDULE OF VALUES

Add the following new subparagraph:

- 9.2.2 The Contractor and each Subcontractor shall prepare a trade payment breakdown for the Work for which each is responsible, such breakdown of the Schedule of Values shall be dated and signed by the Contractor and listed on AIA Document G702A in the same numerical order and Sections as listed in the Specification so that each major item of Work and each subcontracted item of Work is shown. The form shall be divided in detail sufficient to exhibit areas, floors and/or sections of the Work, and/or by convenient units and shall be updated as required by either the Owner or the Architect as necessary to reflect (1) total value, (2) percent of the Work completed to date, (3) value of Work completed to date, (4) percent of previous amount billed, (5) previous amount billed, (6) current percent completed, (7) value of Work completed to date, (8) description of the item, (9) quantities (units), (10) labor, (11) materials and (12) equipment where applicable. General, plumbing, mechanical, and electrical also shall be broken down accordingly by category as the Architect may additionally require. Any trade breakdown which fails to include sufficient detail, is unbalanced or exhibits "front-loading" of the value of the Work shall be rejected. If trade breakdown had been initially approved and subsequently used, but later found improper for any reason, sufficient funds shall be withheld from future Application's for Payment to ensure an adequate reserve (exclusive of normal retainage) to complete the Work.

9.3 Applications for Payment

Add the following clause 9.3.1.3 to 9.3.1:

- 9.3.1.3 Until the work is 50 percent complete, the owner shall pay 90 percent of the amount due the contractor on account of progress payments. At the time the work is 50 percent complete and thereafter, and with the approval of the Owner, the architect may authorize remaining partial payment to be paid in full, if the Contractor is performing the work and is adhering to the construction schedule.

9.8.1 Substantial Completion

The substantial completion date for this project shall be August 12, 2022.

Add the following sub-paragraph to sub-paragraph 9.8.2:

- 9.8.2.1 The Architect will only make two (2) inspections to determine substantial completion. If these inspections determine that the work is not substantially complete, either because of major items not completed or an excessive number of punchlist items, successive inspections requested by the Contractor shall be charged to the Contractor at a rate of \$400.00 per person per half day" and will be deducted from the final Application for Payment.

Add the following sub-paragraph to sub-paragraph 9.10.1:

- 9.10.1.1. The Architect will only make two (2) inspections to determine final completion. If these inspections determine that the work is not finally complete, successive inspections requested by the Contractor shall be charged to the Contractor at a rate of \$400.00 per person per half day" and will be deducted from the final Application for Payment.

Add the following new sub-paragraph 9.10.6 to paragraph 9.10:

9.10.6 In addition to any other damages, failure of the Contractor to achieve Final Completion within sixty (60) after the specified date of Substantial Completion, subject to authorized extensions, will result in the Contractor's being responsible for excess Architect's fees. Excess Architects fees will include the cost of all necessary services, as determined by the Owner and the Architect, incurred after sixty (60) days beyond the date of Substantial Completion. Excess fees will be deducted from the Amount due the Contractor.

Add the following paragraph 9.11 to Article 9

9.11 Liquidated Damages

9.11.1 The contractor and the contractor's surety, if any, shall be liable for and hereinafter stipulated as liquidated damages for each calendar day of delay until the work is substantially complete:

Five Hundred Dollars (\$500.00)

11.1 Contractor's Liability Insurance

Add the following subparagraph to 11.1.1:

11.1.1.1 In accordance with the General Conditions, the Contractor shall maintain the following insurance for the project.

A. Workmen's Compensation - Statutory - and Employers' Liability Insurance that complies with the laws of the state in which the work is located shall be carried on all employees engaged in any and all phases of the work required under this contract.

Minimum Limits:

Workmen's Compensation - Statutory
Employer's Liability: \$500,000 Each Accident
By Disease: \$500,000 Each Employee
\$500,000 Policy Limit

B. General Liability (Bodily Injury and Property Damage Liability) including completed operations coverage, products liability coverage, Broad Form Property Damage and Blanket Contractual Liability Coverage. To cover all phases of the operations required under this contract. Occurrence Form.

Minimum Limits:

General Aggregate.....\$2,000,000.00
Products-Completed Operations
Aggregate.....\$2,000,000.00
Personal & Advertising Injury...\$1,000,000.00
Each Occurrence.....\$1,000,000.00

C. Owner's & Contractor's Protective Bodily Injury and Property Damage Liability Insurance must be provided by the contractor for the benefit of the Owner covering the entire operation involved in the contract. The minimum limits of liability required for such insurance are as follows:

Same Limits as General Liability Coverage.

Extend policy to include interest of Architects.

D. Automobile Bodily Injury and Property Damage Liability Insurance shall be carried on all automobiles, trucks and similar vehicles that will be used in any phase of the work required under this contract. The minimum limits of liability required for such insurance are as follows:

\$1,000,000.00 Combined Single Limit per occurrence for Bodily Injury and Property Damage.

E. Excess Umbrella Liability (Occurrence Form)

Minimum Limit - \$3,000,000.00 Each Occurrence
\$3,000,000.00 Aggregate

F. Builder's "All Risk, Including Theft and Earthquake" Insurance in an amount equal to the full amount of the contract, shall be provided by the Owner.

11.5 Performance Bond and Payment Bond

Delete Subparagraph 11.5.1 and substitute the following paragraph 11.5.1:

11.5.1 The Contractor shall furnish bonds covering faithful performance of the Contract and payment of obligations arising thereunder. Bonds may be obtained through the Contractor's usual surety source and the cost thereof shall be included in the Contract Sum. The amount of each bond shall be equal to 100 percent of the Contract Sum.

11.5.1.1 The Surety shall have, at a minimum, a "Best Rating" of "A" as stated in the most current publication of "Best's Key Rating Guide, Property-Casualty". In addition, the Surety shall have a minimum "Best Financial Strength Category" of "Class V", and in no case less than five (5) times the contract amount.

11.5.1.2 Both Performance Bond and Payment Bond shall be written on AIA Document A312-Performance Bond which is a combined Performance and Payment Bond. The required bonds shall be made payable to the Owner.

11.5.1.3 The Performance and Labor and Material Payment Bonds shall:

(1) be issued by a surety company licensed to do business in South Carolina; and,

(2) be accompanied by a current power of attorney and certified by the attorney-in-fact who executes the bond on the behalf of the surety company; and,

(3) remain in effect for a period not less than one (1) year following the date of Substantial Completion or the time required to resolve any items of incomplete Work and the payment of any disputed amounts, whichever time period is longer; and,

- (4) display the Surety's Bond Number. A rider including the following provisions shall be attached to each Bond stating that:
- (a) The Surety hereby agrees that it consents to and waives notice of any addition, alteration, omission, change, or other modification of the Contract Documents. Any addition, alteration, change, extension of time, or other modification of the Contract Documents, or a forbearance on the part of either the Owner or the Contractor to the other, shall not release the Surety of its obligations hereunder, and notice to the Surety of such matters is hereby waived.
 - (b) The Surety agrees that it is obligated under the bonds to any successor, grantee, or assignee of the Agency.
- (5) Notwithstanding the foregoing, any bonds required by this Contract shall meet the requirements of the SC Code of Laws, as amended.

Add the following new Subparagraphs 11.5.3 and 11.5.5 after subparagraph 11.5.2:

- 11.5.3 The Contractor shall furnish all required bonds to the Owner before final execution of the Contract.
- 11.5.3.1 If the Work is to be commenced prior thereto in response to a letter of intent, the Contractor shall, prior to the commencement of the Work, submit evidence satisfactory to the Owner that such bonds will be furnished.
- 11.5.3.2 The Contractor shall require the attorney-in-fact who executes the required bonds on behalf of the surety to affix thereto a certified and current copy of the power of attorney.
- 11.5.4 The Contractor shall keep the Surety informed of the progress of the Work, and, where necessary, obtain the Surety's consent to, or waiver of:
- 11.5.4.1 notices of changes in the Work;
 - 11.5.4.2 requests for reduction or release of retention;
 - 11.5.4.3 requests for final payment; and
 - 11.5.4.4 any other item required by the Surety.
- 11.5.4.4 The Owner may, in the Owner's sole discretion, inform the Surety of the progress of the Work and obtain consents as necessary to protect the Owner's rights, interest, privileges, and benefits under and pursuant to any bond issued in connection with the Work.
- 11.5.5 If at anytime a surety on any such bond is declared bankrupt or loses its right to do business in the state in which the project is located, or is removed from the list of surety companies accepted on Federal Bonds, the Contractor shall, within 10 calendar days after notice from the Owner to do so, substitute an acceptable bond(s) in such form and sum and signed by such other surety or sureties as may be satisfactory to the Owner. No further payments from the Owner will be deemed due nor shall be made until the new surety or sureties have furnished an acceptable bond(s) to the Owner. The bonds furnished hereunder shall name as obligees the Owner, Owner's partners, and affiliates, any lender(s) of the Owner secured in whole or in part by a lien on the Project, and the title insurance company(ies) that has (have) issued title policies to Owner or its lender(s), and the bond(s) shall be automatically increased in the amount of any additive Change Orders. The bond(s) shall have affixed to it (them) a certified and current copy of a power of attorney for the attorney-in-fact who executes the bond(s) on behalf of the surety(ies).

12.2 Correction of Work

Add the following Subparagraph 12.2.1.1 to Paragraph 12.2.1:

- 12.2.1.2 When the correction of defective and rejected work results in the Contractor or applicable subcontractor falling behind schedule or will delay or prevent other trades from performing their portion of the Work, the Contractor or applicable subcontractor shall use all possible means to maintain the original schedule and to allow other trades to perform their portion of the Work. Accordingly, the Contractor and applicable subcontractor shall not be granted additional time or moneys to maintain the original schedule.

15 Claims and Disputes

Delete the existing subparagraph 15.1.5.2 and substitute the following new subparagraphs

- 15.1.5.2 For the purpose of this Contract, the Contractor shall anticipate 4 scheduled workdays per calendar month as "normally bad or severe weather" and that are unsuitable for performing the Work. These days will not be considered as justification for an extension in Contract Time. If abnormal weather conditions result in a loss of scheduled workdays that exceed the anticipated bad or severe weather days, the Contractor may submit a Claim for an extension in Contract Time for the scheduled workdays that exceed the anticipated days. Only whole days will be considered for an extension of Contract Time. Fractions of days are not acceptable.

- 15.1.5.3 All weather-related Claims for an extension in Contract Time shall be submitted, to the Architect for approval, within 15 calendar after the last day of the month for which the Claim is being submitted. Claims submitted after this time may be rejected. All weather-related Claims for an extension in Contract Time will be reviewed and approved by the Architect on an individual basis. As a minimum, each weather-related Claim for an extension in Contract Time shall include the following information:

- .1 Impact of the lost time
- .2 Portions of the Work involved
- .3 Measures to be taken to make up lost time
- .4 Number of days extension being requested
- .5 Building trades affected by lost scheduled workdays
- .6 Dates of scheduled workdays lost because of weather
- .7 Number of scheduled workdays lost because of weather
- .8 Weather conditions that caused the loss of each scheduled workday
- .9 Supporting documentation of weather conditions that justify the claim

List of Drawings and Specifications:

Drawings prepared by the Architect, numbered and titled as listed below, together with the specifications show and describe the work to be performed. Drawings and specifications shall be considered complementary so that anything shown upon one, or described by the other, or implied by either or both, shall be executed and performed as if shown and/or described by both. Drawings and specifications shall be used for this work only and are the property of the architect, and must be returned upon the completion of the work.

Specifications:

General Conditions
Supplementary Conditions

Drawings:

<u>Index</u>	<u>Title</u>
<u>GENERAL</u>	
AD-G001	PHASE II DEMOLITION - COVER SHEET
AD-LS100	PHASE II DEMOLITION – LIFE SAFETY OVERALL SITE PLAN
AD-LS120	PHASE II DEMOLITION – LIFE SAFETY NEW CONSTRUCTION PLAN
AD-LS121	PHASE II DEMOLITION – SIDEWALK AND FENCING PLAN
AD-LS200	PHASE II DEMOLITION – CODE SUMMARY
AD-LS201	PHASE II DEMOLITION – OSF FORM F3 BLDG CODE ANALYSIS
AD-LS202	PHASE II DEMOLITION – PORTABLE LAYOUTS
<u>CIVIL</u>	
CD1.1	EXISTING CONDITIONS
CD1.2	SITE DEMOLITION PLAN
CD1.3	PORTABLE SITE PLAN
CD2.1	SITE PLAN
CD4.1	SITE DETAILS
CD4.2	SITE DETAILS

ARCHITECTURAL

AD003	PHASE II DEMOLITION – PARTITION TYPES
AD100	PHASE II DEMOLITION – OVERALL EXISTING SITE PLAN
AD110	PHASE II DEMOLITION – ENLARGED DEMOLITION EXTENTS
AD111	PHASE II DEMOLITION – ENLARGED MISC. DEMOLITION PLANS
AD120	PHASE II DEMOLITION – NEW CONSTRUCTION PLAN
AD121	PHASE II DEMOLITION – ENLARGED MISC. NEW CONSTR. PLANS
AD130	PHASE II DEMOLITION – NEW CONSTRUCTION ROOF PLAN
AD330	PHASE II DEMOLITION – WALL SECTIONS
AD331	PHASE II DEMOLITION – WALL SECTIONS
AD332	PHASE II DEMOLITION – WALL SECTIONS
AD333	PHASE II DEMOLITION – WALL SECTIONS
AD334	PHASE II DEMOLITION – WALL SECTIONS
AD400	PHASE II DEMOLITION – MEDIA CTR. VEST. PLANS & DETAILS
AD401	PHASE II DEMOLITION – CANOPY PLANS, SECTIONS & DETAILS
AD600	PHASE II DEMOLITION – PLAN DETAILS
AD601	PHASE II DEMOLITION – PLAN DETAILS
AD610	PHASE II DEMOLITION – SECTION DETAILS
AD800	PHASE II DEMOLITION – DOOR SCHEDULE, TYPES & DETAILS

STRUCTURAL

SD100	1000 LEVEL DEMOLITION PLAN
AD101	DEMOLITION DETAILS

PLUMBING

PD-000	PLUMBING SPECIFICATIONS & PORTABLE PLAN
PD-100	MAIN LEVEL PLUMBING DEMO PLAN

MECHANICAL

M-100	MAIN LEVEL HVAC OVERALL PLAN
M-101	MAIN LEVEL HVAC DEMOLITION PLAN
M-201	GROUND LEVEL HVAC UTILITY RELOCATION PLAN
M-202	MAIN LEVEL HVAC UTILITY RELOCATION PLAN
M-203	HVAC DETAILS & SCHEDULES

ELECTRICAL

ED-101	ELECTRICAL SYMBOLS AND SPECIFICATIONS
ED-201	PORTABLES ELECTRICAL PLAN
ED-202	CORRIDOR DEMOLITION ELECTRICAL PLAN
ED-301	OVERALL DEMO PWR PLAN – AREA “A”
ED-302	OVERALL DEMO PWR PLAN – AREA “B”
ED-401	SPECIAL SYSTEMS DEMOLITION PLAN – EAST
ED-402	SPECIAL SYSTEMS DEMOLITION PLAN – WEST
ED-403	SPECIAL SYSTEMS PLAN – EAST
ED-404	SPECIAL SYSTEMS PLAN – WEST
ED-405	PARTIAL OVERALL SITE DATA PLAN – EAST
ED-406	PARTIAL OVERALL SITE DATA PLAN – WEST
ED-407	PARTIAL OVERALL SITE FIRE ALARM PLAN – EAST
ED-408	PARTIAL OVERALL SITE FIRE ALARM PLAN – WEST
ED-409	PARTIAL OVERALL SITE INTERCOM PLAN – EAST
ED-410	PARTIAL OVERALL SITE INTERCOM PLAN – WEST
ED-510	EXISTING BLDG. PARTIAL DATA RISER
ED-511	EXISTING BLDG. PARTIAL FIRE ALARM AND INTERCOM RISER

SECTION 01 00 00 - GENERAL REQUIREMENTS

PART 1 - GENERAL (Not Used)

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 00 00

SECTION 01 10 00 - SUMMARY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

1. Project information.
2. Work covered by Contract Documents.
3. Contractor's use of site and premises.
4. Work restrictions.
5. Specification and Drawing conventions.
6. Miscellaneous provisions.

- B. Related Requirements:

1. Section 01 50 00 "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.
2. Section 01 73 00 "Execution" for coordination of Owner-installed products.

1.3 DEFINITIONS

- A. Work Package: A group of specifications, drawings, and schedules prepared by the design team to describe a portion of the Project Work for pricing, permitting, and construction.

1.4 PROJECT INFORMATION

- A. Project Identification: 020430.00.

1. Project Location: 150 E. Main Street, Duncan, South Carolina, 29334, United States.

- B. Owner: SCSD5, 100 N, Danzler Road, Duncan, 29334, United States.

1. Owner's Representative: Dr. Greg Wood, greg.wood@spart5.net, 864-949-2350.

SECTION 01 10 00 - SUMMARY

- C. Architect: McMillan Pazdan Smith - Spartanburg.
 - 1. Architect's Representative: Michael Chewning.

- D. Architect's Consultants: Architect has retained the following design professionals, who have prepared designated portions of the Contract Documents:
 - 1. Civil : Blackwood Associates .
 - a. Representative: Trey Blackwood, PE .
 - 2. Structural: Bailey & Son Engineering Representative: Colin Bailey, PE.
 - 3. Electrical: Carolina Engineering Solutions Representative: [James Joye, PE.
 - 4. Mechanical & Plumbing: Crow Bulman Engineering Representative: Shane Bulman, PE.

- E. Contractor: McKnight Construction has been engaged as Contractor for this Project.
 - 1. Contractor Representative: Joe Kinsey .

- F. Construction Manager: McKnight Construction .
 - 1. Construction Manager Representative: Joe Kinsey .
 - 2. Construction Manager for this Project is Project's constructor. The terms "Construction Manager" and "Contractor" are synonymous.

- G. Web-Based Project Software: Project software will be used for purposes of managing communication and documents during the construction stage.
 - 1. See Section 01 31 00 "Project Management and Coordination." for requirements for using web-based Project software.

1.5 WORK COVERED BY CONTRACT DOCUMENTS

- A. The Work of Project is defined by the Contract Documents and includes, but is not limited to, the following:
 - 1. The scope of work for the projects consists of the partial demolition of the existing high school and other Work indicated in the Contract Documents.

- B. Type of Contract:
 - 1. Project will be constructed under a single prime contract.

1.6 CONTRACTOR'S USE OF SITE AND PREMISES

- A. Unrestricted Use of Site: Contractor shall have full use of Project site for construction operations during construction period. Contractor's use of Project site is limited only by Owner's right to perform work or to retain other contractors on portions of Project.

- B. Limits on Use of Site: Limit use of Project site to areas within the Contract limits indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.
 - 1. Driveways, Walkways and Entrances: Keep driveways and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or for storage of materials.
 - a. Schedule deliveries to minimize use of driveways and entrances by construction operations.
 - b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.
- C. Condition of Existing Building: Maintain portions of existing building affected by construction operations in a weathertight condition throughout construction period. Repair damage caused by construction operations.
- D. Condition of Existing Grounds: Maintain portions of existing grounds, landscaping, and hardscaping affected by construction operations throughout construction period. Repair damage caused by construction operations.

1.7 COORDINATION WITH OCCUPANTS

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

1.8 WORK RESTRICTIONS

- A. Comply with restrictions on construction operations.
 - 1. Comply with limitations on use of public streets, work on public streets, rights of way, and other requirements of authorities having jurisdiction.
- B. On-Site Work Hours: Limit work to between 7:00 a.m. to 6:00 p.m., Monday through Friday, unless otherwise indicated. Work hours may be modified to meet Project requirements if approved by Owner and authorities having jurisdiction.
 - 1. Weekend Hours: Coordinate with the owner .

SECTION 01 10 00 - SUMMARY

Page 3 of 5

2. Early Morning Hours: Coordinate with the owner .
 3. Hours for Utility Shutdowns: Coordinate with the owner .
- C. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging for temporary utility services according to requirements indicated:
1. Notify Architect Construction Manager Owner not less than two days in advance of proposed utility interruptions.
 2. Obtain Construction Manager's written permission before proceeding with utility interruptions.
- D. Noise, Vibration, Dust, and Odors: Coordinate operations that may result in high levels of noise and vibration, dust, odors, or other disruption to Owner occupancy with Owner.
1. Notify Construction Manager not less than two days in advance of proposed disruptive operations.
 2. Obtain Construction Manager's written permission before proceeding with disruptive operations.
- E. Smoking and Controlled Substance Restrictions: Use of tobacco products , alcoholic beverages, and other controlled substances on Project site is not permitted.
- F. Employee Identification: Provide identification tags for Contractor personnel working on Project site. Require personnel to use identification tags at all times.
- G. Employee Screening: Comply with Owner's requirements for drug and background screening of Contractor personnel working on Project site.
1. Maintain list of approved screened personnel with Owner's representative.

1.9 SPECIFICATION AND DRAWING CONVENTIONS

- A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
 2. Text Color: Text used in the Specifications, including units of measure, manufacturer and product names, and other text may appear in multiple colors or underlined as part of a hyperlink; no emphasis is implied by text with these characteristics.
 3. Hypertext: Text used in the Specifications may contain hyperlinks. Hyperlinks may allow for access to linked information that is not residing in the Specifications. Unless otherwise indicated, linked information is not part of the Contract Documents.

4. Specification requirements are to be performed by Contractor unless specifically stated otherwise.
- B. Division 00 Contracting Requirements: General provisions of the Contract, including General and Supplementary Conditions, apply to all Sections of the Specifications.
- C. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.
- D. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:
 1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
 2. Abbreviations: Materials and products are identified by abbreviations scheduled on Drawings .
 3. Keynoting: Materials and products are identified by reference keynotes referencing Specification Section numbers found in this Project Manual.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 10 00

SECTION 01 22 00 - UNIT PRICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for unit prices.
- B. Related Requirements:
 - 1. Section 01 21 00 "Allowances" for procedures for using unit prices to adjust quantity allowances.
 - 2. Section 01 26 00 "Contract Modification Procedures" for procedures for submitting and handling Change Orders.
 - 3. Section 01 40 00 "Quality Requirements" for field testing by an independent testing agency.

1.3 DEFINITIONS

- A. Unit price is a price per unit of measurement for materials, equipment, or services, or a portion of the Work, added to or deducted from the Contract Sum by appropriate modification, if the scope of Work or estimated quantities of Work required by the Contract Documents are increased or decreased.

1.4 PROCEDURES

- A. Unit prices include all necessary material, plus cost for delivery, installation, insurance, applicable taxes, overhead, and profit.
- B. Measurement and Payment: See individual Specification Sections for work that requires establishment of unit prices. Methods of measurement and payment for unit prices are specified in those Sections.
- C. Owner reserves the right to reject Contractor's measurement of work-in-place that involves use of established unit prices and to have this work measured, at Owner's expense, by an independent surveyor acceptable to Contractor.

SECTION 01 22 00 - UNIT PRICES

- D. List of Unit Prices: A schedule of unit prices is included in Part 3. Specification Sections referenced in the Part 3 "Schedule of Unit Prices" Article contain requirements for materials described under each unit price.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF UNIT PRICES

- A. Unit Price No. 1: Removal of unsatisfactory soil and replacement with satisfactory soil material.
1. Description: Unsatisfactory soil excavation and disposal off-site and replacement with satisfactory fill material or engineered fill from off-site, as required, in accordance with Section 31 20 00 "Earth Moving."
 2. Unit of Measurement: Cubic Yard of soil excavated, based on in-place surveys of volume before and after removal.
 3. Quantity Allowance: Coordinate unit price with allowance adjustment requirements in Section 01 21 00 "Allowances."
- B. Unit Price No. 2: Mass rock excavation and replacement with satisfactory soil material.
1. Description: Classified mass rock excavation and disposal off-site and replacement with satisfactory fill material or engineered fill from off-site, as required, in accordance with Section 31 20 00 "Earth Moving."
 2. Unit of Measurement: Cubic Yard of rock excavated, based on in-place surveys of volume before and after removal.
 3. Quantity Allowance: Coordinate unit price with allowance adjustment requirements in Section 01 21 00 "Allowances."
- C. Unit Price No. 3: Trench rock excavation and replacement with satisfactory soil material.
1. Description: Classified trench rock excavation and disposal off-site and replacement with satisfactory fill material or engineered fill from off-site, as required, in accordance with Section 31 20 00 "Earth Moving."
 2. Unit of Measurement: Cubic Yard of rock excavated, based on survey of in-place surveys volume of before and after removal.
 3. Quantity Allowance: Coordinate unit price with allowance adjustment requirements in Section 01 21 00 "Allowances."

END OF SECTION 01 22 00

SECTION 01 22 00 - UNIT PRICES

Page 2 of 2

SECTION 01 25 00 - SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for substitutions.
- B. Related Requirements:
 - 1. Document 002600 "Procurement Substitution Procedures" for requirements for substitution requests prior to award of Contract.
 - 2. Section 01 21 00 "Allowances" for products selected under an allowance.
 - 3. Section 01 23 00 "Alternates" for products selected under an alternate.
 - 4. Section 01 60 00 "Product Requirements" for requirements for submitting comparable product submittals for products by listed manufacturers.

1.3 DEFINITIONS

- A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents.
 - 1. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.

1.4 ACTION SUBMITTALS

- A. Substitution Requests: Submit documentation identifying product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
 - 1. Substitution Request Form: Use form .
 - a. CSI/CSC Form 1.5C - Substitution Request (During the Bidding/Negotiating Stage);Current Edition.
 - b. CSI/CSC Form 13.1A - Substitution Request (After the Bidding/Negotiating Phase);Current Edition.

SECTION 01 25 00 - SUBSTITUTION PROCEDURES

2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
 - a. Statement indicating why specified product or fabrication or installation method cannot be provided, if applicable.
 - b. Coordination of information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner and separate contractors that will be necessary to accommodate proposed substitution.
 - c. Detailed comparison of significant qualities of proposed substitutions with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes, such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
 - d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
 - e. Samples, where applicable or requested.
 - f. Certificates and qualification data, where applicable or requested.
 - g. List of similar installations for completed projects, with project names and addresses as well as names and addresses of architects and owners.
 - h. Material test reports from a qualified testing agency, indicating and interpreting test results for compliance with requirements indicated.
 - i. Research reports evidencing compliance with building code in effect for Project, from ICC-ES .
 - j. Detailed comparison of Contractor's construction schedule using proposed substitutions with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
 - k. Cost information, including a proposal of change, if any, in the Contract Sum.
 - l. Contractor's certification that proposed substitution complies with requirements in the Contract Documents, except as indicated in substitution request, is compatible with related materials and is appropriate for applications indicated.
 - m. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.
3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within seven days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.
 - a. Forms of Acceptance: Change Order, Construction Change Directive, or Architect's Supplemental Instructions for minor changes in the Work.
 - b. Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.

**SECTION 01 25 00 - SUBSTITUTION
PROCEDURES**

Page 2 of 3

1.5 QUALITY ASSURANCE

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

1.6 PROCEDURES

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

1.7 SUBSTITUTIONS

- A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than 15 days prior to time required for preparation and review of related submittals.
 - 1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
 - a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
 - b. Substitution request is fully documented and properly submitted.
 - c. Requested substitution will not adversely affect Contractor's construction schedule.
 - d. Requested substitution has received necessary approvals of authorities having jurisdiction.
 - e. Requested substitution is compatible with other portions of the Work.
 - f. Requested substitution has been coordinated with other portions of the Work.
 - g. Requested substitution provides specified warranty.
 - h. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 25 00

**SECTION 01 25 00 - SUBSTITUTION
PROCEDURES**

Page 3 of 3

SECTION 01 26 00 - CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for handling and processing Contract modifications.
- B. Related Requirements:
 - 1. Section 01 25 00 "Substitution Procedures" for administrative procedures for handling requests for substitutions made after the Contract award.
 - 2. Section 01 31 00 "Project Management and Coordination" for requirements for forms for contract modifications provided as part of web-based Project management software.

1.3 MINOR CHANGES IN THE WORK

- A. Architect will issue supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on AIA Document G710 .

1.4 PROPOSAL REQUESTS

- A. Owner-Initiated Proposal Requests: Architect will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.
 - 1. Work Change Proposal Requests issued by Architect are not instructions either to stop work in progress or to execute the proposed change.
 - 2. Within time specified in Proposal Request after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.
 - a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.

SECTION 01 26 00 - CONTRACT MODIFICATION PROCEDURES

- b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
 - c. Include costs of labor and supervision directly attributable to the change.
 - d. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
 - e. Quotation Form: Use forms acceptable to Architect .
- B. Contractor-Initiated Proposals: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to Architect .
1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
 2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
 3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
 4. Include costs of labor and supervision directly attributable to the change.
 5. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
 6. Comply with requirements in Section 01 25 00 "Substitution Procedures" if the proposed change requires substitution of one product or system for product or system specified.
 7. Proposal Request Form: Use form acceptable to Architect .

1.5 ADMINISTRATIVE CHANGE ORDERS

- A. Allowance Adjustment: See Section 01 21 00 "Allowances" for administrative procedures for preparation of Change Order Proposal for adjusting the Contract Sum to reflect actual costs of allowances.
- B. Unit-Price Adjustment: See Section 01 22 00 "Unit Prices" for administrative procedures for preparation of Change Order Proposal for adjusting the Contract Sum to reflect measured scope of unit-price work.

1.6 CHANGE ORDER PROCEDURES

- A. On Owner's approval of a Work Change Proposal Request, Architect will issue a Change Order for signatures of Owner and Contractor on AIA Document G701 .

SECTION 01 26 00 - CONTRACT MODIFICATION PROCEDURES

1.7 CONSTRUCTION CHANGE DIRECTIVE

- A. Construction Change Directive: Architect may issue a Construction Change Directive on AIA Document G714 . Construction Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.
 - 1. Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.
- B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.
 - 1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

1.8 WORK CHANGE DIRECTIVE

- A. Work Change Directive: Architect may issue a Work Change Directive on EJCDC Document C-940 . Work Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.
 - 1. Work Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.
- B. Documentation: Maintain detailed records on a time and material basis of work required by the Work Change Directive.
 - 1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 26 00

SECTION 01 26 00 - CONTRACT MODIFICATION PROCEDURES

Page 3 of 3

SECTION 01 29 00 - PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements necessary to prepare and process Applications for Payment.
- B. Related Requirements:
 - 1. Document 004373 "Proposed Schedule of Values Form" for requirements for furnishing proposed schedule of values with bid.
 - 2. Section 01 21 00 "Allowances" for procedural requirements governing the handling and processing of allowances.
 - 3. Section 01 22 00 "Unit Prices" for administrative requirements governing the use of unit prices.
 - 4. Section 01 26 00 "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.
 - 5. Section 01 32 00 "Construction Progress Documentation" for administrative requirements governing the preparation and submittal of the Contractor's construction schedule.

1.3 DEFINITIONS

- A. Schedule of Values: A statement furnished by Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

1.4 SCHEDULE OF VALUES

- A. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's construction schedule.
 - 1. Coordinate line items in the schedule of values with items required to be indicated as separate activities in Contractor's construction schedule.

SECTION 01 29 00 - PAYMENT PROCEDURES

2. Submit the schedule of values to Architect at earliest possible date, but no later than seven days before the date scheduled for submittal of initial Applications for Payment.
 3. Subschedules for Phased Work: Where the Work is separated into phases requiring separately phased payments, provide subschedules showing values coordinated with each phase of payment.
 4. Subschedules for Separate Elements of Work: Where the Contractor's construction schedule defines separate elements of the Work, provide subschedules showing values coordinated with each element.
 5. Subschedules for Separate Design Contracts: Where the Owner has retained design professionals under separate contracts who will each provide certification of payment requests, provide subschedules showing values coordinated with the scope of each design services contract, as described in Section 01 10 00 "Summary."
- B. Format and Content: Use Project Manual table of contents as a guide to establish line items for the schedule of values. Provide at least one line item for each Specification Section.
1. Identification: Include the following Project identification on the schedule of values:
 - a. Project name and location.
 - b. Owner's name.
 - c. Owner's Project number.
 - d. Name of Architect.
 - e. Architect's Project number.
 - f. Contractor's name and address.
 - g. Date of submittal.
 2. Arrange schedule of values consistent with format of AIA Document G703 .
 3. Arrange the schedule of values in tabular form, with separate columns to indicate the following for each item listed:
 - a. Related Specification Section or division.
 - b. Description of the Work.
 - c. Name of subcontractor.
 - d. Name of manufacturer or fabricator.
 - e. Name of supplier.
 - f. Change Orders (numbers) that affect value.
 - g. Dollar value of the following, as a percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent. Round dollar amounts to whole dollars, with total equal to Contract Sum.
 - 1) Labor.
 - 2) Materials.
 - 3) Equipment.
 4. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Provide multiple line items for principal subcontract amounts in excess of five percent of the Contract Sum.

SECTION 01 29 00 - PAYMENT PROCEDURES

5. Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
 - a. Differentiate between items stored on-site and items stored off-site.
6. Allowances: Provide a separate line item in the schedule of values for each allowance. Show line-item value of unit-cost allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.
7. Purchase Contracts: Provide a separate line item in the schedule of values for each Purchase contract. Show line-item value of Purchase contract. Indicate Owner payments or deposits, if any, and balance to be paid by Contractor.
8. Overhead Costs, Separate Line Items: Show cost of temporary facilities and other major cost items that are not direct cost of actual work-in-place as separate line items.
9. Temporary Facilities: Show cost of temporary facilities and other major cost items that are not direct cost of actual work-in-place as separate line items.
10. Closeout Costs. Include separate line items under Contractor and principal subcontracts for Project closeout requirements in an amount totaling five percent of the Contract Sum and subcontract amount.
11. Schedule of Values Revisions: Revise the schedule of values when Change Orders or Construction Change Directives result in a change in the Contract Sum. Include at least one separate line item for each Change Order and Construction Change Directive.

1.5 APPLICATIONS FOR PAYMENT

- A. Each Application for Payment following the initial Application for Payment shall be consistent with previous applications and payments, as certified by Architect and paid for by Owner.
- B. Payment Application Times: Submit Application for Payment to Architect by the 21st of the month. The period covered by each Application for Payment is one month, ending on the last day of the month .
 1. Submit draft copy of Application for Payment seven days prior to due date for review by Architect.
- C. Application for Payment Forms: Use AIA Document G703 and AIA Document G732 as form for Applications for Payment.
 1. Other Application for Payment forms proposed by the Contractor may be acceptable to Architect and Owner. Submit forms for approval with initial submittal of schedule of values.
- D. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect will return incomplete applications without action.

SECTION 01 29 00 - PAYMENT PROCEDURES

1. Entries shall match data on the schedule of values and Contractor's construction schedule. Use updated schedules if revisions were made.
 2. Include amounts for work completed following previous Application for Payment, whether or not payment has been received. Include only amounts for work completed at time of Application for Payment.
 3. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
 4. Indicate separate amounts for work being carried out under Owner-requested project acceleration.
- E. Stored Materials: Include in Application for Payment amounts applied for materials or equipment purchased or fabricated and stored, but not yet installed. Differentiate between items stored on-site and items stored off-site.
1. Provide certificate of insurance, evidence of transfer of title to Owner, and consent of surety to payment for stored materials.
 2. Provide supporting documentation that verifies amount requested, such as paid invoices. Match amount requested with amounts indicated on documentation; do not include overhead and profit on stored materials.
 3. Provide summary documentation for stored materials indicating the following:
 - a. Value of materials previously stored and remaining stored as of date of previous Applications for Payment.
 - b. Value of previously stored materials put in place after date of previous Application for Payment and on or before date of current Application for Payment.
 - c. Value of materials stored since date of previous Application for Payment and remaining stored as of date of current Application for Payment.
- F. Transmittal: Submit three signed and notarized original copies of each Application for Payment to Architect by a method ensuring receipt within 24 hours. One copy shall include waivers of lien and similar attachments if required.
1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.
- G. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's lien from entities lawfully entitled to file a mechanic's lien arising out of the Contract and related to the Work covered by the payment .
1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
 2. When an application shows completion of an item, submit conditional final or full waivers.
 3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
 4. Submit final Application for Payment with or preceded by conditional final waivers from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.
 5. Waiver Forms: Submit executed waivers of lien on forms acceptable to Owner.

SECTION 01 29 00 - PAYMENT PROCEDURES

- H. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:
1. List of subcontractors.
 2. Schedule of values.
 3. Contractor's construction schedule (preliminary if not final).
 4. Combined Contractor's construction schedule (preliminary if not final) incorporating Work of multiple contracts, with indication of acceptance of schedule by each Contractor.
 5. Products list (preliminary if not final).
 6. Sustainable design action plans, including preliminary project materials cost data.
 7. Schedule of unit prices.
 8. Submittal schedule (preliminary if not final).
 9. List of Contractor's staff assignments.
 10. List of Contractor's principal consultants.
 11. Copies of building permits.
 12. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
 13. Initial progress report.
 14. Report of preconstruction conference.
 15. Certificates of insurance and insurance policies.
 16. Performance and payment bonds.
 17. Data needed to acquire Owner's insurance.
- I. Application for Payment at Substantial Completion: After Architect issues the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.
1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
 - a. Complete administrative actions, submittals, and Work preceding this application, as described in Section 01 77 00 "Closeout Procedures."
 2. This application shall reflect Certificate(s) of Substantial Completion issued previously for Owner occupancy of designated portions of the Work.
- J. Final Payment Application: After completing Project closeout requirements, submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:
1. Evidence of completion of Project closeout requirements.
 2. Certification of completion of final punch list items.
 3. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
 4. Updated final statement, accounting for final changes to the Contract Sum.
 5. AIA Document G706.
 6. AIA Document G706A.
 7. AIA Document G707.
 8. Evidence that claims have been settled.

SECTION 01 29 00 - PAYMENT PROCEDURES

9. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.
10. Final liquidated damages settlement statement.
11. Proof that taxes, fees, and similar obligations are paid.
12. Waivers and releases.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 29 00

SECTION 01 29 00 - PAYMENT PROCEDURES

Page 6 of 6

SECTION 01 31 00 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative provisions for coordinating construction operations on Project, including, but not limited to, the following:
 - 1. General coordination procedures.
 - 2. Coordination drawings.
 - 3. RFIs.
 - 4. Digital project management procedures.
 - 5. Web-based Project management software package.
 - 6. Project meetings.
- B. Related Requirements:
 - 1. Section 01 12 00 "Multiple Contract Summary" for a description of the division of work among separate contracts and responsibility for coordination activities not in this Section.
 - 2. Section 01 32 00 "Construction Progress Documentation" for preparing and submitting Contractor's construction schedule.
 - 3. Section 01 73 00 "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
 - 4. Section 01 77 00 "Closeout Procedures" for coordinating closeout of the Contract.
 - 5. Section 01 91 13 "General Commissioning Requirements" for coordinating the Work with Owner's Commissioning Authority.

1.3 DEFINITIONS

- A. BIM: Building Information Modeling.
- B. RFI: Request for Information. Request from Owner, Architect, or Contractor seeking information required by or clarifications of the Contract Documents.

SECTION 01 31 00 - PROJECT MANAGEMENT AND COORDINATION

1.4 INFORMATIONAL SUBMITTALS

- A. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:
1. Name, address, telephone number, and email address of entity performing subcontract or supplying products.
 2. Number and title of related Specification Section(s) covered by subcontract.
 3. Drawing number and detail references, as appropriate, covered by subcontract.
- B. Key Personnel Names: Within 15 days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses, cellular telephone numbers, and e-mail addresses. Provide names, addresses, and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project.
1. Post copies of list in Project meeting room, in temporary field office, in web-based Project software directory, and in prominent location in built facility. Keep list current at all times.

1.5 GENERAL COORDINATION PROCEDURES

- A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations included in different Sections that depend on each other for proper installation, connection, and operation.
1. Schedule construction operations in sequence required to obtain the best results, where installation of one part of the Work depends on installation of other components, before or after its own installation.
 2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
 3. Make adequate provisions to accommodate items scheduled for later installation.
- B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.
- C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
1. Preparation of Contractor's construction schedule.

**SECTION 01 31 00 - PROJECT MANAGEMENT
AND COORDINATION**

2. Preparation of the schedule of values.
3. Installation and removal of temporary facilities and controls.
4. Delivery and processing of submittals.
5. Progress meetings.
6. Preinstallation conferences.
7. Project closeout activities.
8. Startup and adjustment of systems.

1.6 COORDINATION DRAWINGS

- A. Coordination Drawings, General: Prepare coordination drawings according to requirements in individual Sections, and additionally where installation is not completely indicated on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.
1. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:
 - a. Use applicable Drawings as a basis for preparation of coordination drawings. Prepare sections, elevations, and details as needed to describe relationship of various systems and components.
 - b. Coordinate the addition of trade-specific information to coordination drawings in a sequence that best provides for coordination of the information and resolution of conflicts between installed components before submitting for review.
 - c. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
 - d. Indicate space requirements for routine maintenance and for anticipated replacement of components during the life of the installation.
 - e. Show location and size of access doors required for access to concealed dampers, valves, and other controls.
 - f. Indicate required installation sequences.
 - g. Indicate dimensions shown on Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternative sketches to Architect indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.
- B. Coordination Drawing Organization: Organize coordination drawings as follows:
1. Floor Plans and Reflected Ceiling Plans: Show architectural and structural elements, and mechanical, plumbing, fire-protection, fire-alarm, and electrical Work. Show locations of visible ceiling-mounted devices relative to acoustical ceiling grid. Supplement plan drawings with section drawings where required to adequately represent the Work.
 2. Plenum Space: Indicate subframing for support of ceiling and wall systems, mechanical and electrical equipment, and related Work. Locate components

SECTION 01 31 00 - PROJECT MANAGEMENT AND COORDINATION

Page 3 of 13

within plenums to accommodate layout of light fixtures and other components indicated on Drawings. Indicate areas of conflict between light fixtures and other components.

3. Mechanical Rooms: Provide coordination drawings for mechanical rooms, showing plans and elevations of mechanical, plumbing, fire-protection, fire-alarm, and electrical equipment.
4. Structural Penetrations: Indicate penetrations and openings required for all disciplines.
5. Slab Edge and Embedded Items: Indicate slab edge locations and sizes and locations of embedded items for metal fabrications, sleeves, anchor bolts, bearing plates, angles, door floor closers, slab depressions for floor finishes, curbs and housekeeping pads, and similar items.
6. Mechanical and Plumbing Work: Show the following:
 - a. Sizes and bottom elevations of ductwork, piping, and conduit runs, including insulation, bracing, flanges, and support systems.
 - b. Dimensions of major components, such as dampers, valves, diffusers, access doors, cleanouts and electrical distribution equipment.
 - c. Fire-rated enclosures around ductwork.
7. Electrical Work: Show the following:
 - a. Runs of vertical and horizontal conduit **1-1/4 inches** in diameter and larger.
 - b. Light fixture, exit light, emergency battery pack, smoke detector, and other fire-alarm locations.
 - c. Panel board, switchboard, switchgear, transformer, busway, generator, and motor-control center locations.
 - d. Location of pull boxes and junction boxes, dimensioned from column center lines.
8. Fire-Protection System: Show the following:
 - a. Locations of standpipes, mains piping, branch lines, pipe drops, and sprinkler heads.
9. Review: Architect will review coordination drawings to confirm that, in general, the Work is being coordinated, but not for the details of the coordination, which are Contractor's responsibility. If Architect determines that coordination drawings are not being prepared in sufficient scope or detail, or are otherwise deficient, Architect will so inform Contractor, who shall make suitable modifications and resubmit.
10. Coordination Drawing Prints: Prepare coordination drawing prints according to requirements in Section 01 33 00 "Submittal Procedures."

- C. Coordination Drawing Process: Prepare coordination drawings in the following manner:
1. Schedule submittal and review of Fire Sprinkler, Plumbing, HVAC, and Electrical Shop Drawings to make required changes prior to preparation of coordination drawings.
 2. Commence routing of coordination drawing files with HVAC Installer, who will provide drawing plan files denoting approved ductwork. HVAC Installer will locate ductwork and piping on a single layer, using orange color. Forward drawings to Plumbing Installer.
 3. Plumbing Installer will locate plumbing and equipment on a single layer, using blue color.

**SECTION 01 31 00 - PROJECT MANAGEMENT
AND COORDINATION**

4. Fire Sprinkler Installer will locate piping and equipment, using red color. Fire Sprinkler Installer shall forward drawing files to Electrical Installer.
5. Electrical Installer will indicate service and feeder conduit runs and equipment in green color. Electrical Installer shall forward drawing files to Communications and Electronic Safety and Security Installer.
6. Communications and Electronic Safety and Security Installer will indicate cable trays and cabling runs and equipment in purple color. Communications and Electronic Safety and Security Installer shall forward completed drawing files to Contractor.
7. Contractor shall perform the final coordination review. As each coordination drawing is completed, Contractor will meet with Architect to review and resolve conflicts on the coordination drawings.

D. Coordination Digital Data Files: Prepare coordination digital data files according to the following requirements:

1. File Preparation Format:
 - a. , Version Newforma Project Center , operating in Microsoft Windows operating system.
2. File Submittal Format: Submit or post coordination drawing files using PDF format.
3. BIM File Incorporation: Develop and incorporate coordination drawing files into BIM established for Project.
 - a. Perform three-dimensional component conflict analysis as part of preparation of coordination drawings. Resolve component conflicts prior to submittal. Indicate where conflict resolution requires modification of design requirements by Architect.
4. Architect will furnish Contractor one set of digital data files of Drawings for use in preparing coordination digital data files.
 - a. Architect makes no representations as to the accuracy or completeness of digital data files as they relate to Drawings.
 - b. Digital Data Software Program: Drawings are available in Revit .
 - c. Contractor shall execute a data licensing agreement in the form of AIA Document C106 .

1.7 REQUEST FOR INFORMATION (RFI)

- A. General: Immediately on discovery of the need for additional information, clarification, or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.
1. Architect will return without response those RFIs submitted to Architect by other entities controlled by Contractor.
 2. Coordinate and submit RFIs in a prompt manner to avoid delays in Contractor's work or work of subcontractors.
- B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:

SECTION 01 31 00 - PROJECT MANAGEMENT AND COORDINATION

1. Project name.
 2. Owner name.
 3. Owner's Project number.
 4. Name of Architect.
 5. Architect's Project number.
 6. Date.
 7. Name of Contractor.
 8. RFI number, numbered sequentially.
 9. RFI subject.
 10. Specification Section number and title and related paragraphs, as appropriate.
 11. Drawing number and detail references, as appropriate.
 12. Field dimensions and conditions, as appropriate.
 13. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
 14. Contractor's signature.
 15. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.
 - a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.
- C. RFI Forms: Software-generated form with substantially the same content as indicated above, acceptable to Architect.
1. Attachments shall be electronic files in PDF format.
- D. Architect's Action: Architect will review each RFI, determine action required, and respond. Allow 14 days for Architect's response for each RFI. RFIs received by Architect after 1:00 p.m. will be considered as received the following working day.
1. The following Contractor-generated RFIs will be returned without action:
 - a. Requests for approval of submittals.
 - b. Requests for approval of substitutions.
 - c. Requests for approval of Contractor's means and methods.
 - d. Requests for coordination information already indicated in the Contract Documents.
 - e. Requests for adjustments in the Contract Time or the Contract Sum.
 - f. Requests for interpretation of Architect's actions on submittals.
 - g. Incomplete RFIs or inaccurately prepared RFIs.
 2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt by Architect of additional information.
 3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Section 01 26 00 "Contract Modification Procedures."
 - a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within 5 days of receipt of the RFI response.

**SECTION 01 31 00 - PROJECT MANAGEMENT
AND COORDINATION**

Page 6 of 13

- E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log weekly . Use software log that is part of web-based Project management software. Include the following:
1. Project name.
 2. Name and address of Contractor.
 3. Name and address of Architect.
 4. RFI number, including RFIs that were returned without action or withdrawn.
 5. RFI description.
 6. Date the RFI was submitted.
 7. Date Architect's response was received.
 8. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.
 9. Identification of related Field Order, Work Change Directive, and Proposal Request, as appropriate.
- F. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within three days if Contractor disagrees with response.

1.8 DIGITAL PROJECT MANAGEMENT PROCEDURES

- A. Use of Architect's Digital Data Files: Digital data files of Architect's BIM model will be provided by Architect for Contractor's use during construction.
1. Digital data files may be used by Contractor in preparing coordination drawings, Shop Drawings, and Project Record Drawings.
 2. Architect makes no representations as to the accuracy or completeness of digital data files as they relate to Contract Drawings.
 3. Digital Drawing Software Program: Contract Drawings are available in Revit .
 4. Contractor shall execute a data licensing agreement in the form of AIA Document C106 Digital Data Licensing Agreement .
 - a. Subcontractors and other parties granted access by Contractor to Architect's digital data files shall execute a data licensing agreement in the form of AIA Document C106 .
 5. .
 6. The following digital data files will be furnished for each appropriate discipline:
 - a. Floor plans.
 - b. Reflected ceiling plans.
 - c. .
- B. Web-Based Project Management Software Package: Provide, administer, and use web-based Project management software package for purposes of hosting and managing Project communication and documentation until Final Completion.
1. Web-based Project management software includes, at a minimum, the following features:

SECTION 01 31 00 - PROJECT MANAGEMENT AND COORDINATION

- a. Compilation of Project data, including Contractor, subcontractors, Architect, Architect's consultants, Owner, and other entities involved in Project. Include names of individuals and contact information.
 - b. Access control for each entity for each workflow process, to determine entity's digital rights to create, modify, view, and print documents.
 - c. Document workflow planning, allowing customization of workflow between project entities.
 - d. Creation, logging, tracking, and notification for Project communications required in other Specification Sections, including, but not limited to, RFIs, submittals, Minor Changes in the Work, Construction Change Directives, and Change Orders.
 - e. Track status of each Project communication in real time, and log time and date when responses are provided.
 - f. Procedures for handling PDFs or similar file formats, allowing markups by each entity. Provide security features to lock markups against changes once submitted.
 - g. Processing and tracking of payment applications.
 - h. Processing and tracking of contract modifications.
 - i. Creating and distributing meeting minutes.
 - j. Document management for Drawings, Specifications, and coordination drawings, including revision control.
 - k. Management of construction progress photographs.
 - l. Mobile device compatibility, including smartphones and tablets.
 - m. .
2. Provide up to seven Project management software user licenses for use of Owner , Architect, and Architect's consultants. Provide four hours of software training at Architect's office for web-based Project software users.
 3. At completion of Project, provide digital archive in format that is readable by common desktop software applications in format acceptable to Architect. Provide data in locked format to prevent further changes.
- C. PDF Document Preparation: Where PDFs are required to be submitted to Architect, prepare as follows:
1. Assemble complete submittal package into a single indexed file, incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
 2. Name file with submittal number or other unique identifier, including revision identifier.
 3. Certifications: Where digitally submitted certificates and certifications are required, provide a digital signature with digital certificate on where indicated.

1.9 PROJECT MEETINGS

- A. General: Schedule and conduct meetings and conferences at Project site unless otherwise indicated.

SECTION 01 31 00 - PROJECT MANAGEMENT AND COORDINATION

1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times a minimum of seven days prior to meeting.
 2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
 3. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Architect, within three days of the meeting.
- B. Preconstruction Conference: Schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than 15 days after execution of the Agreement.
1. Attendees: Authorized representatives of Owner Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
 2. Agenda: Discuss items of significance that could affect progress, including the following:
 - a. Responsibilities and personnel assignments.
 - b. Tentative construction schedule.
 - c. Phasing.
 - d. Critical work sequencing and long lead items.
 - e. Designation of key personnel and their duties.
 - f. Lines of communications.
 - g. Use of web-based Project software.
 - h. Procedures for processing field decisions and Change Orders.
 - i. Procedures for RFIs.
 - j. Procedures for testing and inspecting.
 - k. Procedures for processing Applications for Payment.
 - l. Distribution of the Contract Documents.
 - m. Submittal procedures.
 - n. Preparation of Record Documents.
 - o. Use of the premises.
 - p. Work restrictions.
 - q. Working hours.
 - r. Owner's occupancy requirements.
 - s. Responsibility for temporary facilities and controls.
 - t. Procedures for moisture and mold control.
 - u. Procedures for disruptions and shutdowns.
 - v. Construction waste management and recycling.
 - w. Parking availability.
 - x. Office, work, and storage areas.
 - y. Equipment deliveries and priorities.
 - z. First aid.
 - aa. Security.

**SECTION 01 31 00 - PROJECT MANAGEMENT
AND COORDINATION**

- bb. Progress cleaning.
 - 3. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.
- C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity when required by other Sections and when required for coordination with other construction.
- 1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect of scheduled meeting dates.
 - 2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
 - a. Contract Documents.
 - b. Options.
 - c. Related RFIs.
 - d. Related Change Orders.
 - e. Purchases.
 - f. Deliveries.
 - g. Submittals.
 - h. Review of mockups.
 - i. Possible conflicts.
 - j. Compatibility requirements.
 - k. Time schedules.
 - l. Weather limitations.
 - m. Manufacturer's written instructions.
 - n. Warranty requirements.
 - o. Compatibility of materials.
 - p. Acceptability of substrates.
 - q. Temporary facilities and controls.
 - r. Space and access limitations.
 - s. Regulations of authorities having jurisdiction.
 - t. Testing and inspecting requirements.
 - u. Installation procedures.
 - v. Coordination with other work.
 - w. Required performance results.
 - x. Protection of adjacent work.
 - y. Protection of construction and personnel.
 - 3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
 - 4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.
 - 5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.
- D. Progress Meetings: Conduct progress meetings at weekly intervals.

**SECTION 01 31 00 - PROJECT MANAGEMENT
AND COORDINATION**

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

**SECTION 01 31 00 - PROJECT MANAGEMENT
AND COORDINATION**

1. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meetings shall be familiar with Project and authorized to conclude matters relating to the Work.
2. Agenda: Review and correct or approve minutes of the previous coordination meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
 - a. Combined Contractor's Construction Schedule: Review progress since the last coordination meeting. Determine whether each contract is on time, ahead of schedule, or behind schedule, in relation to combined Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
 - b. Schedule Updating: Revise combined Contractor's construction schedule after each coordination meeting, where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with report of each meeting.
 - c. Review present and future needs of each contractor present, including the following:
 - 1) Interface requirements.
 - 2) Sequence of operations.
 - 3) Resolution of BIM component conflicts.
 - 4) Status of submittals.
 - 5) Deliveries.
 - 6) Off-site fabrication.
 - 7) Access.
 - 8) Site use.
 - 9) Temporary facilities and controls.
 - 10) Work hours.
 - 11) Hazards and risks.
 - 12) Progress cleaning.
 - 13) Quality and work standards.
 - 14) Status of RFIs.
 - 15) Proposal Requests.
 - 16) Change Orders.
 - 17) Pending changes.
3. Reporting: Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

**SECTION 01 31 00 - PROJECT MANAGEMENT
AND COORDINATION**

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 31 00

**SECTION 01 31 00 - PROJECT MANAGEMENT
AND COORDINATION**

Page 13 of 13

SECTION 01 32 00 - CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:
 - 1. Contractor's Construction Schedule.
 - 2. Construction schedule updating reports.
 - 3. Daily construction reports.
 - 4. Site condition reports.
- B. Related Requirements:
 - 1. Section 01 40 00 "Quality Requirements" for schedule of tests and inspections.
 - 2. Section 01 29 00 "Payment Procedures" for schedule of values and requirements for use of cost-loaded schedule for Applications for Payment.

1.3 DEFINITIONS

- A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction Project. Activities included in a construction schedule consume time and resources.
 - 1. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.
 - 2. Predecessor Activity: An activity that precedes another activity in the network.
 - 3. Successor Activity: An activity that follows another activity in the network.
- B. Cost Loading: The allocation of the schedule of values for completing an activity as scheduled. The sum of costs for all activities must equal the total Contract Sum.
- C. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine the critical path of Project and when activities can be performed.

SECTION 01 32 00 - CONSTRUCTION PROGRESS DOCUMENTATION

- D. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.
- E. Event: The starting or ending point of an activity.
- F. Float: The measure of leeway in starting and completing an activity.
 - 1. Float time is not for the exclusive use or benefit of either Owner or Contractor, but is a jointly owned, expiring Project resource available to both parties as needed to meet schedule milestones and Contract completion date.
 - 2. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the successor activity.
 - 3. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.
- G. Resource Loading: The allocation of manpower and equipment necessary for completing an activity as scheduled.

1.4 INFORMATIONAL SUBMITTALS

- A. Format for Submittals: Submit required submittals in the following format:
 - 1. Working electronic copy of schedule file.
 - 2. PDF file.
 - 3. Two paper copies, of sufficient size to display entire period or schedule, as required.
- B. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.
 - 1. Submit a working digital copy of schedule, using software indicated, and labeled to comply with requirements for submittals.
- C. Construction Schedule Updating Reports: Submit with Applications for Payment.

1.5 QUALITY ASSURANCE

1.6 COORDINATION

- A. Coordinate Contractor's Construction Schedule with the schedule of values, list of subcontracts, submittal schedule, progress reports, payment requests, and other required schedules and reports.
 - 1. Secure time commitments for performing critical elements of the Work from entities involved.

SECTION 01 32 00 - CONSTRUCTION PROGRESS DOCUMENTATION

2. Coordinate each construction activity in the network with other activities, and schedule them in proper sequence.

1.7 CONTRACTOR'S CONSTRUCTION SCHEDULE

- A. Computer Scheduling Software: Prepare schedules using current version of a program that has been developed specifically to manage construction schedules.
- B. Time Frame: Extend schedule from date established for commencement of the Work to date of Substantial Completion .
 1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.
- C. Activities: Treat each floor or separate area as a separate numbered activity for each main element of the Work. Comply with the following:
 1. Temporary Facilities: Indicate start and completion dates for the following as applicable:
 - a. Securing of approvals and permits required for performance of the Work.
 - b. Temporary facilities.
 - c. Construction of mock-ups, prototypes and samples.
 - d. Owner interfaces and furnishing of items.
 - e. Interfaces with Separate Contracts.
 - f. Regulatory agency approvals.
 - g. Punch list.
 2. Procurement Activities: Include procurement process activities for the following long lead-time items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
 - a. .
 3. Submittal Review Time: Include review and resubmittal times indicated in Section 01 33 00 "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's Construction Schedule with submittal schedule.
 4. Startup and Testing Time: Include no fewer than 15 days for startup and testing.
 5. Commissioning Time: Include no fewer than 15 days for commissioning.
 6. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Architect's administrative procedures necessary for certification of Substantial Completion.
 7. Punch List and Final Completion: Include not more than 30 days for completion of punch list items and Final Completion.
- D. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.
 1. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:

SECTION 01 32 00 - CONSTRUCTION PROGRESS DOCUMENTATION

Page 3 of 8

- a. Subcontract awards.
 - b. Submittals.
 - c. Purchases.
 - d. Mockups.
 - e. Fabrication.
 - f. Sample testing.
 - g. Deliveries.
 - h. Installation.
 - i. Tests and inspections.
 - j. Adjusting.
 - k. Curing.
 - l. Building flush-out.
 - m. Startup and placement into final use and operation.
 - n. Commissioning.
2. Construction Areas: Identify each major area of construction for each major portion of the Work. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities to provide for the following:
- a. Structural completion.
 - b. Temporary enclosure and space conditioning.
 - c. Permanent space enclosure.
 - d. Completion of mechanical installation.
 - e. Completion of electrical installation.
 - f. Substantial Completion.
- E. Cost Correlation: Superimpose a cost correlation timeline, indicating planned and actual costs. On the line, show planned and actual dollar volume of the Work performed as of planned and actual dates used for preparation of payment requests.
1. See Section 01 29 00 "Payment Procedures" for cost reporting and payment procedures.
- F. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:
1. Unresolved issues.
 2. Unanswered Requests for Information.
 3. Rejected or unreturned submittals.
 4. Notations on returned submittals.
 5. Pending modifications affecting the Work and the Contract Time.
- G. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule one week before each regularly scheduled progress meeting.
1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.

**SECTION 01 32 00 - CONSTRUCTION
PROGRESS DOCUMENTATION**

2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
 3. As the Work progresses, indicate Final Completion percentage for each activity.
- H. Recovery Schedule: When periodic update indicates the Work is 14 or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule. Indicate changes to working hours, working days, crew sizes, equipment required to achieve compliance, and date by which recovery will be accomplished.
- I. Distribution: Distribute copies of approved schedule to Architect Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.
1. Post copies in Project meeting rooms and temporary field offices.
 2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

1.8 CPM SCHEDULE REQUIREMENTS

- A. Prepare network diagrams using AON (activity-on-node) format.
- B. Startup Network Diagram: Submit diagram within 14 days of date established for commencement of the Work . Outline significant construction activities for the first 90 days of construction. Include skeleton diagram for the remainder of the Work and a cash requirement prediction based on indicated activities.
- C. CPM Schedule: Prepare Contractor's Construction Schedule using a time-scaled CPM network analysis diagram for the Work.
1. Develop network diagram in sufficient time to submit CPM schedule, so it can be accepted for use no later than 60 days after date established for commencement of the Work .
 - a. Failure to include any work item required for performance of this Contract shall not excuse Contractor from completing all work within applicable completion dates.
 2. Conduct educational workshops to train and inform key Project personnel, including subcontractors' personnel, in proper methods of providing data and using CPM schedule information.
 3. Establish procedures for monitoring and updating CPM schedule and for reporting progress. Coordinate procedures with progress meeting and payment request dates.
 4. Use "one workday" as the unit of time for individual activities. Indicate nonworking days and holidays incorporated into the schedule to coordinate with the Contract Time.

SECTION 01 32 00 - CONSTRUCTION PROGRESS DOCUMENTATION

Page 5 of 8

- D. CPM Schedule Preparation: Prepare a list of all activities required to complete the Work. Using the startup network diagram, prepare a skeleton network to identify probable critical paths.
1. Activities: Indicate the estimated time duration, sequence requirements, and relationship of each activity in relation to other activities. Include estimated time frames for the following activities:
 - a. Preparation and processing of submittals.
 - b. Mobilization and demobilization.
 - c. Purchase of materials.
 - d. Delivery.
 - e. Fabrication.
 - f. Utility interruptions.
 - g. Installation.
 - h. Work by Owner that may affect or be affected by Contractor's activities.
 - i. Testing and inspection.
 - j. Commissioning.
 - k. Punch list and Final Completion.
 - l. Activities occurring following Final Completion.
 2. Critical Path Activities: Identify critical path activities, including those for interim completion dates. Scheduled start and completion dates shall be consistent with Contract milestone dates.
 3. Processing: Process data to produce output data on a computer-drawn, time-scaled network. Revise data, reorganize activity sequences, and reproduce as often as necessary to produce the CPM schedule within the limitations of the Contract Time.
 4. Format: Mark the critical path. Locate the critical path near center of network; locate paths with most float near the edges.
 - a. Subnetworks on separate sheets are permissible for activities clearly off the critical path.
 5. Cost- and Resource-Loading of CPM Schedule: Assign cost to construction activities on the CPM schedule. Do not assign costs to submittal activities. Obtain Architect's approval prior to assigning costs to fabrication and delivery activities. Assign costs under main subcontracts for testing and commissioning activities, operation and maintenance manuals, punch list activities, Project record documents, and demonstration and training (if applicable), in the amount of 5 percent of the Contract Sum.
 - a. Each activity cost shall reflect an appropriate value subject to approval by Architect.
 - b. Total cost assigned to activities shall equal the total Contract Sum.
- E. Contract Modifications: For each proposed contract modification and concurrent with its submission, prepare a time-impact analysis using a network fragment to demonstrate the effect of the proposed change on the overall Project schedule.
- F. Initial Issue of Schedule: Prepare initial network diagram from a sorted activity list indicating straight "early start-total float." Identify critical activities. Prepare tabulated reports showing the following:

**SECTION 01 32 00 - CONSTRUCTION
PROGRESS DOCUMENTATION**

Page 6 of 8

1. Contractor or subcontractor and the Work or activity.
 2. Description of activity.
 3. Main events of activity.
 4. Immediate preceding and succeeding activities.
 5. Early and late start dates.
 6. Early and late finish dates.
 7. Activity duration in workdays.
 8. Total float or slack time.
 9. Average size of workforce.
 10. Dollar value of activity (coordinated with the schedule of values).
- G. Schedule Updating: Concurrent with making revisions to schedule, prepare tabulated reports showing the following:
1. Identification of activities that have changed.
 2. Changes in early and late start dates.
 3. Changes in early and late finish dates.
 4. Changes in activity durations in workdays.
 5. Changes in the critical path.
 6. Changes in total float or slack time.
 7. Changes in the Contract Time.
- H. Value Summaries: Prepare two cumulative value lists, sorted by finish dates.
1. In first list, tabulate activity number, early finish date, dollar value, and cumulative dollar value.
 2. In second list, tabulate activity number, late finish date, dollar value, and cumulative dollar value.
 3. In subsequent issues of both lists, substitute actual finish dates for activities completed as of list date.
 4. Prepare list for ease of comparison with payment requests; coordinate timing with progress meetings.
 - a. In both value summary lists, tabulate "actual percent complete" and "cumulative value completed" with total at bottom.
 - b. Submit value summary printouts one week before each regularly scheduled progress meeting.
- 1.9 REPORTS
- A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:
1. List of subcontractors at Project site.
 2. List of separate contractors at Project site.
 3. Approximate count of personnel at Project site.
 4. Equipment at Project site.
 5. Material deliveries.

**SECTION 01 32 00 - CONSTRUCTION
PROGRESS DOCUMENTATION**

6. High and low temperatures and general weather conditions, including presence of rain or snow.
7. Testing and inspection.
8. Accidents.
9. Meetings and significant decisions.
10. Unusual events.
11. Stoppages, delays, shortages, and losses.
12. Meter readings and similar recordings.
13. Emergency procedures.
14. Orders and requests of authorities having jurisdiction.
15. Change Orders received and implemented.
16. Construction Change Directives received and implemented.
17. Services connected and disconnected.
18. Equipment or system tests and startups.
19. Partial completions and occupancies.
20. Substantial Completions authorized.

- B. Site Condition Reports: Immediately on discovery of a difference between site conditions and the Contract Documents, prepare and submit a detailed report. Submit with a Request for Information. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 32 00

SECTION 01 32 33 - PHOTOGRAPHIC DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for the following:
 - 1. Preconstruction photographs.
 - 2. Concealed Work photographs.
 - 3. Periodic construction photographs.
 - 4. Final Completion construction photographs.
- B. Related Requirements:
 - 1. Section 01 77 00 "Closeout Procedures" for submitting photographic documentation as Project Record Documents at Project closeout.
 - 2. Section 01 79 00 "Demonstration and Training" for submitting video recordings of demonstration of equipment and training of Owner's personnel.
 - 3. Section 02 41 19 "Selective Demolition" for photographic documentation before selective demolition operations commence.

1.3 INFORMATIONAL SUBMITTALS

- A. Key Plan: Submit key plan of Project site and building with notation of vantage points marked for location and direction of each photograph . Indicate elevation or story of construction. Include same information as corresponding photographic documentation.
- B. Digital Photographs: Submit image files within three days of taking photographs.
 - 1. Submit photos by uploading to web-based Project management software site. Include copy of key plan indicating each photograph's location and direction.
 - 2. Identification: Provide the following information with each image description in web-based Project management software site:
 - a. Name of Project.
 - b. Name of Architect.
 - c. Name of Contractor.
 - d. Date photograph was taken.
 - e. Description of location, vantage point, and direction.

SECTION 01 32 33 - PHOTOGRAPHIC DOCUMENTATION

- f. Unique sequential identifier keyed to accompanying key plan.

1.4 FORMATS AND MEDIA

- A. Digital Photographs: Provide color images in JPG format, produced by a digital camera with minimum sensor size of 12 megapixels, and at an image resolution of not less than 3200 by 2400 pixels , and with vibration-reduction technology. Use flash in low light levels or backlit conditions.
- B. Metadata: Record accurate date and time from camera.
- C. File Names: Name media files with date Project area and sequential numbering suffix.

1.5 CONSTRUCTION PHOTOGRAPHS

- A. General: Take photographs with maximum depth of field and in focus.
 - 1. Maintain key plan with each set of construction photographs that identifies each photographic location.
- B. Preconstruction Photographs: Before commencement of the Work, take photographs of Project site and surrounding properties, including existing items to remain during construction, from different vantage points, as directed by Architect .
 - 1. Take 20 photographs to show existing conditions adjacent to property before starting the Work.
 - 2. Take additional photographs as required to record settlement or cracking of adjacent structures, pavements, and improvements.
- C. Concealed Work Photographs: Before proceeding with installing work that will conceal other work, take photographs sufficient in number, with annotated descriptions, to record nature and location of concealed Work, including, but not limited to, the following:
 - 1. Underslab services.
 - 2. Piping.
 - 3. Electrical conduit.
- D. Periodic Construction Photographs: Take 20 photographs coinciding with the cutoff date associated with each Application for Payment. Select vantage points to show status of construction and progress since last photographs were taken.
- E. Final Completion Construction Photographs: Take 20 photographs after date of Substantial Completion for submission as Project Record Documents. Architect will inform photographer of desired vantage points.

SECTION 01 32 33 - PHOTOGRAPHIC DOCUMENTATION

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 32 33

**SECTION 01 32 33 - PHOTOGRAPHIC
DOCUMENTATION**

Page 3 of 3

SECTION 01 33 00 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

1. Submittal schedule requirements.
2. Administrative and procedural requirements for submittals.

- B. Related Requirements:

1. Section 01 29 00 "Payment Procedures" for submitting Applications for Payment and the schedule of values.
2. Section 01 31 00 "Project Management and Coordination" for submitting coordination drawings and subcontract list and for requirements for web-based Project software.
3. Section 01 32 00 "Construction Progress Documentation" for submitting schedules and reports, including Contractor's construction schedule.
4. Section 01 32 33 "Photographic Documentation" for submitting preconstruction photographs, periodic construction photographs, and Final Completion construction photographs.
5. Section 01 40 00 "Quality Requirements" for submitting test and inspection reports, and schedule of tests and inspections.
6. Section 01 77 00 "Closeout Procedures" for submitting closeout submittals and maintenance material submittals.
7. Section 01 78 23 "Operation and Maintenance Data" for submitting operation and maintenance manuals.
8. Section 01 78 39 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.
9. Section 01 79 00 "Demonstration and Training" for submitting video recordings of demonstration of equipment and training of Owner's personnel.

1.3 DEFINITIONS

- A. Action Submittals: Written and graphic information and physical samples that require Architect's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."

SECTION 01 33 00 - SUBMITTAL PROCEDURES

- B. Informational Submittals: Written and graphic information and physical samples that do not require Architect's responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as "informational submittals."

1.4 SUBMITTAL SCHEDULE

- A. Submittal Schedule: Submit, as an action submittal, a list of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Architect and additional time for handling and reviewing submittals required by those corrections.
 - 1. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.
 - 2. Initial Submittal Schedule: Submit concurrently with startup construction schedule. Include submittals required during the first 60 days of construction. List those submittals required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
 - 3. Final Submittal Schedule: Submit concurrently with the first complete submittal of Contractor's construction schedule.
 - a. Submit revised submittal schedule as required to reflect changes in current status and timing for submittals.
 - 4. Format: Arrange the following information in a tabular format:
 - a. Scheduled date for first submittal.
 - b. Specification Section number and title.
 - c. Submittal Category: Action; informational.
 - d. Name of subcontractor.
 - e. Description of the Work covered.
 - f. Scheduled date for Architect's final release or approval.
 - g. Scheduled dates for purchasing.
 - h. Scheduled date of fabrication.
 - i. Scheduled dates for installation.
 - j. Activity or event number.

1.5 SUBMITTAL FORMATS

- A. Submittal Information: Include the following information in each submittal:
 - 1. Project name.
 - 2. Date.
 - 3. Name of Architect.
 - 4. Name of Contractor.
 - 5. Name of firm or entity that prepared submittal.
 - 6. Names of subcontractor, manufacturer, and supplier.

SECTION 01 33 00 - SUBMITTAL PROCEDURES

7. Unique submittal number, including revision identifier. Include Specification Section number with sequential alphanumeric identifier and alphanumeric suffix for resubmittals.
8. Category and type of submittal.
9. Submittal purpose and description.
10. Number and title of Specification Section, with paragraph number and generic name for each of multiple items.
11. Drawing number and detail references, as appropriate.
12. Indication of full or partial submittal.
13. Location(s) where product is to be installed, as appropriate.
14. Other necessary identification.
15. Remarks.
16. Signature of transmitter.

B. Options: Identify options requiring selection by Architect.

C. Deviations and Additional Information: On each submittal, clearly indicate deviations from requirements in the Contract Documents, including minor variations and limitations; include relevant additional information and revisions, other than those requested by Architect on previous submittals. Indicate by highlighting on each submittal or noting on attached separate sheet.

D. Electronic Submittals: Prepare submittals as PDF package, incorporating complete information into each PDF file. Name PDF file with submittal number.

E. Submittals Utilizing Web-Based Project Software: Prepare submittals as PDF files or other format indicated by Project management software.

1.6 SUBMITTAL PROCEDURES

A. Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.

1. Email: Prepare submittals as PDF package and transmit to Architect by sending via email. Include PDF transmittal form. Include information in email subject line as requested by Architect.
 - a. Architect will return annotated file. Annotate and retain one copy of file as a digital Project Record Document file.
2. Web-Based Project Management Software: Prepare submittals in PDF form, and upload to web-based Project management software website. Enter required data in web-based software site to fully identify submittal.
3. Paper: Prepare submittals in paper form and deliver to Architect.

B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.

SECTION 01 33 00 - SUBMITTAL PROCEDURES

2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
 3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
 4. Coordinate transmittal of submittals for related parts of the Work specified in different Sections, so processing will not be delayed because of need to review submittals concurrently for coordination.
 - a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
1. Initial Review: Allow 15 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
 2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
 3. Resubmittal Review: Allow 15 days for review of each resubmittal.
 4. Concurrent Consultant Review: Where the Contract Documents indicate that submittals may be transmitted simultaneously to Architect and to Architect's consultants, allow 15 days for review of each submittal. Submittal will be returned to Architect before being returned to Contractor.
 - a. Submit one copy of submittal to concurrent reviewer in addition to specified number of copies to Architect.
- D. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.
1. Note date and content of previous submittal.
 2. Note date and content of revision in label or title block, and clearly indicate extent of revision.
 3. Resubmit submittals until they are marked with approval notation from Architect's action stamp.
- E. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.
- F. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Architect's action stamp.

SECTION 01 33 00 - SUBMITTAL PROCEDURES

1.7 SUBMITTAL REQUIREMENTS

- A. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
1. If information must be specially prepared for submittal because standard published data are unsuitable for use, submit as Shop Drawings, not as Product Data.
 2. Mark each copy of each submittal to show which products and options are applicable.
 3. Include the following information, as applicable:
 - a. Manufacturer's catalog cuts.
 - b. Manufacturer's product specifications.
 - c. Standard color charts.
 - d. Statement of compliance with specified referenced standards.
 - e. Testing by recognized testing agency.
 - f. Application of testing agency labels and seals.
 - g. Notation of coordination requirements.
 - h. Availability and delivery time information.
 4. For equipment, include the following in addition to the above, as applicable:
 - a. Wiring diagrams that show factory-installed wiring.
 - b. Printed performance curves.
 - c. Operational range diagrams.
 - d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.
 5. Submit Product Data before Shop Drawings, and before or concurrently with Samples.
- B. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.
1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
 - a. Identification of products.
 - b. Schedules.
 - c. Compliance with specified standards.
 - d. Notation of coordination requirements.
 - e. Notation of dimensions established by field measurement.
 - f. Relationship and attachment to adjoining construction clearly indicated.
 - g. Seal and signature of professional engineer if specified.
- C. Samples: Submit Samples for review of type, color, pattern, and texture for a check of these characteristics with other materials.
1. Transmit Samples that contain multiple, related components, such as accessories together in one submittal package.
 2. Identification: Permanently attach label on unexposed side of Samples that includes the following:

SECTION 01 33 00 - SUBMITTAL PROCEDURES

- a. Project name and submittal number.
 - b. Generic description of Sample.
 - c. Product name and name of manufacturer.
 - d. Sample source.
 - e. Number and title of applicable Specification Section.
 - f. Specification paragraph number and generic name of each item.
3. Email Transmittal: Provide PDF transmittal. Include digital image file illustrating Sample characteristics and identification information for record.
 4. Web-Based Project Management Software: Prepare submittals in PDF form, and upload to web-based Project software website. Enter required data in web-based software site to fully identify submittal.
 5. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
 - a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
 - b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.
 6. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units, showing the full range of colors, textures, and patterns available.
 - a. Number of Samples: Submit one full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return submittal with options selected.
 7. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
 - a. Number of Samples: Submit three sets of Samples. Architect will retain two Sample sets; remainder will be returned. Mark up and retain one returned Sample set as a project record Sample.
 - 1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
 - 2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.
- D. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:

SECTION 01 33 00 - SUBMITTAL PROCEDURES

1. Type of product. Include unique identifier for each product indicated in the Contract Documents or assigned by Contractor if none is indicated.
 2. Manufacturer and product name, and model number if applicable.
 3. Number and name of room or space.
 4. Location within room or space.
- E. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.
- F. Design Data: Prepare and submit written and graphic information indicating compliance with indicated performance and design criteria in individual Specification Sections. Include list of assumptions and summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Number each page of submittal.
- G. Certificates:
1. Certificates and Certifications Submittals: Submit a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity. Provide a notarized signature where indicated.
 2. Installer Certificates: Submit written statements on manufacturer's letterhead, certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
 3. Manufacturer Certificates: Submit written statements on manufacturer's letterhead, certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
 4. Material Certificates: Submit written statements on manufacturer's letterhead, certifying that material complies with requirements in the Contract Documents.
 5. Product Certificates: Submit written statements on manufacturer's letterhead, certifying that product complies with requirements in the Contract Documents.
 6. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of AWS B2.1/B2.1M on AWS forms. Include names of firms and personnel certified.
- H. Test and Research Reports:
1. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for substrate preparation and primers required.
 2. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is

SECTION 01 33 00 - SUBMITTAL PROCEDURES

Page 7 of 9

installed in its final location, for compliance with requirements in the Contract Documents.

3. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
4. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.
5. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
6. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:
 - a. Name of evaluation organization.
 - b. Date of evaluation.
 - c. Time period when report is in effect.
 - d. Product and manufacturers' names.
 - e. Description of product.
 - f. Test procedures and results.
 - g. Limitations of use.

1.8 CONTRACTOR'S REVIEW

- A. Action Submittals and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.
- B. Contractor's Approval: Indicate Contractor's approval for each submittal with indication in web-based Project management software. Include name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.
 1. Architect will not review submittals received from Contractor that do not have Contractor's review and approval.

1.9 ARCHITECT'S REVIEW

- A. Action Submittals: Architect will review each submittal, indicate corrections or revisions required , and return.
 1. PDF Submittals: Architect will indicate, via markup on each submittal, the appropriate action .

SECTION 01 33 00 - SUBMITTAL PROCEDURES

- B. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.
- C. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect.
- D. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.
- E. Architect will return without review discard submittals received from sources other than Contractor.
- F. Submittals not required by the Contract Documents will be returned by Architect without action.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 33 00

SECTION 01 35 16 - ALTERATION PROJECT PROCEDURES

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 special procedures for alteration work.

1.3 DEFINITIONS

- A. Alteration Work: This term includes remodeling, renovation, repair, and maintenance work performed within existing spaces or on existing surfaces as part of the Project.
- B. Consolidate: To strengthen loose or deteriorated materials in place.
- C. Design Reference Sample: A sample that represents the Architect's prebid selection of work to be matched; it may be existing work or work specially produced for the Project.
- D. Dismantle: To remove by disassembling or detaching an item from a surface, using gentle methods and equipment to prevent damage to the item and surfaces; disposing of items unless indicated to be salvaged or reinstalled.
- E. Match: To blend with adjacent construction and manifest no apparent difference in material type, species, cut, form, detail, color, grain, texture, or finish; as approved by Architect.
- F. Refinish: To remove existing finishes to base material and apply new finish to match original, or as otherwise indicated.
- G. Repair: To correct damage and defects, retaining existing materials, features, and finishes. This includes patching, piecing-in, splicing, consolidating, or otherwise reinforcing or upgrading materials.
- H. Replace: To remove, duplicate, and reinstall entire item with new material. The original item is the pattern for creating duplicates unless otherwise indicated.
- I. Replicate: To reproduce in exact detail, materials, and finish unless otherwise indicated.

SECTION 01 35 16 - ALTERATION PROJECT PROCEDURES

- J. Reproduce: To fabricate a new item, accurate in detail to the original, and from either the same or a similar material as the original, unless otherwise indicated.
- K. Retain: To keep existing items that are not to be removed or dismantled.
- L. Strip: To remove existing finish down to base material unless otherwise indicated.

1.4 COORDINATION

- A. Alteration Work Subschedule: A construction schedule coordinating the sequencing and scheduling of alteration work for entire Project, including each activity to be performed, and based on Contractor's Construction Schedule. Secure time commitments for performing critical construction activities from separate entities responsible for alteration work.
 - 1. Schedule construction operations in sequence required to obtain best Work results.
 - 2. Coordinate sequence of alteration work activities to accommodate the following:
 - a. Owner's continuing occupancy of portions of existing building.
 - b. Tests and inspections.
 - 3. Detail sequence of alteration work, with start and end dates.
 - 4. Utility Services: Indicate how long utility services will be interrupted. Coordinate shutoff, capping, and continuation of utility services.
 - 5. Use of elevator and stairs.
- B. Pedestrian and Vehicular Circulation: Coordinate alteration work with circulation patterns within Project building(s) and site. Some work is near circulation patterns and adjacent to restricted areas . Circulation patterns cannot be closed off entirely and in places can be only temporarily redirected around small areas of work. Access to restricted areas may not be obstructed. Plan and execute the Work accordingly.

1.5 PROJECT MEETINGS FOR ALTERATION WORK

- A. Preliminary Conference for Alteration Work: Before starting alteration work, conduct conference at Project site .
 - 1. Attendees: In addition to representatives of Owner, Architect, and Contractor, testing service representative, specialists, and chemical-cleaner manufacturer(s) shall be represented at the meeting.
 - 2. Agenda: Discuss items of significance that could affect progress of alteration work, including review of the following:
 - a. Alteration Work Subschedule: Discuss and finalize; verify availability of materials, specialists' personnel, equipment, and facilities needed to make progress and avoid delays.
 - b. Fire-prevention plan.
 - c. Governing regulations.
 - d. Areas where existing construction is to remain and the required protection.
 - e. Sequence of alteration work operations.

**SECTION 01 35 16 - ALTERATION PROJECT
PROCEDURES**

- f. Existing conditions, staging, and structural loading limitations of areas where materials are stored.
 - g. Requirements for extent and quality of work, tolerances, and required clearances.
 - h. Embedded work such as flashings and lintels, special details, collection of waste, protection of occupants and the public, and condition of other construction that affects the Work or will affect the work.
3. Reporting: Record conference results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from conference.

1.6 INFORMATIONAL SUBMITTALS

- A. Alteration Work Program: Submit 30 days before work begins.
- B. Fire-Prevention Plan: Submit 30 days before work begins.

1.7 QUALITY ASSURANCE

- A. Specialist Qualifications: An experienced firm regularly engaged in specialty work similar in nature, materials, design, and extent to alteration work as specified in each Section and that has completed a minimum of five recent projects with a record of successful in-service performance that demonstrates the firm's qualifications to perform this work.
 1. Field Supervisor Qualifications: Full-time supervisors experienced in specialty work similar in nature, material, design, and extent to that indicated for this Project. Supervisors shall be on-site when specialty work begins and during its progress. Supervisors shall not be changed during Project except for causes beyond the control of the specialist firm.
 - a. Construct new mockups of required work whenever a supervisor is replaced.
- B. Fire-Prevention Plan: Prepare a written plan for preventing fires during the Work, including placement of fire extinguishers, fire blankets, rag buckets, and other fire-control devices during each phase or process. Coordinate plan with Owner's fire-protection equipment and requirements. Include fire-watch personnel's training, duties, and authority to enforce fire safety.

1.8 STORAGE AND HANDLING OF SALVAGED MATERIALS

- A. Salvaged Materials:
 1. Clean loose dirt and debris from salvaged items unless more extensive cleaning is indicated.
 2. Pack or crate items after cleaning; cushion against damage during handling. Label contents of containers.

SECTION 01 35 16 - ALTERATION PROJECT PROCEDURES

3. Store items in a secure area until delivery to Owner.
4. Transport items to Owner's storage area on-site designated by Owner .
5. Protect items from damage during transport and storage.

B. Salvaged Materials for Reinstallation:

1. Repair and clean items for reuse as indicated.
2. Pack or crate items after cleaning and repairing; cushion against damage during handling. Label contents of containers.
3. Protect items from damage during transport and storage.
4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment unless otherwise indicated. Provide connections, supports, and miscellaneous materials to make items functional for use indicated.

C. Existing Materials to Remain: Protect construction indicated to remain against damage and soiling from construction work. Where permitted by Architect, items may be dismantled and taken to a suitable, protected storage location during construction work and reinstalled in their original locations after alteration and other construction work in the vicinity is complete.

D. Storage: Catalog and store items within a weathertight enclosure where they are protected from moisture, weather, condensation, and freezing temperatures.

1. Identify each item for reinstallation with a nonpermanent mark to document its original location. Indicate original locations on plans, elevations, sections, or photographs by annotating the identifying marks.
2. Secure stored materials to protect from theft.
3. Control humidity so that it does not exceed 85 percent. Maintain temperatures **5 deg F** or more above the dew point.

1.9 FIELD CONDITIONS

A. Survey of Existing Conditions: Record existing conditions that affect the Work by use of measured drawings preconstruction photographs .

1. Comply with requirements specified in Section 01 32 33 "Photographic Documentation."

B. Discrepancies: Notify Architect of discrepancies between existing conditions and Drawings before proceeding with removal and dismantling work.

PART 2 - PRODUCTS - (Not Used)

PART 3 - EXECUTION

3.1 PROTECTION

- A. Protect persons, motor vehicles, surrounding surfaces of building, building site, plants, and surrounding buildings from harm resulting from alteration work.
 - 1. Use only proven protection methods, appropriate to each area and surface being protected.
 - 2. Provide temporary barricades, barriers, and directional signage to exclude the public from areas where alteration work is being performed.
 - 3. Erect temporary barriers to form and maintain fire-egress routes.
 - 4. Erect temporary protective covers over walkways and at points of pedestrian and vehicular entrance and exit that must remain in service during alteration work.
 - 5. Contain dust and debris generated by alteration work, and prevent it from reaching the public or adjacent surfaces.
 - 6. Provide shoring, bracing, and supports as necessary. Do not overload structural elements.
 - 7. Protect floors and other surfaces along hauling routes from damage, wear, and staining.
 - 8. Provide supplemental sound-control treatment to isolate demolition work from other areas of the building.

- B. Temporary Protection of Materials to Remain:
 - 1. Protect existing materials with temporary protections and construction. Do not remove existing materials unless otherwise indicated.
 - 2. Do not attach temporary protection to existing surfaces except as indicated as part of the alteration work program.

- C. Comply with each product manufacturer's written instructions for protections and precautions. Protect against adverse effects of products and procedures on people and adjacent materials, components, and vegetation.

- D. Utility and Communications Services:
 - 1. Notify Owner, Architect, authorities having jurisdiction, and entities owning or controlling wires, conduits, pipes, and other services affected by alteration work before commencing operations.
 - 2. Disconnect and cap pipes and services as required by authorities having jurisdiction, as required for alteration work.
 - 3. Maintain existing services unless otherwise indicated; keep in service, and protect against damage during operations. Provide temporary services during interruptions to existing utilities.

**SECTION 01 35 16 - ALTERATION PROJECT
PROCEDURES**

- E. Existing Drains: Prior to the start of work in an area, test drainage system to ensure that it is functioning properly. Notify Architect immediately of inadequate drainage or blockage. Do not begin work in an area until the drainage system is functioning properly.
 - 1. Prevent solids such as adhesive or mortar residue or other debris from entering the drainage system. Clean out drains and drain lines that become sluggish or blocked by sand or other materials resulting from alteration work.
 - 2. Protect drains from pollutants. Block drains or filter out sediments, allowing only clean water to pass.

3.2 PROTECTION FROM FIRE

- A. General: Follow fire-prevention plan and the following:
 - 1. Comply with NFPA 241 requirements unless otherwise indicated. Perform duties titled "Owner's Responsibility for Fire Protection."
 - 2. Remove and keep area free of combustibles, including rubbish, paper, waste, and chemicals, unless necessary for the immediate work.
 - a. If combustible material cannot be removed, provide fire blankets to cover such materials.
- B. Fire-Control Devices: Provide and maintain fire extinguishers, fire blankets, and rag buckets for disposal of rags with combustible liquids. Maintain each as suitable for the type of fire risk in each work area. Ensure that nearby personnel and the fire-watch personnel are trained in fire-extinguisher and blanket use.

3.3 GENERAL ALTERATION WORK

- A. Have specialty work performed only by qualified specialists.
- B. Ensure that supervisory personnel are present when work begins and during its progress.
- C. Record existing work before each procedure (preconstruction), and record progress during the work. Use digital preconstruction documentation photographs . Comply with requirements in Section 01 32 33 "Photographic Documentation."
- D. Perform surveys of Project site as the Work progresses to detect hazards resulting from alterations.
- E. Notify Architect of visible changes in the integrity of material or components whether from environmental causes including biological attack, UV degradation, freezing, or thawing or from structural defects including cracks, movement, or distortion.
 - 1. Do not proceed with the work in question until directed by Architect.

SECTION 01 35 16 - ALTERATION PROJECT PROCEDURES

END OF SECTION 01 35 16

**SECTION 01 35 16 - ALTERATION PROJECT
PROCEDURES**

Page 7 of 7

SECTION 01 40 00 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for quality assurance and quality control.
- B. Testing and inspection services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
 - 1. Specific quality-assurance and quality-control requirements for individual work results are specified in their respective Specification Sections. Requirements in individual Sections may also cover production of standard products.
 - 2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and quality-control procedures that facilitate compliance with the Contract Document requirements.
 - 3. Requirements for Contractor to provide quality-assurance and quality-control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.

1.3 DEFINITIONS

- A. Experienced: When used with an entity or individual, "experienced," unless otherwise further described, means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.
- B. Field Quality-Control Tests and Inspections: Tests and inspections that are performed on-site for installation of the Work and for completed Work.
- C. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, subcontractor, or sub-subcontractor, to perform a particular construction operation, including installation, erection, application, assembly, and similar operations.

SECTION 01 40 00 - QUALITY REQUIREMENTS

1. Use of trade-specific terminology in referring to a Work result does not require that certain construction activities specified apply exclusively to specific trade(s).
 - D. Mockups: Physical assemblies of portions of the Work constructed to establish the standard by which the Work will be judged. Mockups are not Samples.
 1. Mockups are used for one or more of the following:
 - a. Verify selections made under Sample submittals.
 - b. Demonstrate aesthetic effects.
 - c. Demonstrate the qualities of products and workmanship.
 - d. Demonstrate successful installation of interfaces between components and systems.
 - e. Perform preconstruction testing to determine system performance.
 2. Product Mockups: Mockups that may include multiple products, materials, or systems specified in a single Section.
 3. In-Place Mockups: Mockups constructed on-site in their actual final location as part of permanent construction.
 - E. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria. Unless otherwise indicated, copies of reports of tests or inspections performed for other than the Project do not meet this definition.
 - F. Product Tests: Tests and inspections that are performed by a nationally recognized testing laboratory (NRTL) according to 29 CFR 1910.7, by a testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program (NVLAP), or by a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.
 - G. Source Quality-Control Tests and Inspections: Tests and inspections that are performed at the source (e.g., plant, mill, factory, or shop).
 - H. Testing Agency: An entity engaged to perform specific tests, inspections, or both. The term "testing laboratory" has the same meaning as the term "testing agency."
 - I. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work, to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
 - J. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work, to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Contractor's quality-control services do not include contract administration activities performed by Architect.
- 1.4 CONFLICTING REQUIREMENTS
- A. Conflicting Standards and Other Requirements: If compliance with two or more standards or requirements is specified and the standards or requirements establish

SECTION 01 40 00 - QUALITY REQUIREMENTS

different or conflicting requirements for minimum quantities or quality levels, inform the Architect regarding the conflict and obtain clarification prior to proceeding with the Work. Refer conflicting requirements that are different, but apparently equal, to Architect for clarification before proceeding.

- B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified is the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

1.5 ACTION SUBMITTALS

1.6 INFORMATIONAL SUBMITTALS

- A. Contractor's Quality-Control Plan: For quality-assurance and quality-control activities and responsibilities.
- B. Qualification Data: For Contractor's quality-control personnel.
- C. Contractor's Statement of Responsibility: When required by authorities having jurisdiction, submit copy of written statement of responsibility submitted to authorities having jurisdiction before starting work on the following systems:
 - 1. Seismic-force-resisting system, designated seismic system, or component listed in the Statement of Special Inspections.
 - 2. Primary wind-force-resisting system or a wind-resisting component listed in the Statement of Special Inspections.
- D. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.
- E. Schedule of Tests and Inspections: Prepare in tabular form and include the following:
 - 1. Specification Section number and title.
 - 2. Entity responsible for performing tests and inspections.
 - 3. Description of test and inspection.
 - 4. Identification of applicable standards.
 - 5. Identification of test and inspection methods.
 - 6. Number of tests and inspections required.
 - 7. Time schedule or time span for tests and inspections.
 - 8. Requirements for obtaining samples.
 - 9. Unique characteristics of each quality-control service.
- F. Reports: Prepare and submit certified written reports and documents as specified.

SECTION 01 40 00 - QUALITY REQUIREMENTS

- G. Permits, Licenses, and Certificates: For Owner's record, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents established for compliance with standards and regulations bearing on performance of the Work.

1.7 CONTRACTOR'S QUALITY-CONTROL PLAN

- A. Quality-Control Plan, General: Submit quality-control plan within 10 days of Notice to Proceed , and not less than five days prior to preconstruction conference. Submit in format acceptable to Architect. Identify personnel, procedures, controls, instructions, tests, records, and forms to be used to carry out Contractor's quality-assurance and quality-control responsibilities and to coordinate Owner's quality-assurance and quality-control activities. Coordinate with Contractor's Construction Schedule.
- B. Quality-Control Personnel Qualifications: Engage qualified personnel trained and experienced in managing and executing quality-assurance and quality-control procedures similar in nature and extent to those required for Project.
 - 1. Project quality-control manager may also serve as Project superintendent .
- C. Submittal Procedure: Describe procedures for ensuring compliance with requirements through review and management of submittal process. Indicate qualifications of personnel responsible for submittal review.
- D. Testing and Inspection: In quality-control plan, include a comprehensive schedule of Work requiring testing or inspection, including the following:
 - 1. Contractor-performed tests and inspections, including subcontractor-performed tests and inspections. Include required tests and inspections and Contractor-elected tests and inspections. Distinguish source quality-control tests and inspections from field quality-control tests and inspections.
 - 2. Special inspections required by authorities having jurisdiction and indicated on the Statement of Special Inspections.
 - 3. Owner-performed tests and inspections indicated in the Contract Documents.
- E. Continuous Inspection of Workmanship: Describe process for continuous inspection during construction to identify and correct deficiencies in workmanship in addition to testing and inspection specified. Indicate types of corrective actions to be required to bring the Work into compliance with standards of workmanship established by Contract requirements and approved mockups.
- F. Monitoring and Documentation: Maintain testing and inspection reports, including log of approved and rejected results. Include Work Architect has indicated as nonconforming or defective. Indicate corrective actions taken to bring nonconforming Work into compliance with requirements. Comply with requirements of authorities having jurisdiction.

SECTION 01 40 00 - QUALITY REQUIREMENTS

1.8 REPORTS AND DOCUMENTS

- A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:
1. Date of issue.
 2. Project title and number.
 3. Name, address, telephone number, and email address of testing agency.
 4. Dates and locations of samples and tests or inspections.
 5. Names of individuals making tests and inspections.
 6. Description of the Work and test and inspection method.
 7. Identification of product and Specification Section.
 8. Complete test or inspection data.
 9. Test and inspection results and an interpretation of test results.
 10. Record of temperature and weather conditions at time of sample-taking and testing and inspection.
 11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
 12. Name and signature of laboratory inspector.
 13. Recommendations on retesting and reinspecting.
- B. Manufacturer's Technical Representative's Field Reports: Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:
1. Name, address, telephone number, and email address of technical representative making report.
 2. Statement on condition of substrates and their acceptability for installation of product.
 3. Statement that products at Project site comply with requirements.
 4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
 5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
 6. Statement of whether conditions, products, and installation will affect warranty.
 7. Other required items indicated in individual Specification Sections.
- C. Factory-Authorized Service Representative's Reports: Prepare written information documenting manufacturer's factory-authorized service representative's tests and inspections specified in other Sections. Include the following:
1. Name, address, telephone number, and email address of factory-authorized service representative making report.
 2. Statement that equipment complies with requirements.
 3. Results of operational and other tests and a statement of whether observed performance complies with requirements.
 4. Statement of whether conditions, products, and installation will affect warranty.
 5. Other required items indicated in individual Specification Sections.

SECTION 01 40 00 - QUALITY REQUIREMENTS

1.9 QUALITY ASSURANCE

- A. Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.
- B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units. As applicable, procure products from manufacturers able to meet qualification requirements, warranty requirements, and technical or factory-authorized service representative requirements.
- C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- D. Installer Qualifications: A firm or individual experienced in installing, erecting, applying, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
- E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that is similar in material, design, and extent to those indicated for this Project.
- F. Specialists: Certain Specification Sections require that specific construction activities be performed by entities who are recognized experts in those operations. Specialists will satisfy qualification requirements indicated and engage in the activities indicated.
 - 1. Requirements of authorities having jurisdiction supersede requirements for specialists.
- G. Testing and Inspecting Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspection indicated, as documented in accordance with ASTM E329, and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.
- H. Manufacturer's Technical Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- I. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect, demonstrate, repair, and perform service on installations of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

SECTION 01 40 00 - QUALITY REQUIREMENTS

Page 6 of 10

- J. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:
1. Build mockups of size indicated.
 2. Build mockups in location indicated or, if not indicated, as directed by Architect.
 3. Notify Architect seven days in advance of dates and times when mockups will be constructed.
 4. Employ supervisory personnel who will oversee mockup construction. Employ workers who will be employed to perform same tasks during the construction at Project.
 5. Demonstrate the proposed range of aesthetic effects and workmanship.
 6. Obtain Architect's approval of mockups before starting corresponding Work, fabrication, or construction.
 - a. Allow seven days for initial review and each re-review of each mockup.
 7. Promptly correct unsatisfactory conditions noted by Architect's preliminary review, to the satisfaction of the Architect, before completion of final mockup.
 8. Approval of mockups by the Architect does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 9. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
 10. Demolish and remove mockups when directed unless otherwise indicated.

1.10 QUALITY CONTROL

- A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.
1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspection they are engaged to perform.
 2. Payment for these services will be made from testing and inspection allowances specified in Section 01 21 00 "Allowances," as authorized by Change Orders.
 3. Costs for retesting and reinspecting construction that replaces or is necessitated by Work that failed to comply with the Contract Documents will be charged to Contractor, and the Contract Sum will be adjusted by Change Order.
- B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities, whether specified or not, to verify and document that the Work complies with requirements.
1. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
 2. Engage a qualified testing agency to perform quality-control services.
 - a. Contractor will not employ same entity engaged by Owner, unless agreed to in writing by Owner.

SECTION 01 40 00 - QUALITY REQUIREMENTS

3. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspection will be performed.
 4. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
 5. Testing and inspection requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
 6. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.
- C. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.
- D. Testing Agency Responsibilities: Cooperate with Architect and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
1. Notify Architect and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
 2. Determine the locations from which test samples will be taken and in which in-situ tests are conducted.
 3. Conduct and interpret tests and inspections, and state in each report whether tested and inspected Work complies with or deviates from requirements.
 4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
 5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
 6. Do not perform duties of Contractor.
- E. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Section 01 33 00 "Submittal Procedures."
- F. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.
- G. Contractor's Associated Requirements and Services: Cooperate with agencies and representatives performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
1. Access to the Work.

SECTION 01 40 00 - QUALITY REQUIREMENTS

2. Incidental labor and facilities necessary to facilitate tests and inspections.
 3. Adequate quantities of representative samples of materials that require testing and inspection. Assist agency in obtaining samples.
 4. Facilities for storage and field curing of test samples.
 5. Delivery of samples to testing agencies.
 6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
 7. Security and protection for samples and for testing and inspection equipment at Project site.
- H. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and quality-control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspection.
1. Schedule times for tests, inspections, obtaining samples, and similar activities.
- I. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents as a component of Contractor's quality-control plan. Coordinate and submit concurrently with Contractor's Construction Schedule. Update and submit with each Application for Payment.
1. Schedule Contents: Include tests, inspections, and quality-control services, including Contractor- and Owner-retained services, commissioning activities, and other Project-required services paid for by other entities.
 2. Distribution: Distribute schedule to Owner, Architect, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.
- 1.11 SPECIAL TESTS AND INSPECTIONS
- A. Special Tests and Inspections: Owner will engage a qualified testing agency special inspector to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner , as indicated in the Statement of Special Inspections attached to this Section, and as follows:
1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures, and reviewing the completeness and adequacy of those procedures to perform the Work.
 2. Notifying Architect and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
 3. Submitting a certified written report of each test, inspection, and similar quality-control service to Architect with copy to Contractor and to authorities having jurisdiction.
 4. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
 5. Interpreting tests and inspections, and stating in each report whether tested and inspected Work complies with or deviates from the Contract Documents.
 6. Retesting and reinspecting corrected Work.

SECTION 01 40 00 - QUALITY REQUIREMENTS

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

- A. Test and Inspection Log: Prepare a record of tests and inspections. Include the following:
 - 1. Date test or inspection was conducted.
 - 2. Description of the Work tested or inspected.
 - 3. Date test or inspection results were transmitted to Architect.
 - 4. Identification of testing agency or special inspector conducting test or inspection.
- B. Maintain log at Project site. Post changes and revisions as they occur. Provide access to test and inspection log for Architect's and authorities' having jurisdiction reference during normal working hours.
 - 1. Submit log at Project closeout as part of Project Record Documents.

3.2 REPAIR AND PROTECTION

- A. General: On completion of testing, inspection, sample-taking, and similar services, repair damaged construction and restore substrates and finishes.
 - 1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Section 01 73 00 "Execution."
- B. Protect construction exposed by or for quality-control service activities.
- C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 01 40 00

SECTION 01 40 00 - QUALITY REQUIREMENTS

Page 10 of 10

SECTION 01 42 00 - REFERENCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DEFINITIONS

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

1.3 INDUSTRY STANDARDS

- A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.
- B. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.
 - 1. For standards referenced by applicable building codes, comply with dates of standards as listed in building codes.
- C. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.
 - 1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

1.4 ABBREVIATIONS AND ACRONYMS

- A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Abbreviations and acronyms not included in this list shall mean the recognized name of the entities indicated in Gale's "Encyclopedia of Associations: National Organizations of the U.S." or in Columbia Books' "National Trade & Professional Associations of the United States." The information in this list is subject to change and is believed to be accurate as of the date of the Contract Documents.
 - 1. AABC - Associated Air Balance Council; www.aabc.com.
 - 2. AAMA - American Architectural Manufacturers Association; www.aamanet.org.
 - 3. AAPFCO - Association of American Plant Food Control Officials; www.aapfco.org.
 - 4. AASHTO - American Association of State Highway and Transportation Officials; www.transportation.org.
 - 5. AATCC - American Association of Textile Chemists and Colorists; www.aatcc.org.
 - 6. ABMA - American Bearing Manufacturers Association; www.americanbearings.org.
 - 7. ABMA - American Boiler Manufacturers Association; www.abma.com.
 - 8. ACI - American Concrete Institute; (Formerly: ACI International); www.concrete.org.
 - 9. ACPA - American Concrete Pipe Association; www.concrete-pipe.org.
 - 10. AEIC - Association of Edison Illuminating Companies, Inc. (The); www.aeic.org.
 - 11. AF&PA - American Forest & Paper Association; www.afandpa.org.
 - 12. AGA - American Gas Association; www.aga.org.
 - 13. AHAM - Association of Home Appliance Manufacturers; www.aham.org.

SECTION 01 42 00 - REFERENCES

Page 2 of 9

14. AHRI - Air-Conditioning, Heating, and Refrigeration Institute (The); www.ahrinet.org.
15. AI - Asphalt Institute; www.asphaltinstitute.org.
16. AIA - American Institute of Architects (The); www.aia.org.
17. AISC - American Institute of Steel Construction; www.aisc.org.
18. AISI - American Iron and Steel Institute; www.steel.org.
19. AITC - American Institute of Timber Construction; www.aitc-glulam.org.
20. AMCA - Air Movement and Control Association International, Inc.; www.amca.org.
21. ANSI - American National Standards Institute; www.ansi.org.
22. AOSA - Association of Official Seed Analysts, Inc.; www.aosaseed.com.
23. APA - APA - The Engineered Wood Association; www.apawood.org.
24. APA - Architectural Precast Association; www.archprecast.org.
25. API - American Petroleum Institute; www.api.org.
26. ARI - Air-Conditioning & Refrigeration Institute; (See AHRI).
27. ARI - American Refrigeration Institute; (See AHRI).
28. ARMA - Asphalt Roofing Manufacturers Association; www.asphaltroofing.org.
29. ASCE - American Society of Civil Engineers; www.asce.org.
30. ASCE/SEI - American Society of Civil Engineers/Structural Engineering Institute; (See ASCE).
31. ASHRAE - American Society of Heating, Refrigerating and Air-Conditioning Engineers; www.ashrae.org.
32. ASME - ASME International; (American Society of Mechanical Engineers); www.asme.org.
33. ASSE - American Society of Sanitary Engineering; www.asse-plumbing.org.
34. ASSP - American Society of Safety Professionals (The); www.assp.org.
35. ASTM - ASTM International; www.astm.org.
36. ATIS - Alliance for Telecommunications Industry Solutions; www.atis.org.
37. AVIXA - Audiovisual and Integrated Experience Association; (Formerly: Infocomm International); www.soundandcommunications.com.
38. AWEA - American Wind Energy Association; www.awea.org.
39. AWI - Architectural Woodwork Institute; www.awinet.org.
40. AWMAC - Architectural Woodwork Manufacturers Association of Canada; www.awmac.com.
41. AWPA - American Wood Protection Association; www.awpa.com.
42. AWS - American Welding Society; www.aws.org.
43. AWWA - American Water Works Association; www.awwa.org.
44. BHMA - Builders Hardware Manufacturers Association; www.buildershardware.com.
45. BIA - Brick Industry Association (The); www.gobrick.com.
46. BICSI - BICSI, Inc.; www.bicsi.org.
47. BIFMA - BIFMA International; (Business and Institutional Furniture Manufacturer's Association); www.bifma.org.
48. BISSC - Baking Industry Sanitation Standards Committee; www.bissc.org.
49. BWF - Badminton World Federation; (Formerly: International Badminton Federation); www.bissc.org.
50. CDA - Copper Development Association; www.copper.org.
51. CE - Conformite Europeenne; <http://ec.europa.eu/growth/single-market/ce-marking/>.

SECTION 01 42 00 - REFERENCES

Page 3 of 9

52. CEA - Canadian Electricity Association; www.electricity.ca.
53. CFFA - Chemical Fabrics and Film Association, Inc.; www.chemicalfabricsandfilm.com.
54. CFSEI - Cold-Formed Steel Engineers Institute; www.cfsei.org.
55. CGA - Compressed Gas Association; www.cganet.com.
56. CIMA - Cellulose Insulation Manufacturers Association; www.cellulose.org.
57. CISCA - Ceilings & Interior Systems Construction Association; www.cisca.org.
58. CISPI - Cast Iron Soil Pipe Institute; www.cispi.org.
59. CLFMI - Chain Link Fence Manufacturers Institute; www.chainlinkinfo.org.
60. CPA - Composite Panel Association; www.compositepanel.org.
61. CRI - Carpet and Rug Institute (The); www.carpet-rug.org.
62. CRRC - Cool Roof Rating Council; www.coolroofs.org.
63. CRSI - Concrete Reinforcing Steel Institute; www.crsi.org.
64. CSA - CSA Group; www.csa-group.org.
65. CSI - Construction Specifications Institute (The); www.csiresources.org.
66. CSSB - Cedar Shake & Shingle Bureau; www.cedarbureau.org.
67. CTA - Consumer Technology Association; www.cta.tech.
68. CTI - Cooling Technology Institute; (Formerly: Cooling Tower Institute); www.coolingtechnology.org.
69. CWC - Composite Wood Council; (See CPA).
70. DASMA - Door and Access Systems Manufacturers Association; www.dasma.com.
71. DHA - Decorative Hardwoods Association; (Formerly: Hardwood Plywood & Veneer Association); www.decorativehardwoods.org.
72. DHI - Door and Hardware Institute; www.dhi.org.
73. ECA - Electronic Components Association; (See ECIA).
74. ECAMA - Electronic Components Assemblies & Materials Association; (See ECIA).
75. ECIA - Electronic Components Industry Association; www.eciaonline.org.
76. EIA - Electronic Industries Alliance; (See TIA).
77. EIMA - EIFS Industry Members Association; www.eima.com.
78. EJMA - Expansion Joint Manufacturers Association, Inc.; www.ejma.org.
79. EOS/ESD Association; (Electrostatic Discharge Association); www.esda.org.
80. ESTA - Entertainment Services and Technology Association; (See PLASA).
81. ETL - Intertek (See Intertek); www.intertek.com.
82. EVO - Efficiency Valuation Organization; www.evo-world.org.
83. FCI - Fluid Controls Institute; www.fluidcontrolsintstitute.org.
84. FIBA - Federation Internationale de Basketball; (The International Basketball Federation); www.fiba.com.
85. FIVB - Federation Internationale de Volleyball; (The International Volleyball Federation); www.fivb.org.
86. FM Approvals - FM Approvals LLC; www.fmglobal.com.
87. FM Global - FM Global; (Formerly: FMG - FM Global); www.fmglobal.com.
88. FRSA - Florida Roofing, Sheet Metal Contractors Association, Inc.; www.floridarroof.com.
89. FSA - Fluid Sealing Association; www.fluidsealing.com.
90. FSC - Forest Stewardship Council U.S.; www.fscus.org.
91. GA - Gypsum Association; www.gypsum.org.
92. GANA - Glass Association of North America;(See NGA).

SECTION 01 42 00 - REFERENCES

Page 4 of 9

93. GS - Green Seal; www.greenseal.org.
94. HI - Hydraulic Institute; www.pumps.org.
95. HI/GAMA - Hydronics Institute/Gas Appliance Manufacturers Association; (See AHRI).
96. HMMA - Hollow Metal Manufacturers Association; (See NAAMM).
97. HPVA - Hardwood Plywood & Veneer Association; (See DHA).
98. HPW - H. P. White Laboratory, Inc.; www.hpwhite.com.
99. IAPSC - International Association of Professional Security Consultants; www.iapsc.org.
100. IAS - International Accreditation Service; www.iasonline.org.
101. ICBO - International Conference of Building Officials; (See ICC).
102. ICC - International Code Council; www.iccsafe.org.
103. ICEA - Insulated Cable Engineers Association, Inc.; www.icea.net.
104. ICPA - International Cast Polymer Alliance; www.icpa-hq.org.
105. ICRI - International Concrete Repair Institute, Inc.; www.icri.org.
106. IEC - International Electrotechnical Commission; www.iec.ch.
107. IEEE - Institute of Electrical and Electronics Engineers, Inc. (The); www.ieee.org.
108. IES - Illuminating Engineering Society; (Formerly: Illuminating Engineering Society of North America); www.ies.org.
109. IESNA - Illuminating Engineering Society of North America; (See IES).
110. IEST - Institute of Environmental Sciences and Technology; www.iest.org.
111. IGMA - Insulating Glass Manufacturers Alliance; www.igmaonline.org.
112. IGSHPA - International Ground Source Heat Pump Association; www.igshpa.org.
113. II - Infocomm International; (See AVIXA).
114. ILI - Indiana Limestone Institute of America, Inc.; www.iliai.com.
115. Intertek - Intertek Group; (Formerly: ETL SEMCO; Intertek Testing Service NA); www.intertek.com.
116. ISA - International Society of Automation (The); (Formerly: Instrumentation, Systems, and Automation Society); www.isa.org.
117. ISAS - Instrumentation, Systems, and Automation Society (The); (See ISA).
118. ISFA - International Surface Fabricators Association; (Formerly: International Solid Surface Fabricators Association); www.isfanow.org.
119. ISO - International Organization for Standardization; www.iso.org.
120. ISSFA - International Solid Surface Fabricators Association; (See ISFA).
121. ITU - International Telecommunication Union; www.itu.int/home.
122. KCMA - Kitchen Cabinet Manufacturers Association; www.kcma.org.
123. LMA - Laminating Materials Association; (See CPA).
124. LPI - Lightning Protection Institute; www.lightning.org.
125. MBMA - Metal Building Manufacturers Association; www.mbma.com.
126. MCA - Metal Construction Association; www.metalconstruction.org.
127. MFMA - Maple Flooring Manufacturers Association, Inc.; www.maplefloor.org.
128. MFMA - Metal Framing Manufacturers Association, Inc.; www.metalframingmfg.org.
129. MHIA - Material Handling Industry of America; www.mhia.org.
130. MIA - Marble Institute of America; (See NSI).
131. MMPA - Moulding & Millwork Producers Association; www.wmmpa.com.
132. MPI - Master Painters Institute; www.paintinfo.com.

SECTION 01 42 00 - REFERENCES

Page 5 of 9

133. MSS - Manufacturers Standardization Society of The Valve and Fittings Industry Inc.; www.mss-hq.org.
134. NAAMM - National Association of Architectural Metal Manufacturers; www.naamm.org.
135. NACE - NACE International; (National Association of Corrosion Engineers International); www.nace.org.
136. NADCA - National Air Duct Cleaners Association; www.nadca.com.
137. NAIMA - North American Insulation Manufacturers Association; www.naima.org.
138. NALP - National Association of Landscape Professionals; www.landscapeprofessionals.org.
139. NBGQA - National Building Granite Quarries Association, Inc.; www.nbgqa.com.
140. NBI - New Buildings Institute; www.newbuildings.org.
141. NCAA - National Collegiate Athletic Association (The); www.ncaa.org.
142. NCMA - National Concrete Masonry Association; www.ncma.org.
143. NEBB - National Environmental Balancing Bureau; www.nebb.org.
144. NECA - National Electrical Contractors Association; www.necanet.org.
145. NeLMA - Northeastern Lumber Manufacturers Association; www.nelma.org.
146. NEMA - National Electrical Manufacturers Association; www.nema.org.
147. NETA - InterNational Electrical Testing Association; www.netaworld.org.
148. NFHS - National Federation of State High School Associations; www.nfhs.org.
149. NFPA - National Fire Protection Association; www.nfpa.org.
150. NFPA - NFPA International; (See NFPA).
151. NFRC - National Fenestration Rating Council; www.nfrc.org.
152. NGA - National Glass Association (The); (Formerly: Glass Association of North America); www.glass.org.
153. NHLA - National Hardwood Lumber Association; www.nhla.com.
154. NLGA - National Lumber Grades Authority; www.nlga.org.
155. NOFMA - National Oak Flooring Manufacturers Association; (See NWFA).
156. NOMMA - National Ornamental & Miscellaneous Metals Association; www.nomma.org.
157. NRCA - National Roofing Contractors Association; www.nrca.net.
158. NRMCA - National Ready Mixed Concrete Association; www.nrmca.org.
159. NSF - NSF International; www.nsf.org.
160. NSI - National Stone Institute; (Formerly: Marble Institute of America); www.naturalstoneinstitute.org.
161. NSPE - National Society of Professional Engineers; www.nspe.org.
162. NSSGA - National Stone, Sand & Gravel Association; www.nssga.org.
163. NTMA - National Terrazzo & Mosaic Association, Inc. (The); www.ntma.com.
164. NWFA - National Wood Flooring Association; www.nwfa.org.
165. PCI - Precast/Prestressed Concrete Institute; www.pci.org.
166. PDI - Plumbing & Drainage Institute; www.pdionline.org.
167. PLASA - PLASA; (Formerly: ESTA - Entertainment Services and Technology Association); www.plasa.org.
168. RCSC - Research Council on Structural Connections; www.boltcouncil.org.
169. RFCI - Resilient Floor Covering Institute; www.rfci.com.
170. RIS - Redwood Inspection Service; www.redwoodinspection.com.
171. SAE - SAE International; www.sae.org.
172. SCTE - Society of Cable Telecommunications Engineers; www.scte.org.
173. SDI - Steel Deck Institute; www.sdi.org.

SECTION 01 42 00 - REFERENCES

Page 6 of 9

174. SDI - Steel Door Institute; www.steeldoor.org.
175. SEFA - Scientific Equipment and Furniture Association (The); www.sefalabs.com.
176. SEI/ASCE - Structural Engineering Institute/American Society of Civil Engineers; (See ASCE).
177. SIA - Security Industry Association; www.siaonline.org.
178. SJI - Steel Joist Institute; www.steeljoist.org.
179. SMA - Screen Manufacturers Association; www.smainfo.org.
180. SMACNA - Sheet Metal and Air Conditioning Contractors' National Association; www.smacna.org.
181. SMPTE - Society of Motion Picture and Television Engineers; www.smpte.org.
182. SPFA - Spray Polyurethane Foam Alliance; www.sprayfoam.org.
183. SPIB - Southern Pine Inspection Bureau; www.spib.org.
184. SPRI - Single Ply Roofing Industry; www.spri.org.
185. SRCC - Solar Rating & Certification Corporation; www.solar-rating.org.
186. SSINA - Specialty Steel Industry of North America; www.ssina.com.
187. SSPC - SSPC: The Society for Protective Coatings; www.sspc.org.
188. STI - Steel Tank Institute; www.steeltank.com.
189. SWI - Steel Window Institute; www.steelwindows.com.
190. SWPA - Submersible Wastewater Pump Association; www.swpa.org.
191. TCA - Tilt-Up Concrete Association; www.tilt-up.org.
192. TCNA - Tile Council of North America, Inc.; www.tileusa.com.
193. TEMA - Tubular Exchanger Manufacturers Association, Inc.; www.tema.org.
194. TIA - Telecommunications Industry Association (The); (Formerly: TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance); www.tiaonline.org.
195. TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance; (See TIA).
196. TMS - The Masonry Society; www.masonrysociety.org.
197. TPI - Truss Plate Institute; www.tpinst.org.
198. TPI - Turfgrass Producers International; www.turfgrassod.org.
199. TRI - Tile Roofing Institute; www.tilerroofing.org.
200. UL - Underwriters Laboratories Inc.; www.ul.com.
201. UNI - Uni-Bell PVC Pipe Association; www.uni-bell.org.
202. USAV - USA Volleyball; www.usavolleyball.org.
203. USGBC - U.S. Green Building Council; www.usgbc.org.
204. USITT - United States Institute for Theatre Technology, Inc.; www.usitt.org.
205. WA - Wallcoverings Association; www.wallcoverings.org.
206. WASTEC - Waste Equipment Technology Association; www.wastec.org.
207. WCLIB - West Coast Lumber Inspection Bureau; www.wclib.org.
208. WCMA - Window Covering Manufacturers Association; www.wcmanet.org.
209. WDMA - Window & Door Manufacturers Association; www.wdma.com.
210. WI - Woodwork Institute; www.wicnet.org.
211. WSRCA - Western States Roofing Contractors Association; www.wsrca.com.
212. WWPA - Western Wood Products Association; www.wwpa.org.

- B. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the

SECTION 01 42 00 - REFERENCES

Page 7 of 9

following list. This information is believed to be accurate as of the date of the Contract Documents.

1. IAPMO - International Association of Plumbing and Mechanical Officials; www.iapmo.org.
2. ICC - International Code Council; www.iccsafe.org.
3. ICC-ES - ICC Evaluation Service, LLC; www.icc-es.org.

C. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Information is subject to change and is up to date as of the date of the Contract Documents.

1. COE - Army Corps of Engineers; www.usace.army.mil.
2. CPSC - Consumer Product Safety Commission; www.cpsc.gov.
3. DOC - Department of Commerce; National Institute of Standards and Technology; www.nist.gov.
4. DOD - Department of Defense; www.quicksearch.dla.mil.
5. DOE - Department of Energy; www.energy.gov.
6. EPA - Environmental Protection Agency; www.epa.gov.
7. FAA - Federal Aviation Administration; www.faa.gov.
8. FG - Federal Government Publications; www.gpo.gov/fdsys.
9. GSA - General Services Administration; www.gsa.gov.
10. HUD - Department of Housing and Urban Development; www.hud.gov.
11. LBL - Lawrence Berkeley National Laboratory; Environmental Energy Technologies Division; www.eetd.lbl.gov.
12. OSHA - Occupational Safety & Health Administration; www.osha.gov.
13. SD - Department of State; www.state.gov.
14. TRB - Transportation Research Board; National Cooperative Highway Research Program; The National Academies; www.trb.org.
15. USDA - Department of Agriculture; Agriculture Research Service; U.S. Salinity Laboratory; www.ars.usda.gov.
16. USDA - Department of Agriculture; Rural Utilities Service; www.usda.gov.
17. USDOJ - Department of Justice; Office of Justice Programs; National Institute of Justice; www.ojp.usdoj.gov.
18. USP - U.S. Pharmacopeial Convention; www.usp.org.
19. USPS - United States Postal Service; www.usps.com.

D. Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.

1. CFR - Code of Federal Regulations; Available from Government Printing Office; www.govinfo.gov.
2. DOD - Department of Defense; Military Specifications and Standards; Available from DLA Document Services; www.quicksearch.dla.mil.
3. DSCC - Defense Supply Center Columbus; (See FS).
4. FED-STD - Federal Standard; (See FS).

SECTION 01 42 00 - REFERENCES

Page 8 of 9

5. FS - Federal Specification; Available from DLA Document Services; www.quicksearch.dla.mil.
 - a. Available from Defense Standardization Program; www.dsp.dla.mil.
 - b. Available from General Services Administration; www.gsa.gov.
 - c. Available from National Institute of Building Sciences/Whole Building Design Guide; www.wbdg.org.
 6. MILSPEC - Military Specification and Standards; (See DOD).
 7. USAB - United States Access Board; www.access-board.gov.
 8. USATBCB - U.S. Architectural & Transportation Barriers Compliance Board; (See USAB).
- E. State Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.
1. CBHF; State of California; Department of Consumer Affairs; Bureau of Electronic and Appliance Repair, Home Furnishings and Thermal Insulation; www.bearhfti.ca.gov.
 2. CCR; California Code of Regulations; Office of Administrative Law; California Title 24 Energy Code; www.calregs.com.
 3. CDHS; California Department of Health Services; (See CDPH).
 4. CDPH; California Department of Public Health; Indoor Air Quality Program; www.cal-iaq.org.
 5. CPUC; California Public Utilities Commission; www.cpuc.ca.gov.
 6. SCAQMD; South Coast Air Quality Management District; www.aqmd.gov.
 7. TFS; Texas A&M Forest Service; Sustainable Forestry and Economic Development; www.txforestservation.tamu.edu.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 42 00

SECTION 01 42 00 - REFERENCES

Page 9 of 9

SECTION 01 45 35 - SCDHEC CONSTRUCTION INSPECTIONS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Section includes administrative and procedural requirements for South Carolina Department of Health and Environmental Control (SCDHEC) Construction Inspections.
- B. Related Requirements:
 - 1. Section 01 70 00 - Execution and Closeout Requirements for inspections and closeout procedures.

1.2 ABBREVIATIONS

- A. The following are abbreviations found in the DHFC Guidelines Manual:
 - 1. DHEC: Department of Health and Environmental Control.
 - 2. BHFL: Bureau of Health Facilities Licensing.
 - 3. CON: Certificate of Need.
 - 4. DHFC: Division of Health Facilities Construction.
 - 5. FLS: Office of Fire and Life Safety.
 - 6. CPIF: Construction Project Information Form.
 - 7. NOC: Notice of Completion.
 - 8. SCLLR: South Carolina Department of Labor and Licensing Regulation.
 - 9. SCDHEC: South Carolina Department of Health and Environmental Control.

1.3 APPLICABLE BUILDING CODES AND STANDARDS

- A. Building Codes: The following building codes are used by DHFC, as published in the DHFC Guidelines Manual (July 2016) in the review of all projects. These codes have been adopted by the SCLLR and the South Carolina Building Code Council.
 - 1. 2018 International Building Code (IBC)
 - 2. 2018 International Fire Code (IFC)
 - 3. 2018 International Existing Building Code (IEBC)
 - 4. 2018 International Mechanical Code (IMC)
 - 5. 2018 International Plumbing Code (IPC)
 - 6. 2018 International Fuel Gas Code (IGC)
 - 7. 2009 International Energy Code (IEC)
- B. Building Standards: The following building standards are used by DHFC in the review of all projects. These standards are enforced when specifically referenced from the IBC

and other building codes. This list is not exhaustive since other standards may apply when referenced from the adopted codes.

1. 2017 ICC A117.1 Accessibility Standard.
2. 2013 NFPA 10 Standard for Portable Fire Extinguishers.
3. 2013 NFPA 13 Standard for the Installation of Sprinkler Systems.
4. 2013 NFPA 13R Standard for the Installation of Sprinkler Systems in Low-Rise Residential Occupancies.
5. 2013 NFPA 13D Standard for the Installation of Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes.
6. 2014 NFPA 70 National Electrical Code.
7. 2013 NFPA 72 National Fire Alarm and Signaling Code.
8. 2015 NFPA 99 Health Care Facilities Code.
9. 2012 NFPA 101 Life Safety Code.
10. 2013 NFPA 110 Standard for Emergency and Standby Power.

1.4 SUBMITTALS

1.5 SCDHEC Documentation: Prepare manual with documents listed on page 35 of the South Carolina DHFC Guidelines Manual for the Final Project Acceptance submittal. Include all certification letters, tests, inspections, etc. required by the SCDHEC Division of Health Facilities Construction. Refer to the following website for complete requirements for

A. Worksheet for DHFC Inspections: Appendix 11A – Inspection Sign/Countersign Document (p.37 of 43) DHFC Guidelines Manual.
www.scdhec.gov/health/docs/DHFC%20GUIDELINES%20MANUAL%20-%2008152016.pdf

1. <https://www.scdhec.gov/sites/default/files/docs/Health/docs/DHFC%20GUIDELINES%20MANUAL%20-%20171010.pdf>

B. Table of Contents for Manual: Appendix 11 – Documents Required for Final Project Acceptance (p.35 of 43) DHFC Guidelines Manual.
www.scdhec.gov/health/docs/DHFC%20GUIDELINES%20MANUAL%20-%2008152016.pdf

1. <https://www.scdhec.gov/sites/default/files/docs/Health/docs/DHFC%20GUIDELINES%20MANUAL%20-%20171010.pdf>

1.6 CONSTRUCTION PHASE INSPECTIONS

A. Required Inspections: Request inspections by email to DHFCadmin@dhec.sc.gov with a subject line as follows: Inspection Request / Project Name / County.

1. Initial Inspection (50 percent): This inspection shall be scheduled when the construction is approximately 50 percent complete. This is considered a

generalized inspection with the intent of all interested parties meeting and addressing all initial project concerns.

2. Second Inspection (80 percent): This inspection is often referred to as an above ceiling inspection. The inspection shall be scheduled when all drywall and above ceiling work is complete but prior to the installation of suspended ceiling panels, gypsum ceilings, and soffit finishes. All above ceiling items shall be visible for inspection. We are most efficient inspecting from floor level. Ceiling tile and soffit finishes will delay our inspection. Only suspended ceiling panels required to complete the installation of a ceiling device shall be allowed to be installed. Border pieces and all other suspended ceiling panels shall not be installed until after the inspection and acceptance of the work by DHFC. Above ceiling and Final Project Acceptance Inspections have generally one rule "everything shall be complete at the time of inspection". This shall include Owner provided items. The above ceiling inspection shall include but not be limited to the inspection of all wall systems, ceilings, seismic requirements, installation of all wiring, mechanical, electrical, plumbing, fire protection and all low voltage systems. The DHFC inspector shall determine at the close of the inspection if a follow-up inspection is required after any identified deficiencies have been corrected.
3. Third Inspection (100 percent): This is the 100 percent Final Project Acceptance Inspection. Prior to scheduling this inspection, the design professionals shall ensure that all punch list items have been 100 percent completed and that all systems have been suitably tested and are performing as intended; all work must be complete to a point where the project can be immediately occupied by patients/residents/participants and staff. This shall include, but not be limited to, all fixed items, building finishes, window shades, and shower curtains. If an individual cannot easily pick up and remove the item, it needs to be installed for the Final Project Acceptance Inspection. Furnishings such as non-fixed tables, chairs, desks, beds, etc. do not need to be installed for the DHFC Final Project Acceptance Inspection.

B. Final Project Acceptance Inspection Requirements:

1. Testing of Life Safety Systems: At the Final Project Acceptance Inspection, DHFC will check all items and test all major building life safety systems including, but not limited to, the sprinkler system, the fire alarm system, nurse call systems, and emergency power systems. However, the DHFC Final Project Acceptance Inspection is not to be used as a substitute for the Design Professional / General Contractor systems testing and "punch list" development. If, at the Final Project Acceptance Inspection, it is obvious that this has happened, the Final Project Acceptance Inspection will be terminated.
2. Ready for Occupancy: Upon our arrival, the building shall be finished, including the Owner installed items. The building shall be clean, and ready to occupy by the Owner.
3. Documentation for Final Construction Inspection: At the Final Project Acceptance Inspection the Design Professional shall make this binder available for review by DHFC. The contents and format for documentation of the required information is outlined in Appendix 10. An NOC will not be issued until the required final project documentation is received and reviewed.

4. Notice of Completion: Upon satisfactory completion of the construction inspection, a Notice of Completion (NOC) document will be issued to BHFL indicating that the project construction is accepted as ready for occupancy. The BHFL will contact the Owner to arrange for a visit by the BHFL prior to occupancy. Licensing will not visit until the DHFC has indicated acceptance of construction.
5. Inspection by the Division of Health Facilities Licensing: Prior to Owner occupancy of the project and following the NOC issuance by DHFC, BHFL must inspect the project prior to occupancy. When BHFL makes their inspection, if all is acceptable, the building or area can be occupied and placed into service immediately. DHFC has limited authority to grant permission to occupy an area or building. If the area or building is occupied by the Owner before approval from licensing, significant action and fines may be imposed.

PART 2 - PRODUCTS

2.1 GENERAL

- A. It is the Contractor's responsibility to have the work ready for inspection when requested. Upon completion of the inspections and approval of the work the Contractor shall be prepared to turn the work product over to the Owner.

2.2 SCDHEC COMPLIANCE DOCUMENTATION

- A. DHEC requires compliance documentation to be submitted at the DHEC Final Construction Inspection per Appendix 11 – Documents Required for Final Project Acceptance (p.35 of 43) DHFC Guidelines Manual. The DHEC Inspector will not approve the project without this required documentation.
- B. Contractor shall gather required documents and compile them in a hardbound, tabulated notebook for DHEC review at the DHEC Final Inspection.
- C. Letters of certification must indicate that the systems “have been tested and found to be operating correctly”. It is not acceptable that certification letters only state “the systems have been installed according to code or the documents”. Certifications going into the notebook should be copies; the originals go to the Owner.
- D. The General Contractor shall include a PDF digital copy of the notebook in their close-out documents.

2.3 SCDHEC FINAL INSPECTION PUNCHLIST

- A. At the Final inspection the DHEC Inspector may find items that are not satisfactory in either quality or completeness. It will be the Contractor's responsibility to compile the list of deficiencies noted by the Inspector on Appendix 11A – Inspection Sign/Countersign Document (p.37 of 43) DHFC Guidelines Manual.

- B. The DHEC Final Inspection Matrix is not to be used as a substitute for the Architect's inspection punchlist which shall be completed prior to the DHEC inspection.

PART 3 - EXECUTION

3.1 GENERAL

- A. Contractor shall make every attempt to have all the applicable work for each inspection completed and ready to turn over to the Owner prior to the DHEC inspection. If it is obvious that the work is not completed and will not be ready for the inspection, the inspection will be cancelled and rescheduled at the Contractor's expense.

3.2 CONSTRUCTION PHASE INSPECTIONS

- A. Unless agreed upon with DHFC, a minimum of three site construction progress visits are required - progress inspection (at 50 percent completion), above ceiling inspection (at 80 percent completion), and a 100 percent Final Project Acceptance Inspection. The specific requirements for the construction inspections are detailed in Appendix 10 to this Guidelines Manual.
 - 1. Project Permitting: DHFC does not issue general building permits. The General Contractor shall secure all required building permits for the project from the local municipality. Work without proper permitting shall not be inspected by DHFC.
 - 2. Schedule a Construction Inspection - To schedule a construction inspection send an email to DHFCadmin@dhec.sc.gov. On the subject line type provide the information in the following format "Inspection Request - Project Name - County." The lead design professional shall schedule, coordinate and attend all inspections. Although we can often accommodate same week inspections, please allow a two week notice for any inspection. It is far to the advantage of all concerned that sufficient inspections be made. It shall be the responsibility of all Design Professionals to confirm that areas requiring inspection are ready for a DHFC inspection. Failed inspections may result in DHFC taking action against all Design Professionals involved.
 - 3. Attendance at Construction Inspections: Construction inspections shall be attended by all parties deemed necessary by the design professional and the general contractor to expedite and complete a thorough inspection, however, at a minimum, each inspection shall be attended by the design professional and the general contractor. If these parties are not present, the inspection will be immediately terminated.
 - 4. Inspection Documentation: The Design Professional shall take detailed notes at each inspection. These inspection notes shall be circulated to all involved parties within five calendar days of the inspection visit. The inspection notes shall also be retained for inclusion into the record documents and formatted as directed by DHFC in a "punch list" sign/counter sign format for the 100 percent Final Acceptance Inspection. A sample sign/countersign document is contained in

Appendix 11A of this manual. An Excel worksheet of this form can be obtained from the DHFC staff architect.

5. Documentation for Final Project Acceptance: Completed projects cannot be inspected for Final Licensing until the appropriate documentation is compiled and assembled into a 3-ring binder. This binder shall be presented at the 100 percent Final Acceptance Inspection. This documentation is itemized in Appendix 11 to this Guidelines Manual. The binder will be reviewed at the Final Acceptance Inspection and provided to the Owner.

3.3 FIRE AND LIFE SAFETY DURING CONSTRUCTION

- A. Whether patient, resident, employee or visitor, the safety of the users of health care facilities is of paramount importance during any construction or renovation project. It is the responsibility of the facility director and the design/construction team to perform the scope of work in such a manner to ensure the safety of these user groups and the uninterrupted proper functioning of the various building life safety structures and systems. Please reference Appendix 12 of DHFC Guidelines Manual for general guidance in ensuring life safety.

3.4 SCDHEC 80-PERCENT ABOVE-CEILING CONSTRUCTION INSPECTION

- A. At least ten (10) days before the Contractor wants the Architect to inspect the above ceiling space, the Contractor shall provide the Architect with a written request.
 1. The Architect will schedule the DHEC Above-Ceiling Inspection on the behalf of the contractor.
- B. The Architect shall perform an above-ceiling inspection and create a sign/countersign punchlist.
- C. The Contractor shall correct any outstanding items on the punchlist prior to the DHEC Above-Ceiling inspection and sign the Architect's punchlist to confirm items are complete. The Architect will verify these items with the Contractor and countersign that each item is complete. If it is obvious that the work is not completed, the DHEC inspection shall be cancelled and rescheduled at the Contractor's expense.
- D. At the Above-Ceiling inspection the DHEC Inspector may find items that are not satisfactory in either quality or completeness. It will be the Contractor's responsibility to compile the list of deficiencies noted by the Inspector on Appendix 11A – Inspection Sign/Countersign Document (p.37 of 43) DHFC Guidelines Manual. All deficiencies shall be corrected before the ceiling is allowed to be closed in.
- E. During the inspection the DHEC inspector may wish to test the systems that were worked on. It is the Contractor's responsibility to have the sub-contractors available for assistance should the systems be tested.

- F. All areas that are part of the inspection shall remain visible and accessible until the entire Above-Ceiling Inspection is finished, the items needing correction have been completed and verified, and the work has been accepted by DHEC.

3.5 SCDHEC FINAL 100-PERCENT CONSTRUCTION INSPECTION

- A. At least ten (10) days before the Contractor wants the Architect to perform a Preliminary Inspection, the Contractor shall provide the Architect with a written request to inspect.
- B. The Architect shall perform a Preliminary Inspection and create a sign/countersign punchlist.
 - 1. The Architect will then schedule the DHEC Final Construction Inspection on the behalf of the contractor.
- C. The Contractor shall correct any outstanding items on the punchlist prior to the date of Substantial Completion and sign the Architect's punchlist to confirm items are complete.
- D. On the date of Substantial Completion, the Architect shall perform a Substantial Completion Inspection and generate a Final Punchlist. The Architect will also verify that the work requirements for Substantial Completion have been met. If it is obvious that the work has not been completed, a Certificate of Substantial Completion will not be given and a new Substantial Completion review date will be scheduled at the Contractor's expense. Substantial Completion shall be established and accepted by the Architect prior to the DHEC Final Inspection
- E. DHEC requires compliance documentation to be submitted at the DHEC Final Construction Inspection per Appendix 11 – Documents Required for Final Project Acceptance (p.35 of 43) DHFC Guidelines Manual. The DHEC Inspector will not approve the project without this required documentation. It is the Contractor's responsibility to gather the documents and compile them in a notebook for DHEC review at the DHEC Final Inspection. All documentation shall be reviewed and approved by the Architect and Owner prior to the DHEC Final inspection per Section 01 77 00 "Closeout Procedures".
- F. During the Inspection the DHEC Inspector may wish to test systems included in the Work. It is the Contractor's responsibility to have all sub-contractors available for assistance and provide necessary means for access to inspect and test the Work.
- G. At the Final inspection the DHEC Inspector may find items that are not satisfactory in either quality or completeness. It will be the Contractor's responsibility to compile the list of deficiencies noted by the Inspector on the Appendix 11A – Inspection Sign/Countersign Document (p.37 of 43) DHFC Guidelines Manual. The Inspector will not accept the work until all items are corrected and verified by the sign-countersign method.

END OF SECTION 01 45 35

SECTION 01 50 00 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.
- B. Related Requirements:
 - 1. Section 01 10 00 "Summary" for work restrictions and limitations on utility interruptions.
 - 2. Section 01 21 00 "Allowances" for allowance for metered use of temporary utilities.

1.3 INFORMATIONAL SUBMITTALS

- A. Site Utilization Plan: Show temporary facilities, temporary utility lines and connections, staging areas, construction site entrances, vehicle circulation, and parking areas for construction personnel.
- B. Implementation and Termination Schedule: Within 15 days of date established for commencement of the Work, submit schedule indicating implementation and termination dates of each temporary utility.
- C. Project Identification and Temporary Signs: Show fabrication and installation details, including plans, elevations, details, layouts, typestyles, graphic elements, and message content.
- D. Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire-prevention program.
- E. Moisture- and Mold-Protection Plan: Describe procedures and controls for protecting materials and construction from water absorption and damage and mold. Describe delivery, handling, storage, installation, and protection provisions for materials subject to water absorption or water damage.

SECTION 01 50 00 - TEMPORARY FACILITIES AND CONTROLS

Page 1 of 13

1. Indicate procedures for discarding water-damaged materials, protocols for mitigating water intrusion into completed Work, and requirements for replacing water-damaged Work.
 2. Indicate sequencing of work that requires water, such as sprayed fire-resistive materials, plastering, and terrazzo grinding, and describe plans for dealing with water from these operations. Show procedures for verifying that wet construction has dried sufficiently to permit installation of finish materials.
 3. Indicate methods to be used to avoid trapping water in finished work.
- F. Dust- and HVAC-Control Plan: Submit coordination drawing and narrative that indicates the dust- and HVAC-control measures proposed for use, proposed locations, and proposed time frame for their operation. Include the following:
1. Locations of dust-control partitions at each phase of work.
 2. HVAC system isolation schematic drawing.
 3. Location of proposed air-filtration system discharge.
 4. Waste-handling procedures.
 5. Other dust-control measures.
- G. Noise and Vibration Control Plan: Identify construction activities that may impact the occupancy and use of existing spaces within the building or adjacent existing buildings, whether occupied by others, or occupied by the Owner. Include the following:
1. Methods used to meet the goals and requirements of the Owner.
 2. Concrete cutting method(s) to be used.
 3. Location of construction devices on the site.
 4. Show compliance with the use and maintenance of quieted construction devices for the duration of the Project.
 5. Indicate activities that may disturb building occupants and that are planned to be performed during non-standard working hours as coordinated with the Owner.
 6. Indicate locations of sensitive equipment areas or other areas requiring special attention as identified by Owner. Indicate means for complying with Owner's requirements.
- 1.4 QUALITY ASSURANCE
- A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.
 - B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.
 - C. Accessible Temporary Egress: Comply with applicable provisions in the United States Access Board's ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.

**SECTION 01 50 00 - TEMPORARY FACILITIES
AND CONTROLS**

1.5 PROJECT CONDITIONS

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

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Chain-Link Fencing: Minimum 2-inch, 0.148-inch- thick, galvanized-steel, chain-link fabric fencing; minimum 6 feet high with galvanized-steel pipe posts; minimum 2-3/8-inch- OD line posts and 2-7/8-inch- OD corner and pull posts , with 1-5/8-inch- OD top rails .
- B. Portable Chain-Link Fencing: Minimum 2-inch, 0.148-inch- thick, galvanized-steel, chain-link fabric fencing; minimum 6 feet high with galvanized-steel pipe posts; minimum 2-3/8-inch- OD line posts and 2-7/8-inch- OD corner and pull posts, with 1-5/8-inch- OD top and bottom rails. Provide concrete bases for supporting posts.
- C. Fencing Windscreen Privacy Screen: Polyester fabric scrim with grommets for attachment to chain-link fence, sized to height of fence, in color selected by Architect from manufacturer's standard colors.
- D. Dust-Control Adhesive-Surface Walk-Off Mats: Provide mats, minimum 36 by 60 inches.
- E. Insulation: Unfaced mineral-fiber blanket, manufactured from glass, slag wool, or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively.

2.2 TEMPORARY FACILITIES

- A. Field Offices: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.
- B. Common-Use Field Office: Of sufficient size to accommodate needs of Owner, Architect , Construction Manager, and construction personnel office activities and to accommodate Project meetings specified in other Division 01 Sections. Keep office clean and orderly. Furnish and equip offices as follows:
 - 1. Furniture required for Project-site documents, including file cabinets, plan tables, plan racks, and bookcases.
 - 2. Conference room of sufficient size to accommodate meetings of 10 individuals. Provide electrical power service and 120-V ac duplex receptacles, with no fewer

SECTION 01 50 00 - TEMPORARY FACILITIES AND CONTROLS

- than one receptacle on each wall. Furnish room with conference table, chairs, and 4-foot- square tack and marker boards.
3. Drinking water and private toilet.
 4. Heating and cooling equipment necessary to maintain a uniform indoor temperature of 68 to 72 deg F.
 5. Lighting fixtures capable of maintaining average illumination of 20 fc at desk height.
- C. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.
1. Store combustible materials apart from building.

2.3 EQUIPMENT

- A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.
- B. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.
1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
 2. Heating, Cooling, and Dehumidifying Units: Listed and labeled for type of fuel being consumed, by a qualified testing agency acceptable to authorities having jurisdiction, and marked for intended location and application.
 3. Permanent HVAC System: If Owner authorizes use of permanent HVAC system for temporary use during construction, provide filter with MERV of 8 at each return-air grille in system and remove at end of construction and clean HVAC system as required in Section 01 77 00 "Closeout Procedures."
- C. Air-Filtration Units: Primary and secondary HEPA-filter-equipped portable units with four-stage filtration. Provide single switch for emergency shutoff. Configure to run continuously.

PART 3 - EXECUTION

3.1 TEMPORARY FACILITIES, GENERAL

- A. Conservation: Coordinate construction and use of temporary facilities with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.
1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. See other Sections for disposition of salvaged materials that are designated as Owner's property.

SECTION 01 50 00 - TEMPORARY FACILITIES AND CONTROLS

3.2 INSTALLATION, GENERAL

- A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.
 - 1. Locate facilities to limit site disturbance as specified in Section 01 10 00 "Summary."
- B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.
- C. Isolation of Work Areas in Occupied Facilities: Prevent dust, fumes, and odors from entering occupied areas.
 - 1. Prior to commencing work, isolate the HVAC system in area where work is to be performed according to coordination drawings.
 - a. Disconnect supply and return ductwork in work area from HVAC systems servicing occupied areas.
 - b. Maintain negative air pressure within work area, using HEPA-equipped air-filtration units, starting with commencement of temporary partition construction, and continuing until removal of temporary partitions is complete.
 - 2. Maintain dust partitions during the Work. Use vacuum collection attachments on dust-producing equipment. Isolate limited work within occupied areas using portable dust-containment devices.
 - 3. Perform daily construction cleanup and final cleanup using approved, HEPA-filter-equipped vacuum equipment.

3.3 TEMPORARY UTILITY INSTALLATION

- A. General: Install temporary service or connect to existing service.
 - 1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
- B. Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.
 - 1. Connect temporary sewers to municipal system as directed by authorities having jurisdiction.
- C. Water Service: Connect to Owner's existing water service facilities. Clean and maintain water service facilities in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.
- D. Sanitary Facilities: Provide temporary toilets, wash facilities, safety shower and eyewash facilities, and drinking water for use of construction personnel. Comply with

SECTION 01 50 00 - TEMPORARY FACILITIES AND CONTROLS

requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.

1. Use of Permanent Toilets: Use of Owner's existing or new toilet facilities is not permitted .
- E. Temporary Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.
1. Provide temporary dehumidification systems when required to reduce ambient and substrate moisture levels to level required to allow installation or application of finishes and their proper curing or drying.
- F. Electric Power Service: Connect to Owner's existing electric power service. Maintain equipment in a condition acceptable to Owner.
- G. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.
1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.
- H. Telephone Service: Provide temporary telephone service in common-use facilities for use by all construction personnel. Install WiFi cell phone access equipment land-based telephone line(s) for each field office.
1. At each telephone, post a list of important telephone numbers.
 - a. Police and fire departments.
 - b. Ambulance service.
 - c. Contractor's home office.
 - d. Contractor's emergency after-hours telephone number.
 - e. Architect's office.
 - f. Construction Manager's home office.
 - g. Engineers' offices.
 - h. Owner's office.
 - i. Principal subcontractors' field and home offices.
- I. Electronic Communication Service: Provide secure WiFi wireless connection to internet with provisions for access by Architect and Owner.
- J. Project Computer: Provide a desktop computer in the primary field office adequate for use by Architect and Owner to access Project electronic documents and maintain electronic communications. Equip computer with not less than the following:
1. Processor: Intel Core i5 or i7.
 2. Memory: 16 gigabyte.

**SECTION 01 50 00 - TEMPORARY FACILITIES
AND CONTROLS**

3. Disk Storage: 1 -terabyte hard-disk drive and combination DVD-RW/CD-RW drive.
4. Display: 24-inch LCD monitor with 256-Mb dedicated video RAM.
5. Full-size keyboard and mouse.
6. Network Connectivity: 10/100BaseT Ethernet .
7. Operating System: Microsoft Windows 10 Professional.
8. Productivity Software:
 - a. Microsoft Office Professional, 2013 or higher, including Word, Excel, and Outlook.
 - b. Adobe Reader DC.
 - c. WinZip 10.0 or higher.
9. Printer: "All-in-one" unit equipped with printer server, combining color printing, photocopying, scanning, and faxing, or separate units for each of these three functions.
10. Internet Service: Broadband modem, router, and ISP, equipped with hardware firewall, providing minimum 10.0 -Mbps upload and 15 -Mbps download speeds at each computer.
11. Internet Security: Integrated software, providing software firewall, virus, spyware, phishing, and spam protection in a combined application.
12. Backup: External hard drive, minimum 2 terrabytes, with automated backup software providing daily backups.

3.4 SUPPORT FACILITIES INSTALLATION

- A. Comply with the following:
 1. Provide construction for temporary field offices, shops, and sheds located within construction area or within 30 feet of building lines that is noncombustible in accordance with ASTM E136. Comply with NFPA 241.
 2. Maintain support facilities until Architect schedules Substantial Completion inspection. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.
- B. Temporary Roads and Paved Areas: Construct and maintain temporary roads and paved areas adequate for construction operations. Locate temporary roads and paved areas within construction limits indicated on Drawings.
 1. Provide dust-control treatment that is nonpolluting and nontracking. Reapply treatment as required to minimize dust.
- C. Temporary Use of Planned Permanent Roads and Paved Areas: Locate temporary roads and paved areas in same location as permanent roads and paved areas. Construct and maintain temporary roads and paved areas adequate for construction operations. Extend temporary roads and paved areas, within construction limits indicated, as necessary for construction operations.

SECTION 01 50 00 - TEMPORARY FACILITIES AND CONTROLS

1. Coordinate elevations of temporary roads and paved areas with permanent roads and paved areas.
 2. Prepare subgrade and install subbase and base for temporary roads and paved areas in accordance with Section 31 20 00 "Earth Moving."
 3. Delay installation of final course of permanent hot-mix asphalt pavement until immediately before Substantial Completion. Repair hot-mix asphalt base-course pavement before installation of final course in accordance with Section 32 12 16 "Asphalt Paving."
- D. Traffic Controls: Comply with requirements of authorities having jurisdiction.
1. Protect existing site improvements to remain, including curbs, pavement, and utilities.
 2. Maintain access for fire-fighting equipment and access to fire hydrants.
- E. Parking: Provide temporary offsite parking areas for construction personnel.
- F. Storage and Staging: Use designated areas of Project site for storage and staging needs.
- G. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.
1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties or endanger permanent Work or temporary facilities.
 2. Remove snow and ice as required to minimize accumulations.
- H. Project Signs: Provide Project signs as indicated. Unauthorized signs are not permitted.
1. Identification Signs: Provide Project identification signs as indicated on Drawings.
 2. Temporary Signs: Provide other signs as indicated and as required to inform public and individuals seeking entrance to Project.
 - a. Provide temporary, directional signs for construction personnel and visitors.
 3. Maintain and touch up signs, so they are legible at all times.
- I. Waste Disposal Facilities: Comply with requirements specified in Section 01 74 19 "Construction Waste Management and Disposal."
- J. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.
1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.
- K. Existing Stair Usage: Use of Owner's existing stairs will be permitted, provided stairs are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore stairs to condition existing before initial use.

**SECTION 01 50 00 - TEMPORARY FACILITIES
AND CONTROLS**

1. Provide protective coverings, barriers, devices, signs, or other procedures to protect stairs and to maintain means of egress. If stairs become damaged, restore damaged areas, so no evidence remains of correction work.
- L. Temporary Use of Permanent Stairs: Use of new stairs for construction traffic will be permitted, provided stairs are protected and finishes restored to new condition at time of Substantial Completion.

3.5 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.
 1. Where access to adjacent properties is required in order to affect protection of existing facilities, obtain written permission from adjacent property owner to access property for that purpose.
- B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
 1. Comply with work restrictions specified in Section 01 10 00 "Summary."
- C. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to undisturbed areas and to adjacent properties and walkways, according to requirements of EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent.
 1. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross tree- or plant-protection zones.
 2. Inspect, repair, and maintain erosion- and sedimentation-control measures during construction until permanent vegetation has been established.
 3. Clean, repair, and restore adjoining properties and roads affected by erosion and sedimentation from Project site during the course of Project.
 4. Remove erosion and sedimentation controls, and restore and stabilize areas disturbed during removal.
- D. Stormwater Control: Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.
- E. Tree and Plant Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.

SECTION 01 50 00 - TEMPORARY FACILITIES AND CONTROLS

- F. Pest Control: Engage pest-control service to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests and to perform extermination and control procedures at regular intervals, so Project will be free of pests and their residues at Substantial Completion. Perform control operations lawfully, using materials approved by authorities having jurisdiction.
- G. Site Enclosure Fence: Before construction operations begin , furnish and install site enclosure fence in a manner that will prevent people from easily entering site except by entrance gates.
 - 1. Extent of Fence: As required to enclose entire Project site or portion determined sufficient to accommodate construction operations .
 - 2. Maintain security by limiting number of keys and restricting distribution to authorized personnel. Furnish one set of keys to Owner.
- H. Security Enclosure and Lockup: Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each workday.
- I. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
- J. Temporary Egress: Provide temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction. Provide signage directing occupants to temporary egress.
- K. Covered Walkway: Erect protective, covered walkway for passage of individuals through or adjacent to Project site. Coordinate with entrance gates, other facilities, and obstructions. Comply with regulations of authorities having jurisdiction and requirements indicated on Drawings.
 - 1. Provide overhead decking, protective enclosure walls, handrails, barricades, warning signs, exit signs, lights, safe and well-drained walkways, and similar provisions for protection and safe passage.
 - 2. Paint and maintain appearance of walkway for duration of the Work.
- L. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.
 - 1. Where heating or cooling is needed and permanent enclosure is incomplete, insulate temporary enclosures.
- M. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241; manage fire-prevention program.

**SECTION 01 50 00 - TEMPORARY FACILITIES
AND CONTROLS**

1. Prohibit smoking in construction areas. Comply with additional limits on smoking specified in other Sections.
2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition in accordance with requirements of authorities having jurisdiction.
3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
4. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign, stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.

3.6 MOISTURE AND MOLD CONTROL

- A. Moisture and Mold Protection: Protect stored materials and installed Work in accordance with Moisture and Mold Protection Plan.
- B. Exposed Construction Period: Before installation of weather barriers, when materials are subject to wetting and exposure and to airborne mold spores, protect as follows:
 1. Protect porous materials from water damage.
 2. Protect stored and installed material from flowing or standing water.
 3. Keep porous and organic materials from coming into prolonged contact with concrete.
 4. Remove standing water from decks.
 5. Keep deck openings covered or dammed.
- C. Partially Enclosed Construction Period: After installation of weather barriers but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:
 1. Do not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.
 2. Keep interior spaces reasonably clean and protected from water damage.
 3. Periodically collect and remove waste containing cellulose or other organic matter.
 4. Discard or replace water-damaged material.
 5. Do not install material that is wet.
 6. Discard and replace stored or installed material that begins to grow mold.
 7. Perform work in a sequence that allows wet materials adequate time to dry before enclosing the material in gypsum board or other interior finishes.
- D. Controlled Construction Period: After completing and sealing of the building enclosure but prior to the full operation of permanent HVAC systems, maintain as follows:
 1. Control moisture and humidity inside building by maintaining effective dry-in conditions.

SECTION 01 50 00 - TEMPORARY FACILITIES AND CONTROLS

2. Use temporary or permanent HVAC system to control humidity within ranges specified for installed and stored materials.
3. Comply with manufacturer's written instructions for temperature, relative humidity, and exposure to water limits.
 - a. Hygroscopic materials that may support mold growth, including wood and gypsum-based products, that become wet during the course of construction and remain wet for 48 hours are considered defective and require replacing.
 - b. Measure moisture content of materials that have been exposed to moisture during construction operations or after installation. Record readings beginning at time of exposure and continuing daily for 48 hours. Identify materials containing moisture levels higher than allowed. Report findings in writing to Architect.
 - c. Remove and replace materials that cannot be completely restored to their manufactured moisture level within 48 hours.

3.7 OPERATION, TERMINATION, AND REMOVAL

- A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.
- B. Maintenance: Maintain facilities in good operating condition until removal.
 1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
- C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.
- D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
 1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
 2. Remove temporary roads and paved areas not intended for or acceptable for integration into permanent construction. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.

SECTION 01 50 00 - TEMPORARY FACILITIES AND CONTROLS

3. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 01 77 00 "Closeout Procedures."

END OF SECTION 01 50 00

**SECTION 01 50 00 - TEMPORARY FACILITIES
AND CONTROLS**

Page 13 of 13

SECTION 01 57 23 - TEMPORARY STORMWATER POLLUTION CONTROL

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Temporary stormwater pollution controls.

1.2 STORMWATER POLLUTION PREVENTION PLAN

- A. The Stormwater Pollution Prevention Plan (SWPPP) is part of the Contract Documents and is bound into this Project Manual.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site .

1.4 INFORMATIONAL SUBMITTALS

- A. Stormwater Pollution Prevention Plan (SWPP): Within 15 days of date established for commencement of the Work, submit completed SWPPP.
- B. EPA authorization under the EPA's "2017 Construction General Permit (CGP)."
- C. Stormwater Pollution Prevention (SWPP) Training Log: For each individual performing Work under the SWPPP.
- D. Inspection reports.

1.5 QUALITY ASSURANCE

- A. Stormwater Pollution Prevention Plan (SWPPP) Coordinator: Experienced individual or firm with a record of successful water pollution control management coordination of projects with similar requirements.
1. SWPPP Coordinator shall complete and finalize the SWPPP form.
 2. SWPPP Coordinator shall be responsible for inspections and maintaining of all requirements of the SWPPP.
- B. Installers: Trained as indicated in the SWPPP.

SECTION 01 57 23 - TEMPORARY STORMWATER POLLUTION CONTROL

PART 2 - PRODUCTS

2.1 TEMPORARY STORMWATER POLLUTION CONTROLS

- A. Provide temporary stormwater pollution controls as required by the SWPPP.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with all best management practices, general requirements, performance requirements, reporting requirements, and all other requirements included in the SWPPP.
- B. Locate stormwater pollution controls in accordance with the SWPPP.
- C. Conduct construction as required to comply with the SWPPP and that minimize possible contamination or pollution or other undesirable effects.
 - 1. Inspect, repair, and maintain SWPPP controls during construction.
 - a. Inspect all SWPPP controls not less than every seven days, and after each occurrence of a storm event, as outlined in the SWPPP.
- D. Remove SWPPP controls at completion of construction and restore and stabilize areas disturbed during construction.

END OF SECTION 01 57 23

SECTION 01 58 13 - TEMPORARY PROJECT SIGNAGE

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes:
 - 1. Requirements for temporary Identification sign.

1.2 SUBMITTALS FOR REVIEW

- A. Sign elevation: Show proposed sign layout with all the information complete.
 - 1. Show the fonts and font sizes that will be used.
 - 2. Show the colors that will be used.
 - a. Indicate the sign locations on the site plan.

1.3 QUALITY ASSURANCE

- A. Construct the sign with materials indicated. Where materials are not indicated, use products that will withstand weather exposure for the duration of the project.

PART 2 - PRODUCTS

2.1 PROJECT IDENTIFICATION SIGNS

- A. Support posts: Wood, pressure preservative treated for ground exposure.
- B. Rough Hardware: Galvanized steel.
- C. Sign panel: Any material which will support the graphics and remain flat for the duration of the project.
 - 1. The panel shall have a smooth surface suitable for painting or for decal application.
 - 2. The panel shall not delaminate over the life of the project.
 - 3. The panel shall resist the code mandated wind loads, with deflection limited to L/240
- D. Paint: Alkyd System MPI EXT 6.2C
 - 1. Primer: MPI-5

2. Intermediate Coat: Same as topcoat.
3. Topcoat: MPI 94, MPI Gloss Level 5.

2.2 VINYL BANNERS

A. Fade resistant vinyl

1. High tenacity 200 x 200 denier, 18 x 18 threads per inch (W/F)
2. Matte surface on both sides
3. Very good flatness, curl resistant banner
4. Opaque double sided frontlit laminate banner
5. High tensile polyester fabric reinforced for maximum durability
6. Fire rated, NFPA701-level 1
7. Heat welded hems
 - a. Fold in hems along all edges with enough width to include the grommets.
8. Grommets in hems.
 - a. Provide and install corrosion resistant grommets at spacing recommended by the banner manufacturer, but not more than 2 feet apart.

B. Printing

1. Printing inks shall be compatible with the vinyl banner.
2. Inks on the banner shall not fade, crack, or lose adhesion for the life of its use.

2.3 MAINTENANCE

A. Maintain the signs for the duration of the project.

1. Repair or replace graphics that become faded or damaged.
2. Touch up paint as required

2.4 CLEANUP

A. Immediately before project closeout remove the signs.

1. Remove the concrete footings.
2. Fill holes with fill soil up to 6 inches below surrounding grade and compact to 95 percent compaction with optimum moisture content.
 - a. Fill remaining 6 inches with topsoil and finish with ground cover matching the surrounding area.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Locate Identification sign where indicated on the drawings.
- B. Locate other signs
- C. Verify that the area of installation is free of underground obstructions.
- D. Remove any obstructions that may interfere with view of the sign from both sides.
- E. Install sign plumb and level.
- F. Slope concrete so that the concrete at the posts is 1 inch above the concrete at the outer edge.
- G. Contact the Architect's Marketing Group for the Architect's logo, rendering, and Owner's logo.

3.2 CONSTRUCTION SIGN SELECTION OPTIONS

- A. Provide site sign layout Option 1, Option 2, and Option 3.
- B. Install project identification sign within 10 days after Notice to Proceed.
- C. Sign notes:
 - 1. Client Logo; Always on top.
 - 2. Project Name; Secondary in layout, with white lettering on black box. Maintain minimum 2 inches of black space around letters. Avoid using fonts smaller than 200 points for best readability.
 - 3. Rendering; Usually third in layout, but sometimes may appear above Project Name if preferred. If no rendering is needed enlarge logos and arrange accordingly. Maintain minimum 2 inches clearance around and between logos.
 - 4. Other Logos; Contractor, developer, and other Architect's logos appear here, and can be stacked or places side by side. Space logos evenly and equidistant from each other. Alternate templates are provided.
 - 5. Rendering; When no rendering is available, enlarge and place logos accordingly. Logos must remain smaller than client logo.
 - 6. Use this template with Mcmillan Pazdan Smith primary logo, enlarged and placed on taller background. Do not make larger than client logo.
 - 7. No contractor or developer logos; When contractor installs own sign do not duplicate logo on this sign. Enlarge client logo, maintaining minimum 2 inches clear on all sides. Use Mcmillan Pazdan Smith primary logo enlarged and placed on taller background. Do not make larger than client logo.

END OF SECTION 01 58 13

SECTION 01 60 00 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.
- B. Related Requirements:
 - 1. Section 01 10 00 "Summary" for Contractor requirements related to Owner-furnished products.
 - 2. Section 01 21 00 "Allowances" for products selected under an allowance.
 - 3. Section 01 23 00 "Alternates" for products selected under an alternate.
 - 4. Section 01 25 00 "Substitution Procedures" for requests for substitutions.
 - 5. Section 01 42 00 "References" for applicable industry standards for products specified.
 - 6. Section 01770 "Closeout Procedures" for submitting warranties.

1.3 DEFINITIONS

- A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
 - 1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature that is current as of date of the Contract Documents.
 - 2. New Products: Items that have not previously been incorporated into another project or facility. Salvaged items or items reused from other projects are not considered new products. Items that are manufactured or fabricated to include recycled content materials are considered new products, unless indicated otherwise.
 - 3. Comparable Product: Product by named manufacturer that is demonstrated and approved through the comparable product submittal process described in Part 2 "Comparable Products" Article, to have the indicated qualities related to type,

SECTION 01 60 00 - PRODUCT REQUIREMENTS

function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.

- B. Basis-of-Design Product Specification: A specification in which a single manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation. Published attributes and characteristics of basis-of-design product establish salient characteristics of products.
 - 1. Evaluation of Comparable Products: In addition to the basis-of-design product description, product attributes and characteristics may be listed to establish the significant qualities related to type, function, in-service performance and physical properties, weight, dimension, durability, visual characteristics, and other special features and requirements for purposes of evaluating comparable products of additional manufacturers named in the specification. Manufacturer's published attributes and characteristics of basis-of-design product also establish salient characteristics of products for purposes of evaluating comparable products.
 - C. Subject to Compliance with Requirements: Where the phrase "Subject to compliance with requirements" introduces a product selection procedure in an individual Specification Section, provide products qualified under the specified product procedure. In the event that a named product or product by a named manufacturer does not meet the other requirements of the specifications, select another named product or product from another named manufacturer that does meet the requirements of the specifications; submit a comparable product request or substitution request, if applicable.
 - D. Comparable Product Request Submittal: An action submittal requesting consideration of a comparable product, including the following information:
 - 1. Identification of basis-of-design product or fabrication or installation method to be replaced, including Specification Section number and title and Drawing numbers and titles.
 - 2. Data indicating compliance with the requirements specified in Part 2 "Comparable Products" Article.
 - E. Basis-of-Design Product Specification Submittal: An action submittal complying with requirements in Section 01 33 00 "Submittal Procedures."
 - F. Substitution: Refer to Section 01 25 00 "Substitution Procedures" for definition and limitations on substitutions.
- 1.4 QUALITY ASSURANCE
- A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.
 - B. Identification of Products: Except for required labels and operating data, do not attach or imprint manufacturer or product names or trademarks on exposed surfaces of

SECTION 01 60 00 - PRODUCT REQUIREMENTS

products or equipment that will be exposed to view in occupied spaces or on the exterior.

1. Labels: Locate required product labels and stamps on a concealed surface, or, where required for observation following installation, on a visually accessible surface that is not conspicuous.
2. Equipment Nameplates: Provide a permanent nameplate on each item of service- or power-operated equipment. Locate on a visually accessible but inconspicuous surface. Include information essential for operation, including the following:
 - a. Name of product and manufacturer.
 - b. Model and serial number.
 - c. Capacity.
 - d. Speed.
 - e. Ratings.
3. See individual identification Sections in Divisions 21, 22, 23, and 26 for additional equipment identification requirements.

1.5 COORDINATION

- A. Modify or adjust affected work as necessary to integrate work of approved comparable products and approved substitutions.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle products, using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.
- B. Delivery and Handling:
 1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
 2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
 3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
 4. Inspect products on delivery to determine compliance with the Contract Documents and that products are undamaged and properly protected.
- C. Storage:
 1. Provide a secure location and enclosure at Project site for storage of materials and equipment.
 2. Store products to allow for inspection and measurement of quantity or counting of units.

SECTION 01 60 00 - PRODUCT REQUIREMENTS

Page 3 of 7

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

1.7 PRODUCT WARRANTIES

- A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.
 1. Manufacturer's Warranty: Written standard warranty form furnished by individual manufacturer for a particular product and issued in the name of the Owner or endorsed by manufacturer to Owner.
 2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner and issued in the name of the Owner or endorsed by manufacturer to Owner.
- B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.
 1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
 2. Specified Form: When specified forms are included in the Project Manual, prepare a written document, using indicated form properly executed.
 3. See other Sections for specific content requirements and particular requirements for submitting special warranties.
- C. Submittal Time: Comply with requirements in Section 01 77 00 "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

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

SECTION 01 60 00 - PRODUCT REQUIREMENTS

1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
3. Owner reserves the right to limit selection to products with warranties meeting requirements of the Contract Documents.
4. Where products are accompanied by the term "as selected," Architect will make selection.
5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.
6. Or Equal: For products specified by name and accompanied by the term "or equal," "or approved equal," or "or approved," comply with requirements in "Comparable Products" Article to obtain approval for use of an unnamed product.
 - a. Submit additional documentation required by Architect in order to establish equivalency of proposed products. Unless otherwise indicated, evaluation of "or equal" product status is by the Architect, whose determination is final.

B. Product Selection Procedures:

1. Sole Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
 - a. Sole product may be indicated by the phrase "Subject to compliance with requirements, provide the following."
2. Sole Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
 - a. Sole manufacturer/source may be indicated by the phrase "Subject to compliance with requirements, provide products by the following."
3. Limited List of Products: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered unless otherwise indicated.
 - a. Limited list of products may be indicated by the phrase "Subject to compliance with requirements, provide one of the following."
4. Non-Limited List of Products: Where Specifications include a list of names of both available manufacturers and products, provide one of the products listed or an unnamed product that complies with requirements.
 - a. Non-limited list of products is indicated by the phrase "Subject to compliance with requirements, available products that may be incorporated in the Work include, but are not limited to, the following."
 - b. Provision of an unnamed product is not considered a substitution, if the product complies with requirements.
5. Limited List of Manufacturers: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered unless otherwise indicated.

SECTION 01 60 00 - PRODUCT REQUIREMENTS

- a. Limited list of manufacturers is indicated by the phrase "Subject to compliance with requirements, provide products by one of the following."
 6. Non-Limited List of Manufacturers: Where Specifications include a list of available manufacturers, provide a product by one of the manufacturers listed or a product by an unnamed manufacturer that complies with requirements.
 - a. Non-limited list of manufacturers is indicated by the phrase "Subject to compliance with requirements, available manufacturers whose products may be incorporated in the Work include, but are not limited to, the following."
 - b. Provision of products of an unnamed manufacturer is not considered a substitution, if the product complies with requirements.
 7. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications may additionally indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.
 - a. For approval of products by unnamed manufacturers, comply with requirements in Section 01 25 00 "Substitution Procedures" for substitutions for convenience.
- C. Visual Matching Specification: Where Specifications require the phrase "match Architect's sample," provide a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.
1. If no product available within specified category matches and complies with other specified requirements, comply with requirements in Section 01 25 00 "Substitution Procedures" for proposal of product.
- D. Visual Selection Specification: Where Specifications include the phrase "as selected by Architect from manufacturer's full range" or a similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.
- E. Sustainable Product Selection: Where Specifications require product to meet sustainable product characteristics, select products complying with indicated requirements. Comply with requirements in Division 01 sustainability requirements Section and individual Specification Sections.
1. Select products for which sustainable design documentation submittals are available from manufacturer.

2.2 COMPARABLE PRODUCTS

- A. Conditions for Consideration of Comparable Products: Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect may return requests without action, except to record noncompliance with the following requirements:
1. Evidence that proposed product does not require revisions to the Contract Documents, is consistent with the Contract Documents, will produce the indicated results, and is compatible with other portions of the Work.
 2. Detailed comparison of significant qualities of proposed product with those of the named basis-of-design product. Significant product qualities include attributes, such as type, function, in-service performance and physical properties, weight, dimension, durability, visual characteristics, and other specific features and requirements.
 3. Evidence that proposed product provides specified warranty.
 4. List of similar installations for completed projects, with project names and addresses and names and addresses of architects and owners, if requested.
 5. Samples, if requested.
- B. Architect's Action on Comparable Products Submittal: If necessary, Architect will request additional information or documentation for evaluation, as specified in Section 01 33 00 "Submittal Procedures."
1. Form of Approval of Submittal: As specified in Section 01 33 00 "Submittal Procedures."
 2. Use product specified if Architect does not issue a decision on use of a comparable product request within time allocated.
- C. Submittal Requirements, Single-Step Process: When acceptable to Architect, incorporate specified submittal requirements of individual Specification Section in combined submittal for comparable products. Approval by the Architect of Contractor's request for use of comparable product and of individual submittal requirements will also satisfy other submittal requirements.

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 60 00

SECTION 01 60 00 - PRODUCT REQUIREMENTS

Page 7 of 7

SECTION 01 73 00 - EXECUTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes general administrative and procedural requirements governing execution of the Work, including, but not limited to, the following:
 - 1. Field engineering and surveying.
 - 2. Installation of the Work.
 - 3. Cutting and patching.
 - 4. Progress cleaning.
 - 5. Starting and adjusting.
 - 6. Protection of installed construction.
- B. Related Requirements:
 - 1. Section 01 10 00 "Summary" for coordination of Owner-furnished products , Owner-performed work , and limits on use of Project site.
 - 2. Section 01 33 00 "Submittal Procedures" for submitting surveys.
 - 3. Section 01 77 00 "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, replacing defective work, and final cleaning.
 - 4. Section 02 41 19 "Selective Demolition" for demolition and removal of selected portions of the building.
 - 5. Section 07 84 13 "Penetration Firestopping" for patching penetrations in fire-rated construction.

1.3 DEFINITIONS

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

1.4 PREINSTALLATION MEETINGS

- A. Cutting and Patching Conference: Conduct conference at Project site .
1. Prior to commencing work requiring cutting and patching, review extent of cutting and patching anticipated and examine procedures for ensuring satisfactory result from cutting and patching work. Inform Architect of scheduled meeting. Require representatives of each entity directly concerned with cutting and patching to attend, including the following:
 - a. Contractor's superintendent.
 - b. Trade supervisor responsible for cutting operations.
 - c. Trade supervisor(s) responsible for patching of each type of substrate.
 - d. Mechanical, electrical, and utilities subcontractors' supervisors, to the extent each trade is affected by cutting and patching operations.
 2. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.
- B. Layout Conference: Conduct conference at Project site .
1. Prior to establishing layout of new and existing perimeter and structural column grid(s), review building location requirements. Review benchmark, control point, and layout and dimension requirements. Inform Architect of scheduled meeting. Require representatives of each entity directly concerned with Project layout to attend, including the following:
 - a. Contractor's superintendent.
 - b. Professional surveyor responsible for performing Project surveying and layout.
 - c. Professional surveyor responsible for performing site survey serving as basis for Project design.
 2. Review meanings and intent of dimensions, notes, terms, graphic symbols, and other layout information indicated on the Drawings.
 3. Review requirements for including layouts on Shop Drawings and other submittals.
 4. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For .
- B. Cutting and Patching Plan: Submit plan describing procedures at least 10 days prior to the time cutting and patching will be performed. Include the following information:
1. Extent: Describe reason for and extent of each occurrence of cutting and patching.
 2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building appearance and other significant visual elements.

3. Products: List products to be used for patching and firms or entities that will perform patching work.
4. Dates: Indicate when cutting and patching will be performed.
5. Utilities and Mechanical and Electrical Systems: List services and systems that cutting and patching procedures will disturb or affect. List services and systems that will be relocated and those that will be temporarily out of service. Indicate length of time permanent services and systems will be disrupted.
 - a. Include description of provisions for temporary services and systems during interruption of permanent services and systems.

1.6 QUALITY ASSURANCE

- A. Land Surveyor Qualifications: A professional land surveyor who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing land-surveying services of the kind indicated.
- B. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.
 1. Structural Elements: When cutting and patching structural elements, or when encountering the need for cutting and patching of elements whose structural function is not known, notify Architect of locations and details of cutting and await directions from Architect before proceeding. Shore, brace, and support structural elements during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection.
 2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety. Operational elements include the following:
 - a. Primary operational systems and equipment.
 - b. Fire separation assemblies.
 - c. Air or smoke barriers.
 - d. Fire-suppression systems.
 - e. Plumbing piping systems.
 - f. Mechanical systems piping and ducts.
 - g. Control systems.
 - h. Communication systems.
 - i. Fire-detection and -alarm systems.
 - j. Conveying systems.
 - k. Electrical wiring systems.
 - l. Operating systems of special construction.
 3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety.
 - a. Water, moisture, or vapor barriers.
 - b. Membranes and flashings.
 - c. Exterior curtain-wall construction.

- d. Sprayed fire-resistive material.
 - e. Equipment supports.
 - f. Piping, ductwork, vessels, and equipment.
 - g. Noise- and vibration-control elements and systems.
4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Comply with requirements specified in other Sections.
- B. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.
 1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Architect for the visual and functional performance of in-place materials. Use materials that are not considered hazardous.
- C. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.
 1. Use cleaning products that comply with Green Seal's GS-37, or if GS-37 is not applicable, use products that comply with the California Code of Regulations maximum allowable VOC levels.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities, mechanical and electrical systems, and other construction affecting the Work.
 1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, gas service piping, and water-service piping; underground electrical services; and other utilities.

SECTION 01 73 00 - EXECUTION

Page 4 of 12

2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.
- B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.
1. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
 2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
 3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
- C. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:
1. Description of the Work, including Specification Section number and paragraph, and Drawing sheet number and detail, where applicable.
 2. List of detrimental conditions, including substrates.
 3. List of unacceptable installation tolerances.
 4. Recommended corrections.
- D. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Existing Utility Information: Furnish information to Owner that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.
- B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents, submit a request for information to Architect in accordance with requirements in Section 01 31 00 "Project Management and Coordination."

3.3 CONSTRUCTION LAYOUT

- A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks and existing conditions. If discrepancies are discovered, notify Architect promptly.
- B. Engage a experienced in laying out the Work, using the following accepted surveying practices:
 - 1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
 - 2. Establish limits on use of Project site.
 - 3. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
 - 4. Inform installers of lines and levels to which they must comply.
 - 5. Check the location, level and plumb, of every major element as the Work progresses.
 - 6. Notify Architect when deviations from required lines and levels exceed allowable tolerances.
 - 7. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.
- C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.
- D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.
- E. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect.

3.4 FIELD ENGINEERING

- A. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.
 - 1. Do not change or relocate existing benchmarks or control points without prior written approval of Architect. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to Architect before proceeding.
 - 2. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.

- B. Benchmarks: Establish and maintain a minimum of two permanent benchmarks on Project site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark.
 - 1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.
 - 2. Where the actual location or elevation of layout points cannot be marked, provide temporary reference points sufficient to locate the Work.
 - 3. Remove temporary reference points when no longer needed. Restore marked construction to its original condition.

- C. Final Property Survey: Engage a land surveyor to prepare a final property survey showing significant features (real property) for Project. Include on the survey a certification, signed by land surveyor, that principal metes, bounds, lines, and levels of Project are accurately positioned as shown on the survey.
 - 1. Show boundary lines, monuments, streets, site improvements and utilities, existing improvements and significant vegetation, adjoining properties, acreage, grade contours, and the distance and bearing from a site corner to a legal point.
 - 2. Recording: At Substantial Completion, have the final property survey recorded by or with authorities having jurisdiction as the official "property survey."

3.5 INSTALLATION

- A. Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
 - 1. Make vertical work plumb, and make horizontal work level.
 - 2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
 - 3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.
 - 4. Maintain minimum headroom clearance of **96 inches** in occupied spaces and **90 inches** in unoccupied spaces, unless otherwise indicated on Drawings.

- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.

- C. Install products at the time and under conditions that will ensure satisfactory results as judged by Architect. Maintain conditions required for product performance until Substantial Completion.

- D. Conduct construction operations, so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy of type expected for Project.

- E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on-site and placement in permanent locations.

SECTION 01 73 00 - EXECUTION

Page 7 of 12

- F. Tools and Equipment: Select tools or equipment that minimize production of excessive noise levels.
- G. Templates: Obtain and distribute to the parties involved templates for Work specified to be factory prepared and field installed. Check Shop Drawings of other portions of the Work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.
- H. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions with manufacturer.
 - 1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
 - 2. Allow for building movement, including thermal expansion and contraction.
 - 3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- I. Joints: Make joints of uniform width. Where joint locations in exposed Work are not indicated, arrange joints for the best visual effect, as judged by Architect. Fit exposed connections together to form hairline joints.
- J. Repair or remove and replace damaged, defective, or nonconforming Work.
 - 1. Comply with Section 01 77 00 "Closeout Procedures" for repairing or removing and replacing defective Work.

3.6 CUTTING AND PATCHING

- A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
 - 1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
- B. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.
- C. Temporary Support: Provide temporary support of Work to be cut.
- D. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

SECTION 01 73 00 - EXECUTION

Page 8 of 12

- E. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching in accordance with requirements in Section 01 10 00 "Summary."
- F. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to prevent interruption to occupied areas.
- G. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
 - 1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 - 2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
 - 3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
 - 4. Excavating and Backfilling: Comply with requirements in applicable Sections where required by cutting and patching operations.
 - 5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
 - 6. Proceed with patching after construction operations requiring cutting are complete.
- H. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as practicable, as judged by Architect. Provide materials and comply with installation requirements specified in other Sections, where applicable.
 - 1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
 - 2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
 - a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
 - b. Restore damaged pipe covering to its original condition.
 - 3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
 - a. Where patching occurs in a painted surface, prepare substrate and apply primer and intermediate paint coats appropriate for substrate over the

patch, and apply final paint coat over entire unbroken surface containing the patch, corner to corner of wall and edge to edge of ceiling. Provide additional coats until patch blends with adjacent surfaces.

4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition and ensures thermal and moisture integrity of building enclosure.

- I. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.7 COORDINATION OF OWNER'S PORTION OF THE WORK

- A. Site Access: Provide access to Project site for Owner's construction personnel and Owner's separate contractors.

1. Provide temporary facilities required for Owner-furnished, Contractor-installed and Owner-furnished, Owner-installed products.
2. Refer to Section 01 10 00 "Summary" for other requirements for Owner-furnished, Contractor-installed and Owner-furnished, Owner-installed products

- B. Coordination: Coordinate construction and operations of the Work with work performed by Owner's construction personnel and Owner's separate contractors.

1. Construction Schedule: Inform Owner of Contractor's preferred construction schedule for Owner's portion of the Work. Adjust construction schedule based on a mutually agreeable timetable. Notify Owner if changes to schedule are required due to differences in actual construction progress.
2. Preinstallation Conferences: Include Owner's construction personnel and Owner's separate contractors at preinstallation conferences covering portions of the Work that are to receive Owner's work. Attend preinstallation conferences conducted by Owner's construction personnel if portions of the Work depend on Owner's construction.

3.8 PROGRESS CLEANING

- A. Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.

1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F.
3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
 - a. Use containers intended for holding waste materials of type to be stored.

SECTION 01 73 00 - EXECUTION

Page 10 of 12

4. Coordinate progress cleaning for joint-use areas where Contractor and other contractors are working concurrently.
- B. Site: Maintain Project site free of waste materials and debris.
 - C. Work Areas: Clean areas where Work is in progress to the level of cleanliness necessary for proper execution of the Work.
 1. Remove liquid spills promptly.
 2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
 - D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
 - E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
 - F. Exposed Surfaces: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
 - G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in Section 01 50 00 "Temporary Facilities and Controls."
 - H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
 - I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
 - J. Limiting Exposures: Supervise construction operations to ensure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.
- 3.9 STARTING AND ADJUSTING
- A. Coordinate startup and adjusting of equipment and operating components with requirements in Section 01 91 13 "General Commissioning Requirements."
 - B. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.

- C. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.
- D. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- E. Manufacturer's Field Service: Comply with qualification requirements in Section 01 40 00 "Quality Requirements."

3.10 PROTECTION AND REPAIR OF INSTALLED CONSTRUCTION

- A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.
- B. Repair Work previously completed and subsequently damaged during construction period. Repair to like-new condition.
- C. Protection of Existing Items: Provide protection and ensure that existing items to remain undisturbed by construction are maintained in condition that existed at commencement of the Work.
- D. Comply with manufacturer's written instructions for temperature and relative humidity.

END OF SECTION 01 73 00

SECTION 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for the following:
 - 1. Salvaging nonhazardous demolition and construction waste.
 - 2. Recycling nonhazardous demolition and construction waste.
 - 3. Disposing of nonhazardous demolition and construction waste.
- B. Related Requirements:
 - 1. Section 04 20 00 "Unit Masonry" for disposal requirements for masonry waste.
 - 2. Section 31 10 00 "Site Clearing" for disposition of waste resulting from site clearing and removal of above- and below-grade improvements.

1.3 DEFINITIONS

- A. Construction Waste: Building, structure, and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.
- B. Demolition Waste: Building, structure, and site improvement materials resulting from demolition operations.
- C. Disposal: Removal of demolition or construction waste and subsequent salvage, sale, recycling, or deposit in landfill, incinerator acceptable to authorities having jurisdiction, or designated spoil areas on Owner's property.
- D. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.
- E. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.
- F. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

SECTION 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

1.4 MATERIALS OWNERSHIP

- A. Unless otherwise indicated, demolition and construction waste becomes property of Contractor.
- B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.
 - 1. Carefully salvage in a manner to prevent damage and promptly return to Owner.

1.5 ACTION SUBMITTALS

- A. Waste Management Plan: Submit plan within 7 days of date established for commencement of the Work .

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For .

1.7 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with transportation and disposal regulations of authorities having jurisdiction.

1.8 WASTE MANAGEMENT PLAN

- A. General: Develop a waste management plan according to requirements in this Section. Plan shall consist of waste identification, waste reduction work plan, and cost/revenue analysis. Distinguish between demolition and construction waste. Indicate quantities by weight or volume, but use same units of measure throughout waste management plan.
- B. Waste Identification: Indicate anticipated types and quantities of demolition and construction waste generated by the Work. Use . Include estimated quantities and assumptions for estimates.
- C. Waste Reduction Work Plan: List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator. Use . Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.
 - 1. Salvaged Materials for Reuse: For materials that will be salvaged and reused in this Project, describe methods for preparing salvaged materials before

SECTION 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

- incorporation into the Work in compliance with Section 02 41 19 "Selective Demolition."
2. Salvaged Materials for Sale: For materials that will be sold to individuals and organizations, include list of their names, addresses, and telephone numbers.
 3. Salvaged Materials for Donation: For materials that will be donated to individuals and organizations, include list of their names, addresses, and telephone numbers.
 4. Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
 5. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.
 6. Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location where materials separation will be performed.
- D. Cost/Revenue Analysis: Indicate total cost of waste disposal as if there were no waste management plan and net additional cost or net savings resulting from implementing waste management plan. Use . Include the following:
1. Total quantity of waste.
 2. Estimated cost of disposal (cost per unit). Include transportation and tipping fees and cost of collection containers and handling for each type of waste.
 3. Total cost of disposal (with no waste management).
 4. Revenue from salvaged materials.
 5. Revenue from recycled materials.
 6. Savings in transportation and tipping fees by donating materials.
 7. Savings in transportation and tipping fees that are avoided.
 8. Handling and transportation costs. Include cost of collection containers for each type of waste.
 9. Net additional cost or net savings from waste management plan.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. General: Achieve end-of-Project rates for salvage/recycling of 50 percent by weight of total nonhazardous solid waste generated by the Work. Practice efficient waste management in the use of materials in the course of the Work. Use all reasonable means to divert construction and demolition waste from landfills and incinerators. Facilitate recycling and salvage of materials .
1. Demolition Waste:
 - a. Asphalt paving.
 - b. Concrete.
 - c. Concrete reinforcing steel.

SECTION 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

Page 3 of 9

- d. Brick.
- e. Concrete masonry units.
- f. Wood studs.
- g. Plywood and oriented strand board.
- h. Wood paneling.
- i. Wood trim.
- j. Structural and miscellaneous steel.
- k. Rough hardware.
- l. Roofing.
- m. Insulation.
- n. Doors and frames.
- o. Door hardware.
- p. Windows.
- q. Glazing.
- r. Metal studs.
- s. Gypsum board.
- t. Acoustical tile and panels.
- u. Carpet.
- v. Carpet pad.
- w. Demountable partitions.
- x. Equipment.
- y. Cabinets.
- z. Plumbing fixtures.
- aa. Piping.
- bb. Supports and hangers.
- cc. Valves.
- dd. Mechanical equipment.
- ee. Refrigerants.
- ff. Electrical conduit.
- gg. Copper wiring.
- hh. Lighting fixtures.
- ii. Lamps.
- jj. Ballasts.
- kk. Electrical devices.
- ll. Switchgear and panelboards.
- mm. Transformers.
- 2. Construction Waste:
 - a. Masonry and CMU.
 - b. Lumber.
 - c. Wood sheet materials.
 - d. Wood trim.
 - e. Metals.
 - f. Roofing.
 - g. Insulation.
 - h. Carpet and pad.
 - i. Gypsum board.
 - j. Piping.
 - k. Electrical conduit.

**SECTION 01 74 19 - CONSTRUCTION WASTE
MANAGEMENT AND DISPOSAL**

Page 4 of 9

- I. Packaging: Regardless of salvage/recycle goal indicated in "General" Paragraph above, salvage or recycle 100 percent of the following uncontaminated packaging materials:
 - 1) Paper.
 - 2) Cardboard.
 - 3) Boxes.
 - 4) Plastic sheet and film.
 - 5) Polystyrene packaging.
 - 6) Wood crates.
 - 7) Wood pallets.
 - 8) Plastic pails.
- m. Construction Office Waste: Regardless of salvage/recycle goal indicated in "General" Paragraph above, salvage or recycle 100 percent of the following construction office waste materials:
 - 1) Paper.
 - 2) Aluminum cans.
 - 3) Glass containers.

PART 3 - EXECUTION

3.1 PLAN IMPLEMENTATION

- A. General: Implement approved waste management plan. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.
 - 1. Comply with operation, termination, and removal requirements in Section 01 50 00 "Temporary Facilities and Controls."
- B. Waste Management Coordinator: Engage a waste management coordinator to be responsible for implementing, monitoring, and reporting status of waste management work plan.
- C. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work.
 - 1. Distribute waste management plan to everyone concerned within three days of submittal return.
 - 2. Distribute waste management plan to entities when they first begin work on-site. Review plan procedures and locations established for salvage, recycling, and disposal.
- D. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
 - 1. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged and recycled.

SECTION 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

2. Comply with Section 01 50 00 "Temporary Facilities and Controls" for controlling dust and dirt, environmental protection, and noise control.

3.2 SALVAGING DEMOLITION WASTE

- A. Comply with requirements in Section 02 41 19 "Selective Demolition" for salvaging demolition waste.
- B. Salvaged Items for Reuse in the Work: Salvage items for reuse and handle as follows:
 1. Clean salvaged items.
 2. Pack or crate items after cleaning. Identify contents of containers with label indicating elements, date of removal, quantity, and location where removed.
 3. Store items in a secure area until installation.
 4. Protect items from damage during transport and storage.
 5. Install salvaged items to comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make items functional for use indicated.
- C. Salvaged Items for Sale and Donation : Not permitted on Project site.
- D. Salvaged Items for Owner's Use: Salvage items for Owner's use and handle as follows:
 1. Clean salvaged items.
 2. Pack or crate items after cleaning. Identify contents of containers with label indicating elements, date of removal, quantity, and location where removed.
 3. Store items in a secure area until delivery to Owner.
 4. Protect items from damage during transport and storage.
- E. Doors and Hardware: Brace open end of door frames. Except for removing door closers, leave door hardware attached to doors.
- F. Equipment: Drain tanks, piping, and fixtures. Seal openings with caps or plugs. Protect equipment from exposure to weather.
- G. Plumbing Fixtures: Separate by type and size.
- H. Lighting Fixtures: Separate lamps by type and protect from breakage.
- I. Electrical Devices: Separate switches, receptacles, switchgear, transformers, meters, panelboards, circuit breakers, and other devices by type.

3.3 RECYCLING DEMOLITION AND CONSTRUCTION WASTE, GENERAL

- A. General: Recycle paper and beverage containers used by on-site workers.

SECTION 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

- B. Recycling Incentives: Revenues, savings, rebates, tax credits, and other incentives received for recycling waste materials shall be shared equally by Owner and Contractor.
- C. Preparation of Waste: Prepare and maintain recyclable waste materials according to recycling or reuse facility requirements. Maintain materials free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to the recycling process.
- D. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical according to approved construction waste management plan.
 - 1. Provide appropriately marked containers or bins for controlling recyclable waste until removed from Project site. Include list of acceptable and unacceptable materials at each container and bin.
 - a. Inspect containers and bins for contamination and remove contaminated materials if found.
 - 2. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
 - 3. Stockpile materials away from construction area. Do not store within drip line of remaining trees.
 - 4. Remove recyclable waste from Owner's property and transport to recycling receiver or processor as often as required to prevent overfilling bins.

3.4 RECYCLING DEMOLITION WASTE

- A. Asphalt Paving: Grind asphalt to maximum 1-1/2-inch size.
 - 1. Crush asphaltic concrete paving and screen to comply with requirements in Section 31 20 00 "Earth Moving" for use as general fill.
- B. Asphalt Paving: Break up and transport paving to asphalt-recycling facility.
- C. Concrete: Remove reinforcement and other metals from concrete and sort with other metals.
 - 1. Pulverize concrete to maximum 1-1/2-inch size.
 - 2. Crush concrete and screen to comply with requirements in Section 31 20 00 "Earth Moving" for use as satisfactory soil for fill or subbase.
- D. Masonry: Remove metal reinforcement, anchors, and ties from masonry and sort with other metals.
 - 1. Pulverize masonry to maximum 1-1/2-inch size.
 - a. Crush masonry and screen to comply with requirements in Section 31 20 00 "Earth Moving" for use as general fill .

SECTION 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

Page 7 of 9

- b. Crush masonry and screen to comply with requirements in Section 32 93 00 "Plants" for use as mineral mulch.
 2. Clean and stack undamaged, whole masonry units on wood pallets.
 - E. Wood Materials: Sort and stack members according to size, type, and length. Separate lumber, engineered wood products, panel products, and treated wood materials.
 - F. Metals: Separate metals by type.
 1. Structural Steel: Stack members according to size, type of member, and length.
 2. Remove and dispose of bolts, nuts, washers, and other rough hardware.
 - G. Asphalt Shingle Roofing: Separate organic and glass-fiber asphalt shingles and felts. Remove and dispose of nails, staples, and accessories.
 - H. Gypsum Board: Stack large clean pieces on wood pallets or in container and store in a dry location. Remove edge trim and sort with other metals. Remove and dispose of fasteners.
 - I. Acoustical Ceiling Panels and Tile: Stack large clean pieces on wood pallets and store in a dry location.
 - J. Metal Suspension System: Separate metal members, including trim and other metals from acoustical panels and tile, and sort with other metals.
 - K. Carpet and Pad: Roll large pieces tightly after removing debris, trash, adhesive, and tack strips.
 1. Store clean, dry carpet and pad in a closed container or trailer provided by carpet reclamation agency or carpet recycler.
 - L. Carpet Tile: Remove debris, trash, and adhesive.
 1. Stack tile on pallet and store clean, dry carpet in a closed container or trailer provided by carpet reclamation agency or carpet recycler.
 - M. Piping: Reduce piping to straight lengths and store by material and size. Separate supports, hangers, valves, sprinklers, and other components by material and size.
 - N. Conduit: Reduce conduit to straight lengths and store by material and size.
 - O. Lamps: Separate lamps by type and store according to requirements in 40 CFR 273.
- 3.5 RECYCLING CONSTRUCTION WASTE
- A. Packaging:
 1. Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.

**SECTION 01 74 19 - CONSTRUCTION WASTE
MANAGEMENT AND DISPOSAL**

2. Polystyrene Packaging: Separate and bag materials.
3. Pallets: As much as possible, require deliveries using pallets to remove pallets from Project site. For pallets that remain on-site, break down pallets into component wood pieces and comply with requirements for recycling wood.
4. Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.

B. Wood Materials:

1. Clean Cut-Offs of Lumber: Grind or chip into small pieces.
2. Clean Sawdust: Bag sawdust that does not contain painted or treated wood.
 - a. Comply with requirements in Section 32 93 00 "Plants" for use of clean sawdust as organic mulch.

C. Gypsum Board: Stack large clean pieces on wood pallets or in container and store in a dry location.

1. Clean Gypsum Board: Grind scraps of clean gypsum board using small mobile chipper or hammer mill. Screen out paper after grinding.
 - a. Comply with requirements in Section 32 93 00 "Plants" for use of clean ground gypsum board as inorganic soil amendment.

D. Paint: Seal containers and store by type.

3.6 DISPOSAL OF WASTE

A. General: Except for items or materials to be salvaged or recycled, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.

1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. Burning: Do not burn waste materials.

3.7 ATTACHMENTS

END OF SECTION 01 74 19

**SECTION 01 74 19 - CONSTRUCTION WASTE
MANAGEMENT AND DISPOSAL**

Page 9 of 9

SECTION 01 77 00 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for Contract closeout, including, but not limited to, the following:
 - 1. Substantial Completion procedures.
 - 2. Final completion procedures.
 - 3. Warranties.
 - 4. Final cleaning.
- B. Related Requirements:
 - 1. Section 01 29 00 "Payment Procedures" for requirements for Applications for Payment for Substantial Completion and Final Completion.
 - 2. Section 01 32 33 "Photographic Documentation" for submitting Final Completion construction photographic documentation.
 - 3. Section 01 78 23 "Operation and Maintenance Data" for additional operation and maintenance manual requirements.
 - 4. Section 01 78 39 "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.
 - 5. Section 01 79 00 "Demonstration and Training" for requirements to train the Owner's maintenance personnel to adjust, operate, and maintain products, equipment, and systems.

1.3 DEFINITIONS

- A. List of Incomplete Items: Contractor-prepared list of items to be completed or corrected, prepared for the Architect's use prior to Architect's inspection, to determine if the Work is substantially complete.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of cleaning agent.

SECTION 01 77 00 - CLOSEOUT PROCEDURES

- B. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.
- C. Certified List of Incomplete Items: Final submittal at Final Completion.

1.5 CLOSEOUT SUBMITTALS

- A. Certificates of Release: From authorities having jurisdiction.
- B. Certificate of Insurance: For continuing coverage.
- C. Field Report: For pest-control inspection.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Schedule of Maintenance Material Items: For maintenance material submittal items required by other Sections.

1.7 SUBSTANTIAL COMPLETION PROCEDURES

- A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's "punch list"), indicating the value of each item on the list and reasons why the Work is incomplete.
- B. Submittals Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
 - 1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction, permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
 - 2. Submit closeout submittals specified in other Division 01 Sections, including Project Record Documents, operation and maintenance manuals, damage or settlement surveys, property surveys, and similar final record information.
 - 3. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
 - 4. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Architect . Label with manufacturer's name and model number.
 - a. Schedule of Maintenance Material Items: Prepare and submit schedule of maintenance material submittal items, including name and quantity of each item and name and number of related Specification Section. Obtain Owner's signature for receipt of submittals.
 - 5. Submit testing, adjusting, and balancing records.
 - 6. Submit sustainable design submittals not previously submitted.

SECTION 01 77 00 - CLOSEOUT PROCEDURES

7. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
- C. Procedures Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
1. Advise Owner of pending insurance changeover requirements.
 2. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
 3. Complete startup and testing of systems and equipment.
 4. Perform preventive maintenance on equipment used prior to Substantial Completion.
 5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings specified in Section 01 79 00 "Demonstration and Training."
 6. Advise Owner of changeover in utility services.
 7. Participate with Owner in conducting inspection and walkthrough with local emergency responders.
 8. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
 9. Complete final cleaning requirements.
 10. Touch up paint and otherwise repair and restore marred exposed finishes to eliminate visual defects.
- D. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of 10 days prior to date the Work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.
1. Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
 2. Results of completed inspection will form the basis of requirements for Final Completion.
- 1.8 FINAL COMPLETION PROCEDURES
- A. Submittals Prior to Final Completion: Before requesting final inspection for determining Final Completion, complete the following:
1. Submit a final Application for Payment in accordance with Section 01 29 00 "Payment Procedures."
 2. Certified List of Incomplete Items: Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list),

SECTION 01 77 00 - CLOSEOUT PROCEDURES

endorsed and dated by Architect. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.

3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.
4. Submit pest-control final inspection report.
5. Submit Final Completion photographic documentation.

B. Inspection: Submit a written request for final inspection to determine acceptance a minimum of 10 days prior to date the Work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

1. Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.9 LIST OF INCOMPLETE ITEMS

A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.

1. Organize list of spaces in sequential order, starting with exterior areas first and proceeding from lowest floor to highest floor, listed by room or space number.
2. Organize items applying to each space by major element, including categories for ceilings, individual walls, floors, equipment, and building systems.
3. Include the following information at the top of each page:
 - a. Project name.
 - b. Date.
 - c. Name of Architect.
 - d. Name of Contractor.
 - e. Page number.
4. Submit list of incomplete items in the following format:
 - a. PDF Electronic File: Architect will return annotated file.

1.10 SUBMITTAL OF PROJECT WARRANTIES

A. Time of Submittal: Submit written warranties on request of Architect for designated portions of the Work where warranties are indicated to commence on dates other than date of Substantial Completion, or when delay in submittal of warranties might limit Owner's rights under warranty.

B. Partial Occupancy: Submit properly executed warranties within 15 days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with Contractor.

SECTION 01 77 00 - CLOSEOUT PROCEDURES

- C. Organize warranty documents into an orderly sequence based on the table of contents of Project Manual.
- D. Warranty Electronic File: Provide warranties and bonds in PDF format. Assemble complete warranty and bond submittal package into a single electronic PDF file with bookmarks enabling navigation to each item. Provide bookmarked table of contents at beginning of document.
 - 1. Submit by uploading to web-based project software site .
- E. Warranties in Paper Form:
 - 1. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.
 - 2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
 - 3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.
- F. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.
 - 1. Use cleaning products that comply with Green Seal's GS-37, or if GS-37 is not applicable, use products that comply with the California Code of Regulations maximum allowable VOC levels.

PART 3 - EXECUTION

3.1 FINAL CLEANING

- A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

SECTION 01 77 00 - CLOSEOUT PROCEDURES

Page 5 of 7

- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:
 - a. Clean Project site of rubbish, waste material, litter, and other foreign substances.
 - b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
 - c. Rake grounds that are not planted, mulched, or paved to a smooth, even-textured surface.
 - d. Remove tools, construction equipment, machinery, and surplus material from Project site.
 - e. Remove snow and ice to provide safe access to building.
 - f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
 - g. Remove debris and surface dust from limited-access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
 - h. Clean flooring, removing debris, dirt, and staining; clean according to manufacturer's recommendations.
 - i. Vacuum and mop concrete.
 - j. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean according to manufacturer's recommendations if visible soil or stains remain.
 - k. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Polish mirrors and glass, taking care not to scratch surfaces.
 - l. Remove labels that are not permanent.
 - m. Wipe surfaces of mechanical and electrical equipment and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
 - n. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
 - o. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
 - p. Clean ducts, blowers, and coils if units were operated without filters during construction or that display contamination with particulate matter on inspection.
 - 1) Clean HVAC system in compliance with Section 23 01 30.52 "Existing HVAC Air-Distribution System Cleaning." Provide written report on completion of cleaning.
 - q. Clean luminaires, lamps, globes, and reflectors to function with full efficiency.

SECTION 01 77 00 - CLOSEOUT PROCEDURES

- r. Clean strainers.
 - s. Leave Project clean and ready for occupancy.
- C. Pest Control: Comply with pest control requirements in Section 01 50 00 "Temporary Facilities and Controls." Prepare written report.
- D. Construction Waste Disposal: Comply with waste-disposal requirements in Section 01 74 19 "Construction Waste Management and Disposal."

3.2 REPAIR OF THE WORK

- A. Complete repair and restoration operations required by Section 01 73 00 "Execution" before requesting inspection for determination of Substantial Completion.

END OF SECTION 01 77 00

SECTION 01 77 00 - CLOSEOUT PROCEDURES

Page 7 of 7

SECTION 01 78 23 - OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
 - 1. Operation and maintenance documentation directory manuals.
 - 2. Emergency manuals.
 - 3. Systems and equipment operation manuals.
 - 4. Systems and equipment maintenance manuals.
 - 5. Product maintenance manuals.
- B. Related Requirements:
 - 1. Section 01 12 00 "Multiple Contract Summary" for coordinating operation and maintenance manuals covering the Work of multiple contracts.
 - 2. Section 01 33 00 "Submittal Procedures" for submitting copies of submittals for operation and maintenance manuals.
 - 3. Section 01 91 13 "General Commissioning Requirements" for verification and compilation of data into operation and maintenance manuals.

1.3 DEFINITIONS

- A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.
- B. Subsystem: A portion of a system with characteristics similar to a system.

1.4 CLOSEOUT SUBMITTALS

- A. Submit operation and maintenance manuals indicated. Provide content for each manual as specified in individual Specification Sections, and as reviewed and approved at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.

SECTION 01 78 23 - OPERATION AND MAINTENANCE DATA

1. Architect will comment on whether content of operation and maintenance submittals is acceptable.
 2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.
- B. Format: Submit operation and maintenance manuals in the following format:
1. Submit on digital media acceptable to Architect . Enable reviewer comments on draft submittals.
 2. Submit three paper copies. Architect will return two copies.
- C. Initial Manual Submittal: Submit draft copy of each manual at least 30 days before commencing demonstration and training. Architect will comment on whether general scope and content of manual are acceptable.
- D. Final Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least 15 days before commencing demonstration and training. Architect will return copy with comments.
1. Correct or revise each manual to comply with Architect's comments. Submit copies of each corrected manual within 15 days of receipt of Architect's comments and prior to commencing demonstration and training.
- E. Comply with Section 01 77 00 "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

1.5 FORMAT OF OPERATION AND MAINTENANCE MANUALS

- A. Manuals, Electronic Files: Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required.
1. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.
 2. File Names and Bookmarks: Bookmark individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel on opening file.
- B. Manuals, Paper Copy: Submit manuals in the form of hard-copy, bound and labeled volumes.
1. Binders: Heavy-duty, three-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold **8-1/2-by-11-inch** paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.

SECTION 01 78 23 - OPERATION AND MAINTENANCE DATA

Page 2 of 9

- a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
 - b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents, and indicate Specification Section number on bottom of spine. Indicate volume number for multiple-volume sets.
2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section of the manual. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.
 3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software storage media for computerized electronic equipment. Enclose title pages and directories in clear plastic sleeves.
 4. Supplementary Prepared on 8-1/2-by-11-inch white bond paper.
 5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.
 - a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
 - b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

1.6 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS

- A. Organization of Manuals: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:
 1. Title page.
 2. Table of contents.
 3. Manual contents.
- B. Title Page: Include the following information:
 1. Subject matter included in manual.
 2. Name and address of Project.
 3. Name and address of Owner.
 4. Date of submittal.
 5. Name and contact information for Contractor.
 6. Name and contact information for Architect.
 7. Name and contact information for Commissioning Authority.
 8. Names and contact information for major consultants to the Architect that designed the systems contained in the manuals.

SECTION 01 78 23 - OPERATION AND MAINTENANCE DATA

Page 3 of 9

9. Cross-reference to related systems in other operation and maintenance manuals.
- C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.
 1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.
 - D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.
 - E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."
- 1.7 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY MANUAL
- A. Operation and Maintenance Documentation Directory: Prepare a separate manual that provides an organized reference to emergency, operation, and maintenance manuals. List items and their location to facilitate ready access to desired information. Include the following:
 1. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.
 2. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.
 3. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.
- 1.8 EMERGENCY MANUALS
- A. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.
 - B. Content: Organize manual into a separate section for each of the following:
 1. Type of emergency.
 2. Emergency instructions.
 3. Emergency procedures.

**SECTION 01 78 23 - OPERATION AND
MAINTENANCE DATA**

- C. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:
1. Fire.
 2. Flood.
 3. Gas leak.
 4. Water leak.
 5. Power failure.
 6. Water outage.
 7. System, subsystem, or equipment failure.
 8. Chemical release or spill.
- D. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.
- E. Emergency Procedures: Include the following, as applicable:
1. Instructions on stopping.
 2. Shutdown instructions for each type of emergency.
 3. Operating instructions for conditions outside normal operating limits.
 4. Required sequences for electric or electronic systems.
 5. Special operating instructions and procedures.

1.9 SYSTEMS AND EQUIPMENT OPERATION MANUALS

- A. Systems and Equipment Operation Manual: Assemble a complete set of data indicating operation of each system, subsystem, and piece of equipment not part of a system. Include information required for daily operation and management, operating standards, and routine and special operating procedures.
1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
 2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.
- B. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:
1. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
 2. Performance and design criteria if Contractor has delegated design responsibility.
 3. Operating standards.
 4. Operating procedures.
 5. Operating logs.
 6. Wiring diagrams.

SECTION 01 78 23 - OPERATION AND MAINTENANCE DATA

Page 5 of 9

7. Control diagrams.
8. Piped system diagrams.
9. Precautions against improper use.
10. License requirements including inspection and renewal dates.

C. Descriptions: Include the following:

1. Product name and model number. Use designations for products indicated on Contract Documents.
2. Manufacturer's name.
3. Equipment identification with serial number of each component.
4. Equipment function.
5. Operating characteristics.
6. Limiting conditions.
7. Performance curves.
8. Engineering data and tests.
9. Complete nomenclature and number of replacement parts.

D. Operating Procedures: Include the following, as applicable:

1. Startup procedures.
2. Equipment or system break-in procedures.
3. Routine and normal operating instructions.
4. Regulation and control procedures.
5. Instructions on stopping.
6. Normal shutdown instructions.
7. Seasonal and weekend operating instructions.
8. Required sequences for electric or electronic systems.
9. Special operating instructions and procedures.

E. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.

F. Piped Systems: Diagram piping as installed, and identify color coding where required for identification.

1.10 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

A. Systems and Equipment Maintenance Manuals: Assemble a complete set of data indicating maintenance of each system, subsystem, and piece of equipment not part of a system. Include manufacturers' maintenance documentation, preventive maintenance procedures and frequency, repair procedures, wiring and systems diagrams, lists of spare parts, and warranty information.

1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.

**SECTION 01 78 23 - OPERATION AND
MAINTENANCE DATA**

- B. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranties and bonds as described below.
- C. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.
- D. Manufacturers' Maintenance Documentation: Include the following information for each component part or piece of equipment:
1. Standard maintenance instructions and bulletins; include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.
 - a. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.
 2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
 3. Identification and nomenclature of parts and components.
 4. List of items recommended to be stocked as spare parts.
- E. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:
1. Test and inspection instructions.
 2. Troubleshooting guide.
 3. Precautions against improper maintenance.
 4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
 5. Aligning, adjusting, and checking instructions.
 6. Demonstration and training video recording, if available.
- F. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.
1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
 2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.

**SECTION 01 78 23 - OPERATION AND
MAINTENANCE DATA**

- G. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.
 - H. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
 - 1. Include procedures to follow and required notifications for warranty claims.
 - I. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.
 - 1. Do not use original project record documents as part of maintenance manuals.
- 1.11 PRODUCT MAINTENANCE MANUALS
- A. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.
 - B. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.
 - C. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.
 - D. Product Information: Include the following, as applicable:
 - 1. Product name and model number.
 - 2. Manufacturer's name.
 - 3. Color, pattern, and texture.
 - 4. Material and chemical composition.
 - 5. Reordering information for specially manufactured products.
 - E. Maintenance Procedures: Include manufacturer's written recommendations and the following:
 - 1. Inspection procedures.
 - 2. Types of cleaning agents to be used and methods of cleaning.
 - 3. List of cleaning agents and methods of cleaning detrimental to product.
 - 4. Schedule for routine cleaning and maintenance.
 - 5. Repair instructions.

- F. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.
- G. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
 - 1. Include procedures to follow and required notifications for warranty claims.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 78 23

SECTION 01 78 39 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for Project Record Documents, including the following:
 - 1. Record Drawings.
 - 2. Record specifications.
 - 3. Record Product Data.
 - 4. Miscellaneous record submittals.
- B. Related Requirements:
 - 1. Section 01 12 00 "Multiple Contract Summary" for coordinating Project Record Documents covering the Work of multiple contracts.
 - 2. Section 01 73 00 "Execution" for final property survey.
 - 3. Section 01 77 00 "Closeout Procedures" for general closeout procedures.
 - 4. Section 01 78 23 "Operation and Maintenance Data" for operation and maintenance manual requirements.

1.3 CLOSEOUT SUBMITTALS

- A. Record Drawings: Comply with the following:
 - 1. Number of Copies: Submit one set(s) of marked-up record prints.
 - 2. Number of Copies: Submit copies of Record Drawings as follows:
 - a. Initial Submittal:
 - 1) Submit one paper-copy set(s) of marked-up record prints.
 - 2) Submit PDF electronic files of scanned record prints and one set(s) of file prints.
 - 3) Submit Record Digital Data Files and one set(s) of plots.
 - 4) Architect will indicate whether general scope of changes, additional information recorded, and quality of drafting are acceptable.
 - b. Final Submittal:
 - 1) Submit three paper-copy set(s) of marked-up record prints.

SECTION 01 78 39 - PROJECT RECORD DOCUMENTS

- 2) Submit PDF electronic files of scanned Record Prints and three set(s) of file prints.
 - 3) Print each drawing, whether or not changes and additional information were recorded.
- B. Record Specifications: Submit annotated PDF electronic files of Project's Specifications, including addenda and Contract modifications.
- C. Record Product Data: Submit annotated PDF electronic files and directories of each submittal.
1. Where record Product Data are required as part of operation and maintenance manuals, submit duplicate marked-up Product Data as a component of manual.
- D. Miscellaneous Record Submittals: See other Specification Sections for miscellaneous record-keeping requirements and submittals in connection with various construction activities. Submit annotated PDF electronic files and directories of each submittal.
- E. Reports: Submit written report weekly indicating items incorporated into Project Record Documents concurrent with progress of the Work, including revisions, concealed conditions, field changes, product selections, and other notations incorporated.
- 1.4 RECORD DRAWINGS
- A. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and revised drawings as modifications are issued.
1. Preparation: Mark record prints 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 record prints.
 - a. Give particular attention to 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.
 - e. Cross-reference record prints to corresponding photographic documentation.
 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.
 - d. Locations and depths of underground utilities.
 - e. Revisions to routing of piping and conduits.
 - f. Revisions to electrical circuitry.
 - g. Actual equipment locations.

**SECTION 01 78 39 - PROJECT RECORD
DOCUMENTS**

- h. Duct size and routing.
 - i. Locations of concealed internal utilities.
 - j. Changes made by Change Order or Construction Change Directive.
 - k. Changes made following Architect's written orders.
 - l. Details not on the original Contract Drawings.
 - m. Field records for variable and concealed conditions.
 - n. Record information on the Work that is shown only schematically.
 3. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.
 4. Mark record prints 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. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.
 - B. Record Digital Data Files: Immediately before inspection for Certificate of Substantial Completion, review marked-up record prints with Architect. When authorized, prepare a full set of corrected digital data files of the Contract Drawings, as follows:
 1. Format: Annotated PDF electronic file with comment function enabled.
 2. Incorporate changes and additional information previously marked on record prints. Delete, redraw, and add details and notations where applicable.
 3. Refer instances of uncertainty to Architect for resolution.
 4. Architect will furnish Contractor with one set of digital data files of the Contract Drawings for use in recording information.
 - a. See Section 01 31 00 "Project Management and Coordination" for requirements related to use of Architect's digital data files.
 - b. Architect will provide data file layer information. Record markups in separate layers.
 - C. Format: Identify and date each Record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.
 1. Record Prints: Organize record prints into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
 2. Format: Annotated PDF electronic file with comment function enabled.
 3. Record Digital Data Files: Organize digital data information into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sheet identification. Include identification in each digital data file.
 4. Identification: As follows:
 - a. Project name.
 - b. Date.
 - c. Designation "PROJECT RECORD DRAWINGS."
 - d. Name of Architect.
 - e. Name of Contractor.

**SECTION 01 78 39 - PROJECT RECORD
DOCUMENTS**

1.5 RECORD SPECIFICATIONS

- A. Preparation: Mark Specifications to indicate the actual product installation, where installation varies from that indicated in Specifications, addenda, and Contract modifications.
 - 1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 - 2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
 - 3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
 - 4. For each principal product, indicate whether Record Product Data has been submitted in operation and maintenance manuals instead of submitted as Record Product Data.
 - 5. Note related Change Orders , Record Product Data, and Record Drawings where applicable.
- B. Format: Submit record specifications as annotated PDF electronic file .

1.6 RECORD PRODUCT DATA

- A. Recording: Maintain one copy of each submittal during the construction period for Project Record Document purposes. Post changes and revisions to Project Record Documents as they occur; do not wait until end of Project.
- B. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.
 - 1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 - 2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
 - 3. Note related Change Orders , Record Specifications, and Record Drawings where applicable.
- C. Format: Submit Record Product Data as annotated PDF electronic file .
 - 1. Include Record Product Data directory organized by Specification Section number and title, electronically linked to each item of Record Product Data.

1.7 MISCELLANEOUS RECORD SUBMITTALS

- A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.

- B. Format: Submit miscellaneous record submittals as PDF electronic file .
 - 1. Include miscellaneous record submittals directory organized by Specification Section number and title, electronically linked to each item of miscellaneous record submittals.

1.8 MAINTENANCE OF RECORD DOCUMENTS

- A. Maintenance of Record Documents: Store Record Documents in the field office apart from the Contract Documents used for construction. Do not use Project Record Documents for construction purposes. Maintain Record Documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to Project Record Documents for Architect's reference during normal working hours.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 78 39

SECTION 01 78 39 - PROJECT RECORD DOCUMENTS

Page 5 of 5

SECTION 02 41 16 - STRUCTURE DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Demolition and removal of buildings and site improvements.
2. Removing below-grade construction.
3. Disconnecting, capping or sealing, and removing site utilities.

1.2 MATERIALS OWNERSHIP

- A. Unless otherwise indicated, demolition waste becomes property of Contractor.
- B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.
 1. Carefully salvage in a manner to prevent damage and promptly return to Owner.

1.3 PREINSTALLATION MEETINGS

- A. Predemolition Conference: Conduct conference at Project site .

1.4 INFORMATIONAL SUBMITTALS

- A. Engineering Survey: Submit engineering survey of condition of building.
- B. Proposed Protection Measures: Submit report, including Drawings, that indicates the measures proposed for protecting individuals and property , for environmental protection , for dust control and , for noise control. Indicate proposed locations and construction of barriers.
 1. Adjacent Buildings: Detail special measures proposed to protect adjacent buildings to remain including means of egress from those buildings.
- C. Schedule of building demolition activities with starting and ending dates for each activity.
- D. Predemolition photographs or video.

SECTION 02 41 16 - STRUCTURE DEMOLITION

- E. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician.

1.5 CLOSEOUT SUBMITTALS

1.6 QUALITY ASSURANCE

- A. Refrigerant Recovery Technician Qualifications: Certified by EPA-approved certification program.

1.7 FIELD CONDITIONS

- A. Buildings to be demolished will be vacated and their use discontinued before start of the Work.
- B. Buildings immediately adjacent to demolition area will be occupied. Conduct building demolition so operations of occupied buildings will not be disrupted.
 - 1. Provide not less than 72 hours' notice of activities that will affect operations of adjacent occupied buildings.
 - 2. Maintain access to existing walkways, exits, and other facilities used by occupants of adjacent buildings.
 - a. Do not close or obstruct walkways, exits, or other facilities used by occupants of adjacent buildings without written permission from authorities having jurisdiction.
- C. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
- D. On-site storage or sale of removed items or materials is not permitted.
- E. Arrange demolition schedule so as not to interfere with Owner's on-site operations .

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

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

SECTION 02 41 16 - STRUCTURE DEMOLITION

2.2 SOIL MATERIALS

- A. Satisfactory Soils: Comply with requirements in Section 31 20 00 "Earth Moving."

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that utilities have been disconnected and capped before starting demolition operations.
- B. Engage a professional engineer to perform an engineering survey of condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during building demolition operations.
- C. Inventory and record the condition of items to be removed and salvaged.

3.2 PREPARATION

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

3.3 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

- A. Existing Utilities to be Disconnected: Locate, identify, disconnect, and seal or cap off utilities serving buildings and structures to be demolished.
 - 1. Arrange to shut off utilities with utility companies.
 - 2. If removal, relocation, or abandonment of utility services will affect adjacent occupied buildings, then provide temporary utilities that bypass buildings and structures to be demolished and that maintain continuity of service to other buildings and structures.
 - 3. Cut off pipe or conduit a minimum of **24 inches** below grade. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing according to requirements of authorities having jurisdiction.
 - 4. Do not start demolition work until utility disconnecting and sealing have been completed and verified in writing.

3.4 PROTECTION

- A. Existing Facilities: Protect adjacent walkways, loading docks, building entries, and other building facilities during demolition operations. Maintain exits from existing buildings.

SECTION 02 41 16 - STRUCTURE DEMOLITION

- B. Temporary Shoring: Provide and maintain interior and exterior shoring, bracing, or structural support to preserve stability and prevent unexpected movement or collapse of construction being demolished.
- C. Existing Utilities to Remain: Maintain utility services to remain and protect from damage during demolition operations. Do not interrupt existing utilities serving adjacent occupied or operating facilities unless authorized in writing by Owner and authorities having jurisdiction.
- D. Temporary Protection: Erect temporary protection, such as walks, fences, railings, canopies, and covered passageways, where required by authorities having jurisdiction and as indicated. Comply with requirements in Section 01 50 00 "Temporary Facilities and Controls."
 - 1. Protect adjacent buildings and facilities from damage due to demolition activities.
 - 2. Protect existing site improvements, appurtenances, and landscaping to remain.
 - 3. Erect a plainly visible fence around drip line of individual trees or around perimeter drip line of groups of trees to remain.
 - 4. Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
 - 5. Provide protection to ensure safe passage of people around building demolition area and to and from occupied portions of adjacent buildings and structures.
 - 6. Protect walls, windows, roofs, and other adjacent exterior construction that are to remain and that are exposed to building demolition operations.
 - 7. Erect and maintain dustproof partitions and temporary enclosures to limit dust, noise, and dirt migration to occupied portions of adjacent buildings.
- E. Remove temporary barriers and protections where hazards no longer exist. Where open excavations or other hazardous conditions remain, leave temporary barriers and protections in place.

3.5 DEMOLITION

- A. General: Demolish indicated buildings and site improvements completely. Use methods required to complete the Work within limitations of governing regulations and as follows:
 - 1. Do not use cutting torches until work area is cleared of flammable materials. Maintain portable fire-suppression devices during flame-cutting operations.
 - 2. Maintain fire watch during and for at least 8 hours after flame-cutting operations.
 - 3. Maintain adequate ventilation when using cutting torches.
 - 4. Locate building demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
- B. Site Access and Temporary Controls: Conduct building demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

SECTION 02 41 16 - STRUCTURE DEMOLITION

1. Do not close or obstruct streets, walks, walkways, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed trafficways if required by authorities having jurisdiction.
 2. Use water mist and other suitable methods to limit spread of dust and dirt. Comply with governing environmental-protection regulations.
- C. Explosives: Use of explosives is not permitted.
- D. Proceed with demolition of structural framing members systematically, from higher to lower level. Complete building demolition operations above each floor or tier before disturbing supporting members on the next lower level.
- E. Remove debris from elevated portions of the building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
- F. Salvage: Items to be removed and salvaged are indicated on Drawings.
- G. Demolish foundation walls and other below-grade construction that are within footprint of new construction and extending **5 feet** <Insert dimension> outside footprint indicated for new construction outside footprint indicated for new construction.
1. Remove below-grade construction, including basements, foundation walls, and footings, completely .
- H. Existing Utilities: Demolish existing utilities and below-grade utility structures that are within **5 feet** outside footprint indicated for new construction. Abandon utilities outside this area.
- I. Hydraulic Elevator Systems: Demolish and remove elevator system, including cylinder, plunger, well assembly, steel well casing and liner, oil supply lines, and tanks.
- J. Below-Grade Areas: Completely fill below-grade areas and voids resulting from building demolition operations with satisfactory soil materials according to backfill requirements in Section 31 20 00 "Earth Moving."
- K. Site Grading: Uniformly rough grade area of demolished construction to a smooth surface, free from irregular surface changes. Provide a smooth transition between adjacent existing grades and new grades.
- L. Promptly repair damage to adjacent buildings caused by demolition operations.
- 3.6 CLEANING
- A. Remove demolition waste materials from Project site and dispose of them in an EPA-approved construction and demolition waste landfill acceptable to authorities having jurisdiction.
 - B. Do not burn demolished materials.

SECTION 02 41 16 - STRUCTURE DEMOLITION

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

END OF SECTION 02 41 16

SECTION 02 41 19 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

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

B. Related Requirements:

1. Section 01 10 00 "Summary" for restrictions on use of the premises, Owner-occupancy requirements, and phasing requirements.
2. Section 01 56 39 "Temporary Tree and Plant Protection" for temporary protection of existing trees and plants that are affected by selective demolition.
3. Section 01 73 00 "Execution" for cutting and patching procedures.
4. Section 01 35 16 "Alteration Project Procedures" for general protection and work procedures for alteration projects.
5. Section 31 10 00 "Site Clearing" for site clearing and removal of above- and below-grade improvements not part of selective demolition.

1.2 DEFINITIONS

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

1.3 MATERIALS OWNERSHIP

- A. Unless otherwise indicated, demolition waste becomes property of Contractor.
- B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items

SECTION 02 41 19 - SELECTIVE DEMOLITION

of interest or value to Owner that may be uncovered during demolition remain the property of Owner.

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

1.4 PREINSTALLATION MEETINGS

A. Predemolition Conference: Conduct conference at Project site .

1. Inspect and discuss condition of construction to be selectively demolished.
2. Review structural load limitations of existing structure.
3. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
4. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
5. Review areas where existing construction is to remain and requires protection.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For refrigerant recovery technician.

B. Engineering Survey: Submit engineering survey of condition of building.

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

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

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

E. Predemolition Photographs or Video: Show existing conditions of adjoining construction, including finish surfaces, that might be misconstrued as damage caused by salvage and demolition operations. Comply with Section 01 32 33 "Photographic Documentation." Submit before Work begins.

F. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was

SECTION 02 41 19 - SELECTIVE DEMOLITION

recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

1.6 CLOSEOUT SUBMITTALS

1.7 QUALITY ASSURANCE

- A. Refrigerant Recovery Technician Qualifications: Certified by an EPA-approved certification program.

1.8 FIELD CONDITIONS

- A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.
 - B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
 - C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.
 - D. Hazardous Materials: Present in buildings and structures to be selectively demolished. A report on the presence of hazardous materials is on file for review and use. Examine report to become aware of locations where hazardous materials are present.
 - 1. Hazardous material remediation is specified elsewhere in the Contract Documents.
 - 2. Do not disturb hazardous materials or items suspected of containing hazardous materials except under procedures specified elsewhere in the Contract Documents.
 - 3. Owner will provide material safety data sheets for suspected hazardous materials that are known to be present in buildings and structures to be selectively demolished because of building operations or processes performed there.
 - E. Storage or sale of removed items or materials on-site is not permitted.
 - F. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
 - 1. Maintain fire-protection facilities in service during selective demolition operations.
- 1.9 COORDINATION
- A. Arrange selective demolition schedule so as not to interfere with Owner's operations.

SECTION 02 41 19 - SELECTIVE DEMOLITION

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

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

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that utilities have been disconnected and capped before starting selective demolition operations.
- B. Review Project Record Documents of existing construction or other existing condition and hazardous material information provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in Project Record Documents.
- C. Engage a professional engineer to perform an engineering survey of condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during selective building demolition operations.
 - 1. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.
- D. Steel Tendons: Locate tensioned steel tendons and include recommendations for de-tensioning.
- E. Verify that hazardous materials have been remediated before proceeding with building demolition operations.
- F. Survey of Existing Conditions: Record existing conditions by use of preconstruction photographs or video .
 - 1. Inventory and record the condition of items to be removed and salvaged.
 - 2. Before selective demolition or removal of existing building elements that will be reproduced or duplicated in final Work, make permanent record of measurements, materials, and construction details required to make exact reproduction.

SECTION 02 41 19 - SELECTIVE DEMOLITION

3.2 PREPARATION

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

3.3 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

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

3.4 PROTECTION

- A. Temporary Protection: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
 - 1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
 - 2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
 - 3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.

SECTION 02 41 19 - SELECTIVE DEMOLITION

4. Cover and protect furniture, furnishings, and equipment that have not been removed.
 5. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Section 01 50 00 "Temporary Facilities and Controls."
- B. Temporary Shoring: Design, provide, and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.
1. Strengthen or add new supports when required during progress of selective demolition.
- C. Remove temporary barricades and protections where hazards no longer exist.

3.5 SELECTIVE DEMOLITION, GENERAL

- A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
 2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping. Temporarily cover openings to remain.
 3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
 4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
 5. Maintain fire watch during and for at least 8 hours after flame-cutting operations.
 6. Maintain adequate ventilation when using cutting torches.
 7. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
 8. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
 9. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
 10. Dispose of demolished items and materials promptly. Comply with requirements in Section 01 74 19 "Construction Waste Management and Disposal."
- B. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

SECTION 02 41 19 - SELECTIVE DEMOLITION

Page 6 of 8

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

3.6 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

- A. Concrete: Demolish in small sections. Using power-driven saw, cut concrete to a depth of at least **3/4 inch** at junctures with construction to remain. Dislodge concrete from reinforcement at perimeter of areas being demolished, cut reinforcement, and then remove remainder of concrete. Neatly trim openings to dimensions indicated.
- B. Concrete: Demolish in sections. Cut concrete full depth at junctures with construction to remain and at regular intervals using power-driven saw, and then remove concrete between saw cuts.
- C. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, and then remove masonry between saw cuts.
- D. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, and then break up and remove.
- E. Resilient Floor Coverings: Remove floor coverings and adhesive according to recommendations in RFCI's "Recommended Work Practices for the Removal of Resilient Floor Coverings."
- F. Roofing: Remove no more existing roofing than what can be covered in one day by new roofing and so that building interior remains watertight and weathertight. See Section 075552 for new roofing requirements.
 - 1. Remove existing roof membrane, flashings, copings, and roof accessories.
 - 2. Remove existing roofing system down to substrate.

3.7 DISPOSAL OF DEMOLISHED MATERIALS

- A. Remove demolition waste materials from Project site and dispose of them in an EPA-approved construction and demolition waste landfill acceptable to authorities having jurisdiction.
 - 1. Do not allow demolished materials to accumulate on-site.
 - 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
 - 3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
 - 4. Comply with requirements specified in Section 01 74 19 "Construction Waste Management and Disposal."

- B. Burning: Do not burn demolished materials.

3.8 CLEANING

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

END OF SECTION 02 41 19

SECTION 05 40 00 - COLD-FORMED METAL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Exterior non-load-bearing wall framing.
2. Interior non-load-bearing wall framing.
3. Soffit framing.

B. Related Requirements:

1. Section 05 50 00 "Metal Fabrications" for miscellaneous steel shapes, masonry shelf angles, and connections used with cold-formed metal framing.
2. Section 09 21 16.23 "Gypsum Board Shaft Wall Assemblies" for interior non-load-bearing, metal-stud-framed, shaft-wall assemblies, with height limitations.
3. Section 09 22 16 "Non-Structural Metal Framing" for standard, interior non-load-bearing, metal-stud framing, with height limitations and ceiling-suspension assemblies.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site .

1. .

1.3 ACTION SUBMITTALS

A. Product Data: For the following:

1. Cold-formed steel framing materials.
2. Exterior non-load-bearing wall framing.
3. Interior non-load-bearing wall framing.
4. Vertical deflection clips.
5. Single deflection track.
6. Double deflection track.
7. Drift clips.
8. Soffit framing.
9. Post-installed anchors.
10. Power-actuated anchors.

B. Shop Drawings:

SECTION 05 40 00 - COLD-FORMED METAL FRAMING

1. Include layout, spacings, sizes, thicknesses, and types of cold-formed steel framing; fabrication; and fastening and anchorage details, including mechanical fasteners.
2. Indicate reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining work.

C. Delegated Design Submittal: For cold-formed steel framing.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For testing agency.

B. Welding certificates.

C. Product Certificates: For each type of code-compliance certification for studs and tracks.

D. Product Test Reports: For each listed product, for tests performed by manufacturer and witnessed by a qualified testing agency .

1. Steel sheet.
2. Expansion anchors.
3. Power-actuated anchors.
4. Mechanical fasteners.
5. Vertical deflection clips.
6. Horizontal drift deflection clips
7. Miscellaneous structural clips and accessories.

1.5 QUALITY ASSURANCE

A. Testing Agency Qualifications: Qualified according to ASTM E329 for testing indicated.

B. Product Tests: Mill certificates or data from a qualified independent testing agency indicating steel sheet complies with requirements, including base-metal thickness, yield strength, tensile strength, total elongation, chemical requirements, and metallic-coating thickness.

C. Code-Compliance Certification of Studs and Tracks: Provide documentation that framing members are certified according to the product-certification program of the Steel Stud Manufacturers Association .

D. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
2. AWS D1.3/D1.3M, "Structural Welding Code - Sheet Steel."

SECTION 05 40 00 - COLD-FORMED METAL FRAMING

- E. Comply with AISI S230 "Standard for Cold-Formed Steel Framing - Prescriptive Method for One and Two Family Dwellings."

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Protect and store cold-formed steel framing from corrosion, moisture staining, deformation, and other damage during delivery, storage, and handling as required in AISI S202.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. **Manufacturers:** Subject to compliance with requirements, provide products by one of the following:
 1. ClarkDietrich.
 2. MarinoWARE.
 3. SCAFCO Steel Stud Company.
 4. Steel Network, Inc. (The).
 5. Steeler, Inc.

2.2 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 01 40 00 "Quality Requirements," to design cold-formed steel framing.
- B. Cold-Formed Steel Framing Standards: Unless more stringent requirements are indicated, framing complies with AISI S100 and ASTM C955 AISI S240.

2.3 COLD-FORMED STEEL FRAMING MATERIALS

- A. Framing Members, General: Comply with ASTM C955 AISI S240 for conditions indicated.
- B. Steel Sheet: ASTM A1003/A1003M, Structural Grade, Type H, metallic coated, of grade and coating designation as follows:
 1. Grade: As required by structural performance .
 2. Coating: G60 , A60 , AZ50 , or GF30 .
- C. Steel Sheet for Clips: ASTM A653/A653M, structural steel, zinc coated, of grade and coating as follows:
 1. Grade: .

SECTION 05 40 00 - COLD-FORMED METAL FRAMING

2. Coating: .

2.4 EXTERIOR NON-LOAD-BEARING WALL FRAMING

- A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:
 1. Minimum Base-Metal Thickness: 0.0538 inch .
 2. Flange Width: 1-5/8 inches .
 3. Section Properties: .
- B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges, and as follows:
 1. Minimum Base-Metal Thickness: 0.0538 inch .
 2. Flange Width: 1-1/4 inches .
- C. Vertical Deflection Clips, Exterior: Manufacturer's standard bypass clips, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. ClarkDietrich.
 - b. Marino\WARE.
 - c. SCAFCO Steel Stud Company.
 - d. Steel Network, Inc. (The).
 - e. Steeler, Inc.
- D. Single Deflection Track: Manufacturer's single, deep-leg, U-shaped steel track; unpunched, with unstiffened flanges, of web depth to contain studs while allowing free vertical movement, with flanges designed to support horizontal loads and transfer them to the primary structure, and as follows:
 1. Minimum Base-Metal Thickness: 0.0538 inch .
 2. Flange Width: 1 inch plus the design gap for one-story structures and 1 inch plus twice the design gap for other applications .
- E. Double Deflection Tracks: Manufacturer's double, deep-leg, U-shaped steel tracks, consisting of nested inner and outer tracks; unpunched, with unstiffened flanges.
 1. Outer Track: Of web depth to allow free vertical movement of inner track, with flanges designed to support horizontal loads and transfer them to the primary structure, and as follows:
 - a. Minimum Base-Metal Thickness: 0.0538 inch .
 - b. Flange Width: 1 inch plus the design gap for one-story structures and 1 inch plus twice the design gap for other applications .
 2. Inner Track: Of web depth indicated, and as follows:
 - a. Minimum Base-Metal Thickness: 0.0538 inch .

SECTION 05 40 00 - COLD-FORMED METAL FRAMING

b. Flange Width: .

- F. Drift Clips: Manufacturer's standard bypass or head clips, capable of isolating wall stud from upward and downward vertical displacement and lateral drift of primary structure through positive mechanical attachment to stud web and structure.

2.5 INTERIOR NON-LOAD-BEARING WALL FRAMING

- A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: 0.0538 inch .
2. Flange Width: 1-5/8 inches .
3. Section Properties: .

- B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: 0.0538 inch .
2. Flange Width: 1-1/4 inches .

- C. Vertical Deflection Clips, Interior: Manufacturer's standard bypass clips, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. ClarkDietrich.
 - b. Marino\WARE.
 - c. SCAFCO Steel Stud Company.
 - d. Steel Network, Inc. (The).
 - e. Steeler, Inc.

- D. Single Deflection Track: Manufacturer's single, deep-leg, U-shaped steel track; unpunched, with unstiffened flanges, of web depth to contain studs while allowing free vertical movement, with flanges designed to support horizontal loads and transfer them to the primary structure, and as follows:

1. Minimum Base-Metal Thickness: 0.0538 inch .
2. Flange Width: 1 inch plus the design gap for one-story structures and 1 inch plus twice the design gap for other applications .

- E. Double Deflection Tracks: Manufacturer's double, deep-leg, U-shaped steel tracks, consisting of nested inner and outer tracks; unpunched, with unstiffened flanges.

1. Outer Track: Of web depth to allow free vertical movement of inner track, with flanges designed to support horizontal loads and transfer them to the primary structure, and as follows:
 - a. Minimum Base-Metal Thickness: 0.0538 inch .

SECTION 05 40 00 - COLD-FORMED METAL FRAMING

- b. Flange Width: **1 inch** plus the design gap for one-story structures and **1 inch** plus twice the design gap for other applications .
 2. Inner Track: Of web depth indicated, and as follows:
 - a. Minimum Base-Metal Thickness: **0.0538 inch** .
 - b. Flange Width: .
- F. Drift Clips: Manufacturer's standard bypass or head clips, capable of isolating wall stud from upward and downward vertical displacement and lateral drift of primary structure through positive mechanical attachment to stud web and structure.

2.6 SOFFIT FRAMING

- A. Exterior Soffit Frame: Manufacturer's standard C-shaped steel sections, of web depths indicated, with stiffened flanges, and as follows:
 1. Minimum Base-Metal Thickness: **0.0428 inch** .
 2. Flange Width: **1-3/8 inches** , minimum.
 3. Section Properties: .

2.7 FRAMING ACCESSORIES

- A. Fabricate steel-framing accessories from ASTM A1003/A1003M, Structural Grade, Type H, metallic coated steel sheet, of same grade and coating designation used for framing members.
- B. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:
 1. Bracing, bridging, and solid blocking.
 2. Anchor clips.
 3. End clips.
 4. Joist hangers and end closures.

2.8 ANCHORS, CLIPS, AND FASTENERS

- A. Steel Shapes and Clips: ASTM A36/A36M, zinc coated by hot-dip process according to ASTM A123/A123M.
- B. Post-Installed Anchors: Fastener systems with bolts of same basic metal as fastened metal, if visible, unless otherwise indicated; with working capacity greater than or equal to the design load, according to an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC58 or ICC-ES AC308 as appropriate for the substrate.
 1. Uses: Securing cold-formed steel framing to structure.
 2. Type: or adhesive anchor.
 3. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B633 or **ASTM F1941**, Class Fe/Zn 5, unless otherwise indicated.

SECTION 05 40 00 - COLD-FORMED METAL FRAMING

4. Material for Exterior or Interior Locations and Where Stainless Steel Is Indicated: Alloy stainless steel bolts, **ASTM F593**, and nuts, **ASTM F594**.
- C. Power-Actuated Anchors: Fastener systems with working capacity greater than or equal to the design load, according to an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.
- D. Mechanical Fasteners: ASTM C1513, corrosion-resistant-coated, self-drilling, self-tapping, steel drill screws.
 1. Head Type: Low-profile head beneath sheathing; manufacturer's standard elsewhere.
- E. Welding Electrodes: Comply with AWS standards.

2.9 MISCELLANEOUS MATERIALS

- A. Galvanizing Repair Paint: ASTM A780/A780M MIL-P-21035B or SSPC-Paint 20.
- B. Shims: Load-bearing, high-density, multimonomer, nonleaching plastic; or cold-formed steel of same grade and metallic coating as framing members supported by shims.

2.10 FABRICATION

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

SECTION 05 40 00 - COLD-FORMED METAL FRAMING

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

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

- A. Before sprayed fire-resistive materials are applied, attach continuous angles, supplementary framing, or tracks to structural members indicated to receive sprayed fire-resistive materials.
- B. After applying sprayed fire-resistive materials, remove only as much of these materials as needed to complete installation of cold-formed framing without reducing thickness of fire-resistive materials below that required to obtain fire-resistance ratings indicated. Protect remaining fire-resistive materials from damage.
- C. Install load-bearing shims or grout between the underside of load-bearing wall bottom track and the top of foundation wall or slab at locations with a gap larger than **1/4 inch** to ensure a uniform bearing surface on supporting concrete or masonry construction.
- D. Install sill sealer gasket at the underside of wall bottom track or rim track and at the top of foundation wall or slab at stud or joist locations.
- E. Install sill sealer gasket/termite barrier in accordance with manufacturer's written instructions at the underside of wall bottom track or rim track and at the top of foundation wall or slab at stud or joist locations.

3.3 INSTALLATION, GENERAL

- A. Cold-formed steel framing may be shop or field fabricated for installation, or it may be field assembled.
- B. Install cold-formed steel framing according to AISI S200, AISI S202, and manufacturer's written instructions unless more stringent requirements are indicated.

SECTION 05 40 00 - COLD-FORMED METAL FRAMING

- C. Install shop- or field-fabricated, cold-formed framing and securely anchor to supporting structure.
 - 1. Screw, bolt, or weld wall panels at horizontal and vertical junctures to produce flush, even, true-to-line joints with maximum variation in plane and true position between fabricated panels not exceeding **1/16 inch**.
 - D. Install cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened.
 - 1. Cut framing members by sawing or shearing; do not torch cut.
 - 2. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, or riveting. Wire tying of framing members is not permitted.
 - a. Comply with AWS D1.3/D1.3M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
 - b. Locate mechanical fasteners, install according to Shop Drawings, and comply with requirements for spacing, edge distances, and screw penetration.
 - E. Install framing members in one-piece lengths unless splice connections are indicated for track or tension members.
 - F. Install temporary bracing and supports to secure framing and support loads equal to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.
 - G. Do not bridge building expansion joints with cold-formed steel framing. Independently frame both sides of joints.
 - H. Install insulation, specified in Section 07 21 00 "Thermal Insulation," in framing-assembly members, such as headers, sills, boxed joists, and multiple studs at openings, that are inaccessible on completion of framing work.
 - I. Fasten hole-reinforcing plate over web penetrations that exceed size of manufacturer's approved or standard punched openings.
- 3.4 INSTALLATION OF EXTERIOR NONLOADBEARING WALL FRAMING
- A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure.
 - B. Fasten both flanges of studs to top and bottom track unless otherwise indicated. Space studs as follows:
 - 1. Stud Spacing: As indicated on Drawings .

**SECTION 05 40 00 - COLD-FORMED METAL
FRAMING**

- C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar requirements.
- D. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.
 - 1. Install single deep-leg deflection tracks and anchor to building structure.
 - 2. Install double deep-leg deflection tracks and anchor outer track to building structure.
 - 3. Connect vertical deflection clips to bypassing studs and anchor to building structure.
 - 4. Connect drift clips to cold-formed steel framing and anchor to building structure.
- E. Install horizontal bridging in wall studs, spaced vertically in rows indicated on Shop Drawings but not more than **48 inches** apart. Fasten at each stud intersection.
 - 1. Channel Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs.
 - 2. Strap Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
 - 3. Bar Bridging: Proprietary bridging bars installed according to manufacturer's written instructions.
- F. Top Bridging for Single Deflection Track: Install row of horizontal bridging within **12 inches** of single deflection track. Install a combination of bridging and stud or stud-track solid blocking of width and thickness matching studs, secured to stud webs or flanges.
 - 1. Install solid blocking at centers indicated on Shop Drawings.
- G. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

3.5 INSTALLATION OF INTERIOR NONLOADBEARING WALL FRAMING

- A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure.
- B. Fasten both flanges of studs to top and bottom track unless otherwise indicated. Space studs as follows:
 - 1. Stud Spacing: As indicated on Drawings .
- C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar requirements.

SECTION 05 40 00 - COLD-FORMED METAL FRAMING

- D. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.
1. Install single deep-leg deflection tracks and anchor to building structure.
 2. Install double deep-leg deflection tracks and anchor outer track to building structure.
 3. Connect vertical deflection clips to studs and anchor to building structure.
 4. Connect drift clips to cold-formed steel metal framing and anchor to building structure.
- E. Install horizontal bridging in wall studs, spaced vertically in rows indicated on Shop Drawings but not more than **48 inches** apart. Fasten at each stud intersection.
1. Channel Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs.
 2. Strap Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
 3. Bar Bridging: Proprietary bridging bars installed according to manufacturer's written instructions.
- F. Top Bridging for Single Deflection Track: Install row of horizontal bridging within **12 inches** of single deflection track. Install a combination of bridging and stud or stud-track solid blocking of width and thickness matching studs, secured to stud webs or flanges.
1. Install solid blocking at centers indicated on Shop Drawings.
- G. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

3.6 INSTALLATION OF JOIST FRAMING

- A. Install perimeter joist track sized to match joists. Align and securely anchor or fasten track to supporting structure at corners, ends, and spacings indicated on Shop Drawings.
- B. Install joists bearing on supporting frame, level, straight, and plumb; adjust to final position, brace, and reinforce. Fasten joists to both flanges of joist track.
1. Install joists over supporting frame with a minimum end bearing of **1-1/2 inches**.
 2. Reinforce ends and bearing points of joists with web stiffeners, end clips, joist hangers, steel clip angles, or steel-stud sections.
- C. Space joists not more than **2 inches** from abutting walls, and as follows:
1. Joist Spacing: As indicated on Drawings .

SECTION 05 40 00 - COLD-FORMED METAL FRAMING

- D. Frame openings with built-up joist headers, consisting of joist and joist track or another combination of connected joists if indicated.
- E. Install bridging at intervals indicated on Shop Drawings. Fasten bridging at each joist intersection as follows:
 - 1. Joist-Track Solid Bridging: Joist-track solid blocking of width and thickness indicated, secured to joist webs.
- F. Secure joists to load-bearing interior walls to prevent lateral movement of bottom flange.
- G. Install miscellaneous joist framing and connections, including web stiffeners, closure pieces, clip angles, continuous angles, hold-down angles, anchors, and fasteners, to provide a complete and stable joist-framing assembly.

3.7

3.8 INSTALLATION TOLERANCES

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

3.9 REPAIR

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed steel framing with galvanized repair paint according to ASTM A780/A780M and manufacturer's written instructions.

3.10 FIELD QUALITY CONTROL

- A. Testing: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Field and shop welds will be subject to testing and inspecting.
- C. Testing agency will report test results promptly and in writing to Contractor and Architect.
- D. Cold-formed steel framing will be considered defective if it does not pass tests and inspections.

SECTION 05 40 00 - COLD-FORMED METAL FRAMING

- E. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.11 PROTECTION

- A. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that cold-formed steel framing is without damage or deterioration at time of Substantial Completion.

END OF SECTION 05 40 00

SECTION 06 10 53 - MISCELLANEOUS ROUGH CARPENTRY

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. Wood blocking and nailers.
2. Wood furring.

- B. Related Requirements:

1. Section 06 16 00 "Sheathing" for sheathing, subflooring, and underlayment.
2. Section 06 17 53 "Shop-Fabricated Wood Trusses" for wood trusses made from dimension lumber.
3. Section 31 31 16 "Termite Control" for site application of borate treatment to wood framing.

1.3 DEFINITIONS

- A. Boards or Strips: Lumber of less than **2 inches nominal** size in least dimension.
- B. Dimension Lumber: Lumber of **2 inches nominal** or greater size but less than **5 inches nominal** size in least dimension.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
 1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
 2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements.

SECTION 06 10 53 - MISCELLANEOUS ROUGH CARPENTRY

Include physical properties of treated materials based on testing by a qualified independent testing agency.

3. For fire-retardant treatments, include physical properties of treated lumber both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D5664.
4. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.

1.5 INFORMATIONAL SUBMITTALS

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

1. Preservative-treated wood.
2. Fire-retardant-treated wood.
3. Power-driven fasteners.
4. Post-installed anchors.
5. Metal framing anchors.

1.6 QUALITY ASSURANCE

- ### A. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant-treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

1.7 DELIVERY, STORAGE, AND HANDLING

- ### A. Stack lumber flat with spacers beneath and between each bundle to provide air circulation. Protect lumber from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

- #### A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
1. Factory mark each piece of lumber with grade stamp of grading agency.
 2. For exposed lumber indicated to receive a stained or natural finish, mark grade stamp on end or back of each piece .

SECTION 06 10 53 - MISCELLANEOUS ROUGH CARPENTRY

3. Dress lumber, S4S, unless otherwise indicated.

B. Maximum Moisture Content of Lumber: 19 percent unless otherwise indicated.

2.2 MISCELLANEOUS LUMBER

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

1. Blocking.
2. Nailers.

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

1. Mixed southern pine or southern pine; SPIB.

C. For blocking not used for attachment of other construction, Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.

D. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.

E. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.

2.3 FASTENERS

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

1. Where carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners of Type 304 stainless steel.

B. Nails, Brads, and Staples: ASTM F1667.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

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

SECTION 06 10 53 - MISCELLANEOUS ROUGH CARPENTRY

- B. Set carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit carpentry accurately to other construction. Locate furring, nailers, blocking, and similar supports to comply with requirements for attaching other construction.
- C. Install plywood backing panels by fastening to studs; coordinate locations with utilities requiring backing panels. Install fire-retardant-treated plywood backing panels with classification marking of testing agency exposed to view.
- D. Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.
- E. Do not splice structural members between supports unless otherwise indicated.
- F. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.
 - 1. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than **16 inches** o.c.
- G. Provide fire blocking in furred spaces, stud spaces, and other concealed cavities as indicated and as follows:
 - 1. Fire block furred spaces of walls, at each floor level, at ceiling, and at not more than **96 inches** o.c. with solid wood blocking or noncombustible materials accurately fitted to close furred spaces.
 - 2. Fire block concealed spaces of wood-framed walls and partitions at each floor level, at ceiling line of top story, and at not more than **96 inches** o.c. Where fire blocking is not inherent in framing system used, provide closely fitted solid wood blocks of same width as framing members and **2-inch nominal** thickness.
 - 3. Fire block concealed spaces between floor sleepers with same material as sleepers to limit concealed spaces to not more than **100 sq. ft.** and to solidly fill space below partitions.
 - 4. Fire block concealed spaces behind combustible cornices and exterior trim at not more than **20 feet** o.c.
- H. Sort and select lumber so that natural characteristics do not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
- I. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.
 - 1. Use inorganic boron for items that are continuously protected from liquid water.
 - 2. Use copper naphthenate for items not continuously protected from liquid water.
- J. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.

**SECTION 06 10 53 - MISCELLANEOUS ROUGH
CARPENTRY**

- K. Securely attach carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
 - 1. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.
 - 2. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in ICC's International Residential Code for One- and Two-Family Dwellings.
 - 3. ICC-ES evaluation report for fastener.
- L. Use steel common nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood. Drive nails snug but do not countersink nail heads unless otherwise indicated.

3.2 INSTALLATION OF WOOD BLOCKING AND NAILER

- A. Install where indicated and where required for screeding or attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.
- B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces unless otherwise indicated.
- C. Provide permanent grounds of dressed, pressure-preservative-treated, key-beveled lumber not less than 1-1/2 inches wide and of thickness required to bring face of ground to exact thickness of finish material. Remove temporary grounds when no longer required.

3.3 PROTECTION

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

END OF SECTION 06 10 53

SECTION 06 10 53 - MISCELLANEOUS ROUGH CARPENTRY

Page 5 of 5

SECTION 06 16 00 - SHEATHING

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. Wall sheathing.
2. Roof sheathing.
3. Parapet sheathing.
4. Sheathing joint and penetration treatment.

- B. Related Requirements:

1. Section 06 10 53 "Miscellaneous Rough Carpentry" for plywood backing panels.
2. Section 07 25 00 "Weather Barriers" for water-resistive barrier applied over wall sheathing.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site .

1. Review air-barrier and water-resistant glass-mat gypsum sheathing requirements and installation, special details, transitions, mockups, air-leakage testing, protection, and work scheduling that covers air-barrier and water-resistant glass-mat gypsum sheathing.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1. Include data for wood-preserved treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements. Indicate type of preservative used and net amount of preservative retained.

SECTION 06 16 00 - SHEATHING

2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements. Include physical properties of treated materials.
 3. For fire-retardant treatments, include physical properties of treated plywood both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D5516.
 4. For products receiving waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
 5. For air-barrier and water-resistant glass-mat gypsum sheathing, include manufacturer's technical data and tested physical and performance properties of products.
- B. Shop Drawings: For air-barrier and water-resistant glass-mat gypsum sheathing assemblies.
1. Show locations and extent of sheathing, accessories, and assemblies specific to Project conditions.
 2. Include details for sheathing joints and cracks, counterflashing strips, penetrations, inside and outside corners, terminations, and tie-ins with adjoining construction.
 3. Include details of interfaces with other materials that form part of air barrier.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer. including list of ABAA-certified installers and supervisors employed by Installer, who work on Project and testing and inspecting agency.
- B. Product Certificates: From air-barrier and water-resistant glass-mat gypsum sheathing manufacturer, certifying compatibility of sheathing accessory materials with Project materials that connect to or that come in contact with the sheathing.
- C. Product Test Reports: For each air-barrier and water-resistant glass-mat gypsum sheathing assembly, indicating compliance with specified requirements, for tests performed by a qualified testing agency.
- D. Evaluation Reports: For the following, from ICC-ES:
1. Wood-preservative-treated plywood.
 2. Fire-retardant-treated plywood.
 3. Foam-plastic sheathing.
 4. Air-barrier and water-resistant glass-mat gypsum sheathing.
- E. Field quality-control reports.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer of air-barrier and water-resistant glass-mat gypsum sheathing.
 - 1. Installer shall be licensed by ABAA according to ABAA's Quality Assurance Program and shall employ ABAA-certified installers and supervisors on Project.
- B. Mockups: Build mockups to set quality standards for materials and execution.
 - 1. Build integrated mockups of exterior wall assembly as indicated on Drawings , incorporating backup wall construction, window, storefront, door frame and sill, ties and other penetrations, and flashing to demonstrate crack and joint treatment and sealing of gaps, terminations, and penetrations of air-barrier sheathing assembly.
 - a. Coordinate construction of mockups to permit inspection and testing of sheathing before external insulation and cladding are installed.
 - b. Include junction with roofing membrane , building corner condition, and foundation wall intersection.
 - c. If Architect determines mockups do not comply with requirements, reconstruct mockups until mockups are approved.
 - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- C. Testing Agency Qualifications:
 - 1. For testing agency providing classification marking for fire-retardant-treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.
 - 2. For testing and inspecting agency providing tests and inspections related to air-barrier and water-resistant glass-mat gypsum sheathing: an independent agency, qualified according to ASTM E329 for testing indicated, and certified by Air Barrier Association of America, Inc.

1.7 PRECONSTRUCTION TESTING

- A. Preconstruction Testing Service: Owner will engage a qualified testing agency to perform preconstruction testing on field mockups.
- B. Mockup Testing: Air-barrier and water-resistant glass-mat gypsum sheathing assemblies shall comply with performance requirements indicated, as evidenced by reports based on mockup testing by a qualified testing agency.

1. Air-Leakage-Location Testing: Mockups will be tested for evidence of air leakage according to ASTM E1186, chamber depressurization with detection liquids .
2. Air-Leakage-Volume Testing: Mockups will be tested for air-leakage rate according to ASTM E783 or ASTM E2357.
3. Notify Architect seven days in advance of the dates and times when mockups will be tested.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Stack panels flat with spacers beneath and between each bundle to provide air circulation. Protect sheathing from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Air-Barrier and Water-Resistant Glass-Mat Gypsum Sheathing Performance: Air-barrier and water-resistant glass-mat gypsum sheathing assembly, and seals with adjacent construction, shall be capable of performing as a continuous air barrier and as a liquid-water drainage plane flashed to discharge to the exterior incidental condensation or water penetration. Air-barrier assemblies shall be capable of accommodating substrate movement and of sealing substrate expansion and control joints, construction material changes, penetrations , tie-ins to other installed air barriers, and transitions at perimeter conditions without deterioration and air leakage exceeding specified limits.

2.2 WALL SHEATHING

- A. Glass-Mat Gypsum Sheathing: ASTM C1177/C1177M.
 1. **Manufacturers:** Subject to compliance with requirements, provide products by one of the following:
 - a. Certainteed; SAINT-GOBAIN.
 - b. National Gypsum Company.
 - c. USG Corporation.
 2. Type and Thickness: Type X, **5/8 inch** thick.
 3. Size: **48 by 96 inches** for vertical installation.
- B. Air-Barrier and Water-Resistant Glass-Mat Gypsum Sheathing: ASTM C1177/C1177M, Type X, coated fiberglass mat gypsum sheathing with integral weather-resistant barrier and air barrier complying with ASTM E2178.
 1. **Manufacturers:** Subject to compliance with requirements, provide products by the following:
 - a. USG Corporation.
 2. Thickness: **5/8 inch** thick.

SECTION 06 16 00 - SHEATHING

3. Size: 48 by 96 inches for vertical installation.
4. Edges: Square.
5. Flashing and Transitions Strips: As acceptable to sheathing manufacturer.
6. Air Permeance: Maximum 0.004 cfm/sq. ft. of surface area at 1.57-lbf/sq. ft. pressure difference when tested according to ASTM E2178.
7. Vapor Permeance: Minimum 20 perms when tested according to ASTM E96/E96M, Desiccant Method, Procedure A.
8. Sheathing Assembly Air Leakage: Maximum 0.04 cfm/sq. ft. of surface area at 1.57 lbf/sq. ft. (0.2 L/s x sq. m of surface area at 75 Pa) when tested according to ASTM E2357.
9. Fire Propagation Characteristics: Complies with NFPA 285 testing as part of an approved assembly.
10. UV Resistance: Can be exposed to sunlight for 90 days according to manufacturer's written instructions.
11. Provide primers, transition strips, termination strips, joint reinforcing fabric and strips, joint sealants, counterflashing strips, flashing sheets and metal termination bars, termination mastic, substrate patching materials, adhesives, tapes, foam sealants, lap sealants, and other accessory materials that are recommended in writing by sheathing manufacturer to produce a complete air-barrier assembly and that are compatible with primary air-barrier material and adjacent construction to which they may seal.

2.3 ROOF SHEATHING

2.4 PARAPET SHEATHING

A. Glass-Mat Gypsum Sheathing: ASTM C1177/C1177M.

1. **Manufacturers:** Subject to compliance with requirements, undefined:
 - a. Certainteed; SAINT-GOBAIN.
 - b. National Gypsum Company.
 - c. USG Corporation.
2. Type and Thickness: Type X, 5/8 inch thick.
3. Size: 48 by 96 inches for vertical installation.

2.5 FASTENERS

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

1. For roof parapet and wall sheathing, provide fasteners with hot-dip zinc coating complying with ASTM A153/A153M .

B. Nails, Brads, and Staples: ASTM F1667.

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

SECTION 06 16 00 - SHEATHING

- D. Screws for Fastening Gypsum Sheathing to Cold-Formed Metal Framing: Steel drill screws, in length recommended by sheathing manufacturer for thickness of sheathing to be attached.
 - 1. For steel framing less than 0.0329 inch thick, use screws that comply with ASTM C1002.
 - 2. For steel framing from 0.033 to 0.112 inch thick, use screws that comply with ASTM C954.
- E. Screws for Fastening Composite Nail Base Insulated Roof Sheathing to Metal Roof Deck: Steel drill screws, in type and length recommended by sheathing manufacturer for thickness of sheathing to be attached, with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B117. Provide washers or plates if recommended by sheathing manufacturer.

2.6 SHEATHING JOINT-AND-PENETRATION TREATMENT MATERIALS

- A. Sealant for Glass-Mat Gypsum Sheathing: Elastomeric, medium-modulus, neutral-curing silicone joint sealant compatible with joint substrates formed by gypsum sheathing and other materials, recommended by sheathing manufacturer for application indicated and complying with requirements for elastomeric sealants specified in Section 07 92 00 "Joint Sealants."
- B. Sealant for Glass-Mat Gypsum Sheathing: Silicone emulsion sealant complying with ASTM C834, compatible with sheathing tape and sheathing and recommended by tape and sheathing manufacturers for use with glass-fiber sheathing tape and for covering exposed fasteners.
 - 1. Sheathing Tape: Self-adhering glass-fiber tape, minimum 2 inches wide, 10 by 10 or 10 by 20 threads/inch , of type recommended by sheathing and tape manufacturers for use with silicone emulsion sealant in sealing joints in glass-mat gypsum sheathing and with a history of successful in-service use.

2.7 MISCELLANEOUS MATERIALS

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement. Arrange joints so that pieces do not span between fewer than three support members.
- B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction unless otherwise indicated.

- C. Securely attach to substrate by fastening as indicated, complying with the following:
 - 1. Table 2304.9.1, "Fastening Schedule," in the ICC's International Building Code.
 - 2. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in the ICC's International Residential Code for One- and Two-Family Dwellings.
 - 3. ICC-ES evaluation report for fastener.
- D. Use common wire nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections. Install fasteners without splitting wood.
- E. Coordinate wall parapet and roof sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.
- F. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.
- G. Coordinate sheathing installation with installation of materials installed over sheathing so sheathing is not exposed to precipitation or left exposed at end of the workday when rain is forecast.

3.2 GYPSUM SHEATHING INSTALLATION

- A. Comply with GA-253 and with manufacturer's written instructions.
 - 1. Fasten gypsum sheathing to wood framing with screws.
 - 2. Fasten gypsum sheathing to cold-formed metal framing with screws.
 - 3. Install panels with a **3/8-inch** gap where non-load-bearing construction abuts structural elements.
 - 4. Install panels with a **1/4-inch** gap where they abut masonry or similar materials that might retain moisture, to prevent wicking.
- B. Apply fasteners so heads bear tightly against face of sheathing, but do not cut into facing.
- C. Horizontal Installation: Install sheathing with V-grooved edge down and tongue edge up. Interlock tongue with groove to bring long edges in contact with edges of adjacent panels without forcing. Abut ends over centers of studs, and stagger end joints of adjacent panels not less than one stud spacing. Attach at perimeter and within field of panel to each stud.
 - 1. Space fasteners approximately **8 inches** o.c. and set back a minimum of **3/8 inch** from edges and ends of panels.
 - 2. For sheathing under stucco cladding, panels may be initially tacked in place with screws if overlying self-furring metal lath is screw-attached through sheathing to studs immediately after sheathing is installed.

SECTION 06 16 00 - SHEATHING

Page 7 of 10

- D. Vertical Installation: Install vertical edges centered over studs. Abut ends and edges with those of adjacent panels. Attach at perimeter and within field of panel to each stud.
1. Space fasteners approximately **8 inches** o.c. and set back a minimum of **3/8 inch** from edges and ends of panels.
 2. For sheathing under stucco cladding, panels may be initially tacked in place with screws if overlying self-furring metal lath is screw-attached through sheathing to studs immediately after sheathing is installed.
- E. Seal sheathing joints according to sheathing manufacturer's written instructions.
1. Apply elastomeric sealant to joints and fasteners and trowel flat. Apply sufficient amount of sealant to completely cover joints and fasteners after troweling. Seal other penetrations and openings.
 2. Apply glass-fiber sheathing tape to glass-mat gypsum sheathing joints and apply and trowel sealant to embed entire face of tape in sealant. Apply sealant to exposed fasteners with a trowel so fasteners are completely covered. Seal other penetrations and openings.
- F. Air-Barrier and Water-Resistant Glass-Mat Gypsum Sheathing:
1. Install accessory materials according to sheathing manufacturer's written instructions and details to form a seal with adjacent construction, to seal fasteners, and ensure continuity of air and water barrier.
 - a. Coordinate the installation of sheathing with installation of roofing membrane and base flashing to ensure continuity of air barrier with roofing membrane.
 - b. Install transition strip on roofing membrane or base flashing, so that a minimum of **3 inches** of coverage is achieved over each substrate.
 2. Connect and seal sheathing material continuously to air barriers specified under other Sections as well as to roofing-membrane air barrier, concrete below-grade structures, floor-to-floor construction, exterior glazing and window systems, glazed curtain-wall systems, storefront systems, exterior louvers, exterior door framing, and other construction used in exterior wall openings, using accessory materials.
 3. Apply joint sealants forming part of air-barrier assembly within manufacturer's recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.
 4. Wall Openings: Prime concealed, perimeter frame surfaces of windows, curtain walls, storefronts, and doors. Apply transition strip, so that a minimum of **3 inches** of coverage is achieved over each substrate. Maintain **3 inches** of full contact over firm bearing to perimeter frames, with not less than **1 inch** of full contact.
 - a. Transition Strip: Roll firmly to enhance adhesion.
 - b. Preformed Silicone Extrusion: Set in full bed of silicone sealant applied to walls, frame, and air-barrier material.
 5. Fill gaps in perimeter frame surfaces of windows, curtain walls, storefronts, doors, and miscellaneous penetrations of sheathing material with foam sealant.

SECTION 06 16 00 - SHEATHING

Page 8 of 10

6. Seal strips and transition strips around masonry reinforcing or ties and penetrations with termination mastic.
7. Seal top of through-wall flashings to sheathing with an additional 6-inch- wide, transition strip.
8. Seal exposed edges of strips at seams, cuts, penetrations, and terminations not concealed by metal counterflashings or ending in reglets with termination mastic.
9. Repair punctures, voids, and deficient lapped seams in strips and transition strips extending 6 inches beyond repaired areas in strip direction.

3.3 FIELD QUALITY CONTROL

- A. ABAA Quality Assurance Program: Perform examinations, preparation, installation, testing, and inspections under ABAA's Quality Assurance Program.
- B. Testing and Inspecting Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- C. Inspections: Air-barrier and water-resistant glass-mat gypsum sheathing, accessories, and installation are subject to inspection for compliance with requirements.
 1. Continuity of air-barrier system has been achieved throughout the building envelope with no gaps or holes.
 2. Laps in strips and transition strips have complied with minimum requirements and have been shingled in the correct direction (or mastic has been applied on exposed edges), with no fishmouths.
 3. Termination mastic has been applied on cut edges.
 4. Strips and transition strips have been firmly adhered to substrate.
 5. Compatible materials have been used.
 6. Transitions at changes in direction and structural support at gaps have been provided.
 7. Connections between assemblies (sheathing and sealants) have complied with requirements for cleanliness, surface preparation and priming, structural support, integrity, and continuity of seal.
 8. All penetrations have been sealed.
- D. Tests: As determined by testing agency from among the following tests:
 1. Air-Leakage-Location Testing: Air-barrier sheathing assemblies will be tested for evidence of air leakage according to ASTM E1186, chamber depressurization using detection liquids .
 2. Air-Leakage-Volume Testing: Air-barrier assemblies will be tested for air-leakage rate according to ASTM E783 or ASTM E2357.
- E. Air barriers will be considered defective if they do not pass tests and inspections.
- F. Repair damage to air barriers caused by testing; follow manufacturer's written instructions.
- G. Prepare test and inspection reports.

SECTION 06 16 00 - SHEATHING

Page 9 of 10

END OF SECTION 06 16 00

SECTION 07 21 19 - FOAMED-IN-PLACE INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Closed-cell spray polyurethane foam.

B. Related Requirements:

1. Section 07 57 00 "Coated Foamed Roofing" for spray polyurethane foam insulation used for roofing applications.

1.2 ACTION SUBMITTALS

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

1.3 INFORMATIONAL SUBMITTALS

- A. Product test reports.
- B. Research reports.

PART 2 - PRODUCTS

2.1 CLOSED-CELL SPRAY POLYURETHANE FOAM

- A. Closed-Cell Spray Polyurethane Foam: ASTM C 1029, Type II, minimum density of **1.5 lb/cu. ft.** and minimum aged R-value at **1-inch** thickness of **6.2 deg F x h x sq. ft./Btu at 75 deg F.**

1. **Manufacturers:** Subject to compliance with requirements, provide products by one of the following:
 - a. Gaco; Wallfoam 183M .
 - b. BASF Walltite US Series
2. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - a. Flame-Spread Index: 25 or less.
 - b. Smoke-Developed Index: 450 or less.

SECTION 07 21 19 - FOAMED-IN-PLACE INSULATION

3. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with insulation manufacturer's written instructions applicable to products and applications.
- B. Spray insulation to envelop entire area to be insulated and fill voids.
- C. Apply in multiple passes to not exceed maximum thicknesses recommended by manufacturer. Do not spray into rising foam.

END OF SECTION 07 21 19

SECTION 07 54 23 - THERMOPLASTIC-POLYOLEFIN (TPO) ROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Adhered Mechanically fastened thermoplastic polyolefin (TPO) roofing system.
2. Accessory roofing materials.
3. Substrate board.
4. Roof insulation.
5. Insulation accessories and cover board.
6. Asphalt materials.

1.2 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site .

1.3 ACTION SUBMITTALS

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

1. For insulation and roof system component fasteners, include copy of FM Approvals' RoofNav listing.

- B. Shop Drawings: Include roof plans, sections, details, and attachments to other work, including the following:

1. Layout and thickness of insulation.
2. Base flashings and membrane termination details.
3. Flashing details at penetrations.
4. Tapered insulation layout, thickness, and slopes.
5. Roof plan showing orientation of steel roof deck and orientation of roof membrane, fastening spacings, and patterns for mechanically fastened roofing system.
6. Insulation fastening patterns for corner, perimeter, and field-of-roof locations.
7. Tie-in with adjoining air barrier.

- C. Samples: For the following products:

1. Roof membrane and flashings, of color required.

- D. Wind Uplift Resistance Submittal: For roofing system, indicating compliance with wind uplift performance requirements.

SECTION 07 54 23 - THERMOPLASTIC-POLYOLEFIN (TPO) ROOFING

1.4 INFORMATIONAL SUBMITTALS

- A. Manufacturer Certificates:
 - 1. Performance Requirement Certificate: Signed by roof membrane manufacturer, certifying that roofing system complies with requirements specified in "Performance Requirements" Article.
 - a. Submit evidence of compliance with performance requirements.
 - 2. Special Warranty Certificate: Signed by roof membrane manufacturer, certifying that all materials supplied under this Section are acceptable for special warranty.
- B. Product Test Reports: For roof membrane and insulation, for tests performed by a qualified testing agency, indicating compliance with specified requirements.
- C. Research reports.
- D. Field Test Reports:
 - 1. Concrete internal relative humidity test reports.
 - 2. Fastener-pullout test results and manufacturer's revised requirements for fastener patterns.
- E. Field quality-control reports.
- F. Sample warranties.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance data.
- B. Certified statement from existing roof membrane manufacturer stating that existing roof warranty has not been affected by Work performed under this Section.

1.6 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Manufacturers: A qualified manufacturer that is UL listed listed in FM Approvals' RoofNav for roofing system identical to that used for this Project.
 - 2. Installers: A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's special warranty.

1.7 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of roofing system that fail in materials or workmanship within specified warranty period.

SECTION 07 54 23 - THERMOPLASTIC-POLYOLEFIN (TPO) ROOFING

1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Accelerated Weathering: Roof membrane to withstand 2000 hours of exposure when tested according to ASTM G152, ASTM G154, or ASTM G155.
- B. Impact Resistance: Roof membrane to resist impact damage when tested according to ASTM D3746, ASTM D4272, or the "Resistance to Foot Traffic Test" in FM Approvals 4470.
- C. SPRI's Directory of Roof Assemblies Listing: Roof membrane, base flashings, and component materials comply with requirements in FM Approvals 4450 or FM Approvals 4470 as part of a roofing system, and are listed in SPRI's Directory of Roof Assemblies for roof assembly identical for that specified for this Project.
 1. Wind Uplift Load Capacity: 120 psf .

2.2 THERMOPLASTIC POLYOLEFIN (TPO) ROOFING

- A. TPO Sheet: ASTM D6878/D6878M, internally fabric- or scrim-reinforced, fabric-backed TPO sheet.
 1. **Manufacturers:** Subject to compliance with requirements, provide products by one of the following:
 - a. Carlisle Syntec Systems.
 - b. Firestone Building Products.
 - c. GAF.
 - d. Johns Manville; a Berkshire Hathaway company.
 2. Thickness: **60 mils** , nominal.
 3. Exposed Face Color: White .

2.3 ACCESSORY ROOFING MATERIALS

- A. General: Accessory materials recommended by roofing system manufacturer for intended use and compatible with other roofing components.
 1. Adhesive and Sealants: Comply with VOC limits of authorities having jurisdiction.
- B. Sheet Flashing: Manufacturer's standard unreinforced TPO sheet flashing, **55 mils** thick, minimum, of same color as TPO sheet.
- C. Prefabricated Pipe Flashings: As recommended by roof membrane manufacturer.

SECTION 07 54 23 - THERMOPLASTIC- POLYOLEFIN (TPO) ROOFING

Page 3 of 12

- D. Bonding Adhesive: Manufacturer's standard , water based.
- E. Slip Sheet: ASTM D2178/D2178M, Type IV; glass fiber; asphalt-impregnated felt .
- F. Metal Termination Bars: Manufacturer's standard, predrilled stainless steel or aluminum bars, approximately 1 by 1/8 inch thick; with anchors.
- G. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening roofing components to substrate, and acceptable to roofing system manufacturer.
- H. Miscellaneous Accessories: Provide pourable sealers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, T-joint covers, lap sealants, termination reglets, and other accessories.

2.4 SUBSTRATE BOARD

- A. Glass-Mat Gypsum Roof Substrate Board: ASTM C1177/C1177M, water-resistant gypsum board.
 - 1. **Manufacturers:** Subject to compliance with requirements, provide products by one of the following:
 - a. Certainteed; SAINT-GOBAIN.
 - b. Georgia-Pacific Gypsum LLC.
 - c. National Gypsum Company.
 - d. USG Corporation.
 - 2. Thickness: Type X, 5/8 inch thick.
 - 3. Surface Finish: Factory primed .
- B. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening substrate board to roof deck.

2.5 ROOF INSULATION

- A. Extruded-Polystyrene Board Insulation: ASTM C578, Type V, 3.00-lb/cu. ft. , minimum density, 100 psi minimum compressive strength, square edged.
 - 1. **Manufacturers:** Subject to compliance with requirements, provide products by one of the following:
 - a. DiversiFoam Products.
 - b. Kingspan Insulation LLC.
 - c. Owens Corning.
 - d. The Dow Chemical Company.
 - 2. Thermal Resistance: R-value of 5.0 per 1 inch.
 - 3. Size: 48 by 96 inches.
 - 4. Thickness:
 - a. Base Layer: 1-1/2 inches .

SECTION 07 54 23 - THERMOPLASTIC-POLYOLEFIN (TPO) ROOFING

- b. Upper Layer: .

2.6 INSULATION ACCESSORIES AND COVER BOARD

- A. Fasteners: Factory-coated steel fasteners with metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening roof insulation and cover boards to substrate, and acceptable to roofing system manufacturer.
- B. Induction-Welding Plates: Minimum **3-inch** diameter with recessed center, **0.034-inch** thick, aluminum-zinc alloy-coated steel plates, factory-coated with adhesive formulated for roof membrane, with corresponding corrosion-resistant fasteners and thermal isolation spacers below plates.
- C. Insulation Adhesive: Insulation manufacturer's recommended adhesive formulated to attach roof insulation to substrate or to another insulation layer as follows:
1. Modified asphaltic, asbestos-free, cold-applied adhesive.
- D. Glass-Mat Gypsum Cover Board: ASTM C1177/C1177M, water-resistant gypsum board.
1. **Manufacturers:** Subject to compliance with requirements, provide products by one of the following:
 - a. Certainteed; SAINT-GOBAIN.
 - b. Georgia-Pacific Gypsum LLC.
 - c. National Gypsum Company.
 - d. USG Corporation.
 2. Thickness: **1/4 inch** .
 3. Surface Finish: Factory primed .

2.7 ASPHALT MATERIALS

- A. Roofing Asphalt: ASTM D312/D312M, Type III or Type IV .

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.
1. Verify that minimum concrete drying period recommended by roofing system manufacturer has passed.
 2. Verify that concrete substrate is visibly dry and free of moisture, and that minimum concrete internal relative humidity is not more than 75 percent, or as

SECTION 07 54 23 - THERMOPLASTIC-POLYOLEFIN (TPO) ROOFING

Page 5 of 12

recommended by roofing system manufacturer, when tested according to ASTM F2170.

- a. Test Frequency: One test probe per each 1000 sq. ft. , or portion thereof, of roof deck, with not less than three tests probes.
 - b. Submit test reports within 24 hours after performing tests.
3. Verify that concrete-curing compounds that will impair adhesion of roofing components to roof deck have been removed.
 4. Verify that joints in precast concrete roof decks have been grouted flush with top of concrete.

3.2 PREPARATION

- A. Perform fastener-pullout tests according to roof system manufacturer's written instructions.
 1. Submit test result within 24 hours after performing tests.
 - a. Include manufacturer's requirements for any revision to previously submitted fastener patterns required to achieve specified wind uplift requirements.

3.3 INSTALLATION OF ROOFING, GENERAL

- A. Install roofing system according to roofing system manufacturer's written instructions, FM Approvals' RoofNav listed roof assembly requirements, and FM Global Property Loss Prevention Data Sheet 1-29.
- B. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system at end of workday or when rain is forecast. Remove and discard temporary seals before beginning Work on adjoining roofing.
- C. Install roof membrane and auxiliary materials to tie in to existing roofing to maintain weathertightness of transition and to not void warranty for existing roofing system.
- D. Coordinate installation and transition of roofing system component serving as an air barrier with air barrier specified under Section 07 27 26 "Fluid-Applied Membrane Air Barriers."

3.4 INSTALLATION OF SUBSTRATE BOARD

- A. Install substrate board with long joints in continuous straight lines, with end joints staggered not less than 24 inches in adjacent rows.
 1. At steel roof decks, install substrate board at right angle to flutes of deck.
 - a. Locate end joints over crests of steel roof deck.
 2. Tightly butt substrate boards together.

SECTION 07 54 23 - THERMOPLASTIC-POLYOLEFIN (TPO) ROOFING

3. Cut substrate board to fit tight around penetrations and projections, and to fit tight to intersecting sloping roof decks.
4. Fasten substrate board to top flanges of steel deck according to recommendations in FM Approvals' RoofNav listed roof assembly requirements for specified Windstorm Resistance Classification and FM Global Property Loss Prevention Data Sheet 1-29.
5. Fasten substrate board to top flanges of steel deck to resist uplift pressure at corners, perimeter, and field of roof according to roofing system manufacturers' written instructions.
6. Loosely lay substrate board over roof deck.

3.5 INSTALLATION OF INSULATION

- A. Coordinate installing roofing system components so insulation is not exposed to precipitation or left exposed at end of workday.
- B. Comply with roofing system and roof insulation manufacturer's written instructions for installing roof insulation.
- C. Installation Over Metal Decking:
 1. Install base layer of insulation with joints staggered not less than **24 inches** in adjacent rows and with long joints continuous at right angle to flutes of decking.
 - a. Locate end joints over crests of decking.
 - b. Where installing composite and noncomposite insulation in two or more layers, install noncomposite board insulation for bottom layer and intermediate layers, if applicable, and install composite board insulation for top layer.
 - c. Trim insulation neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
 - d. Make joints between adjacent insulation boards not more than **1/4 inch** in width.
 - e. At internal roof drains, slope insulation to create a square drain sump with each side equal to the diameter of the drain bowl plus **24 inches**.
 - 1) Trim insulation so that water flow is unrestricted.
 - f. Fill gaps exceeding **1/4 inch** with insulation.
 - g. Cut and fit insulation within **1/4 inch** of nailers, projections, and penetrations.
 - h. Loosely lay base layer of insulation units over substrate.
 - i. Mechanically attach base layer of insulation and substrate board using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to metal decks.
 - 1) Fasten insulation according to requirements in FM Approvals' RoofNav for specified Windstorm Resistance Classification .
 - 2) Fasten insulation to resist specified uplift pressure at corners, perimeter, and field of roof.
 2. Install upper layers of insulation and tapered insulation with joints of each layer offset not less than **12 inches** from previous layer of insulation.

SECTION 07 54 23 - THERMOPLASTIC-POLYOLEFIN (TPO) ROOFING

Page 7 of 12

- a. Staggered end joints within each layer not less than **24 inches** in adjacent rows.
 - b. Install with long joints continuous and with end joints staggered not less than **12 inches** in adjacent rows.
 - c. Trim insulation neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
 - d. Make joints between adjacent insulation boards not more than **1/4 inch** in width.
 - e. At internal roof drains, slope insulation to create a square drain sump with each side equal to the diameter of the drain bowl plus **24 inches**.
 - 1) Trim insulation so that water flow is unrestricted.
 - f. Fill gaps exceeding **1/4 inch** with insulation.
 - g. Cut and fit insulation within **1/4 inch** of nailers, projections, and penetrations.
 - h. Loosely lay each layer of insulation units over substrate.
 - i. Adhere each layer of insulation to substrate using adhesive according to FM Approvals' RoofNav listed roof assembly requirements for specified Windstorm Resistance Classification and FM Global Property Loss Prevention Data Sheet 1-29, as follows:
 - 1) Set each layer of insulation in a solid mopping of hot roofing asphalt, applied within plus or minus **25 deg F** of equiviscous temperature.
 - 2) Set each layer of insulation in ribbons of bead-applied insulation adhesive, firmly pressing and maintaining insulation in place.
 - 3) Set each layer of insulation in a uniform coverage of full-spread insulation adhesive, firmly pressing and maintaining insulation in place.
- D. Place thermal spacers and plates on insulation in required fastening patterns to achieve FM rating and secure in accordance with manufacturer's instructions.
1. Install plates and fasteners tight and flat to substrate with no dimpling, and with fastener extending **1 inch** minimum into roof deck; do not overdrive fasteners.

3.6 INSTALLATION OF COVER BOARDS

- A. Install cover boards over insulation with long joints in continuous straight lines with end joints staggered between rows. Offset joints of insulation below a minimum of **6 inches** in each direction.
1. Trim cover board neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
 2. At internal roof drains, conform to slope of drain sump.
 - a. Trim cover board so that water flow is unrestricted.
 3. Cut and fit cover board tight to nailers, projections, and penetrations.
 4. Loosely lay cover board over substrate.
 5. Adhere cover board to substrate using adhesive according to FM Approvals' RoofNav listed roof assembly requirements for specified Windstorm Resistance

SECTION 07 54 23 - THERMOPLASTIC-POLYOLEFIN (TPO) ROOFING

Classification and FM Global Property Loss Prevention Data Sheet 1-29, as follows:

- a. Set cover board in a solid mopping of hot roofing asphalt, applied within plus or minus **25 deg F** of equiviscous temperature.
 - b. Set cover board in ribbons of bead-applied insulation adhesive, firmly pressing and maintaining insulation in place.
 - c. Set cover board in a uniform coverage of full-spread insulation adhesive, firmly pressing and maintaining insulation in place.
- B. Install slip sheet over cover board and beneath roof membrane.
- C. Place plates on insulation in required fastening patterns to achieve FM rating and secure in accordance with manufacturer's instructions.
1. Install plates and fasteners tight and flat to substrate with no dimpling, and with fastener extending **1 inch** minimum into roof deck; do not overdrive fasteners.

3.7 INSTALLATION OF ADHERED ROOF MEMBRANE

- A. Adhere roof membrane over area to receive roofing according to roofing system manufacturer's written instructions.
- B. Unroll roof membrane and allow to relax before installing.
- C. Start installation of roofing in presence of roofing system manufacturer's technical personnel and Owner's testing and inspection agency.
- D. Accurately align roof membrane, and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.
- E. Bonding Adhesive: Apply to substrate and underside of roof membrane at rate required by manufacturer, and allow to partially dry before installing roof membrane. Do not apply to splice area of roof membrane.
- F. Hot Roofing Asphalt: Apply a solid mopping of hot roofing asphalt to substrate at temperature and rate required by manufacturer, and install fabric-backed roof membrane. Do not apply to splice area of roof membrane.
- G. Fabric-Backed Roof Membrane Adhesive: Apply to substrate at rate required by manufacturer, and install fabric-backed roof membrane.
- H. In addition to adhering, mechanically fasten roof membrane securely at terminations, penetrations, and perimeter of roofing.
- I. Apply roof membrane with side laps shingled with slope of roof deck where possible.
- J. Seams: Clean seam areas, overlap roof membrane, and hot-air weld side and end laps of roof membrane and sheet flashings, to ensure a watertight seam installation.

SECTION 07 54 23 - THERMOPLASTIC-POLYOLEFIN (TPO) ROOFING

Page 9 of 12

1. Test lap edges with probe to verify seam weld continuity. Apply lap sealant to seal cut edges of roof membrane and sheet flashings.
 2. Verify field strength of seams a minimum of twice daily, and repair seam sample areas.
 3. Repair tears, voids, and lapped seams in roof membrane that do not comply with requirements.
- K. Spread sealant bed over deck-drain flange at roof drains, and securely seal roof membrane in place with clamping ring.

3.8 INSTALLATION OF MECHANICALLY FASTENED ROOF MEMBRANE

- A. Mechanically fasten roof membrane over area to receive roofing according to roofing system manufacturer's written instructions.
- B. Unroll roof membrane and allow to relax before installing.
- C. For in-splice attachment, install roof membrane with long dimension perpendicular to steel roof deck flutes.
- D. Start installation of roofing in presence of roofing system manufacturer's technical personnel and Owners testing and inspection agency.
- E. Accurately align roof membrane, and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.
- F. Mechanically fasten or adhere roof membrane securely at terminations, penetrations, and perimeter of roofing.
- G. Apply roof membrane with side laps shingled with slope of roof deck where possible.
- H. In-Seam Attachment: Secure one edge of TPO sheet using fastening plates or metal battens centered within seam, and mechanically fasten TPO sheet to roof deck.
- I. Seams: Clean seam areas, overlap roof membrane, and hot-air weld side and end laps of roof membrane and sheet flashings to ensure a watertight seam installation.
 1. Test lap edges with probe to verify seam weld continuity. Apply lap sealant to seal cut edges of roof membrane and flashing sheet.
 2. Verify field strength of seams a minimum of twice daily, and repair seam sample areas.
 3. Repair tears, voids, and lapped seams in roof membrane that do not comply with requirements.
- J. Spread sealant bed over deck-drain flange at roof drains, and securely seal roof membrane in place with clamping ring.

SECTION 07 54 23 - THERMOPLASTIC-POLYOLEFIN (TPO) ROOFING

Page 10 of 12

3.9 INSTALLATION OF BASE FLASHING

- A. Install sheet flashings and preformed flashing accessories, and adhere to substrates according to roofing system manufacturer's written instructions.
- B. Apply bonding adhesive to substrate and underside of sheet flashing at required rate, and allow to partially dry. Do not apply to seam area of flashing.
- C. Flash penetrations and field-formed inside and outside corners with cured or uncured sheet flashing.
- D. Clean seam areas, overlap, and firmly roll sheet flashings into the adhesive. Hot-air weld side and end laps to ensure a watertight seam installation.
- E. Terminate and seal top of sheet flashings and mechanically anchor to substrate through termination bars.

3.10 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to inspect substrate conditions, surface preparation, roof membrane application, flashings, protection, and drainage components, and to furnish reports to Architect.
- B. Perform the following tests:
 - 1. Infrared Thermography: Testing agency surveys entire roof area using infrared color thermography according to ASTM C1153.
 - a. Perform tests before overlying construction is placed.
 - b. After infrared scan, locate specific areas of leaks by electrical capacitance/impedance testing or nuclear hydrogen detection testing.
 - c. After testing, repair leaks, repeat tests, and make further repairs until roofing and flashing installations are watertight.
 - 1) Cost of retesting is Contractor's responsibility.
 - d. Testing agency to prepare survey report of initial scan indicating locations of entrapped moisture, if any.
 - 2. Electrical Capacitance/Impedance Testing: Testing agency surveys entire roof area for entrapped water within roof assembly according to ASTM D7954/D7954M.
 - a. Perform tests before overlying construction is placed.
 - b. After testing, repair leaks, repeat tests, and make further repairs until roofing and flashing installations are watertight.
 - 1) Cost of retesting is Contractor's responsibility.
 - c. Testing agency to prepare survey report indicating locations of entrapped moisture, if any.
- C. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion, in presence of Architect, and to prepare inspection report.

SECTION 07 54 23 - THERMOPLASTIC-POLYOLEFIN (TPO) ROOFING

- D. Repair or remove and replace components of roofing system where inspections indicate that they do not comply with specified requirements.

3.11 PROTECTING AND CLEANING

- A. Protect roofing system from damage and wear during remainder of construction period. When remaining construction does not affect or endanger roofing system, inspect roofing system for deterioration and damage, describing its nature and extent in a written report, with copies to Architect and Owner.
- B. Correct deficiencies in or remove roofing system that does not comply with requirements, repair substrates, and repair or reinstall roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.
- C. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION 07 54 23

SECTION 07 62 00 - SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Manufactured reglets with counterflashing.
2. Formed roof-drainage sheet metal fabrications.
3. Formed low-slope roof sheet metal fabrications.
4. Formed wall sheet metal fabrications.

1.2 PREINSTALLATION MEETINGS

- ##### A. Preinstallation Conference: Conduct conference at Project site .

1.3 ACTION SUBMITTALS

A. Product Data: For each of the following

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

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

1. Include plans, elevations, sections, and attachment details.
2. Detail fabrication and installation layouts, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled Work.
3. Include identification of material, thickness, weight, and finish for each item and location in Project.
4. Include details for forming, including profiles, shapes, seams, and dimensions.
5. Include details for joining, supporting, and securing, including layout and spacing of fasteners, cleats, clips, and other attachments. Include pattern of seams.
6. Include details of termination points and assemblies.
7. Include details of expansion joints and expansion-joint covers, including showing direction of expansion and contraction from fixed points.
8. Include details of roof-penetration flashing.
9. Include details of edge conditions, including eaves, ridges, valleys, rakes, crickets, flashings, and counterflashings.
10. Include details of special conditions.
11. Include details of connections to adjoining work.

SECTION 07 62 00 - SHEET METAL FLASHING AND TRIM

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

1.4 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For each type of coping and roof edge flashing that is ANSI/SPRI/FM 4435/ES-1 tested .
- B. Evaluation Reports: For copings and roof edge flashing, from an agency acceptable to authority having jurisdiction showing compliance with ANSI/SPRI/FM 4435/ES-1.
- C. Sample warranty.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance data.
- B. Special warranty.

1.6 QUALITY ASSURANCE

- A. Fabricator Qualifications: Employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.
 - 1. For copings and roof edge flashings that are ANSI/SPRI/FM 4435/ES-1 tested , shop is to be listed as able to fabricate required details as tested and approved.

1.7 WARRANTY

- A. Special Warranty on Finishes: Manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within specified warranty period.
 - 1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
 - a. Color fading more than 5 Delta E units when tested in accordance with ASTM D2244.
 - b. Chalking in excess of a No. 8 rating when tested in accordance with ASTM D4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
 - 2. Finish Warranty Period: 20 years from date of Substantial Completion.

SECTION 07 62 00 - SHEET METAL FLASHING AND TRIM

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Sheet metal flashing and trim assemblies, including cleats, anchors, and fasteners, are to withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim are not to rattle, leak, or loosen, and are to remain watertight.
- B. Sheet Metal Standard for Flashing and Trim: Comply with NRCA's "The NRCA Roofing Manual: Architectural Metal Flashing, Condensation and Air Leakage Control, and Reroofing" and SMACNA's "Architectural Sheet Metal Manual" requirements for dimensions and profiles shown unless more stringent requirements are indicated.
- C. Sheet Metal Standard for Copper: Comply with CDA's "Copper in Architecture Handbook." Conform to dimensions and profiles shown unless more stringent requirements are indicated.
- D. SPRI Wind Design Standard: Manufacture and install copings roof edge flashings tested in accordance with ANSI/SPRI/FM 4435/ES-1 and capable of resisting the following design pressure:
 - 1. Design Pressure: psf .
- E. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - 1. Temperature Change: 120 deg F , ambient; 180 deg F , material surfaces .

2.2 SHEET METALS

- A. Protect mechanical and other finishes on exposed surfaces from damage by applying strippable, temporary protective film before shipping.
- B. Copper Sheet: ASTM B370, cold-rolled copper sheet, H00 or H01 temper.
 - 1. **Manufacturers:** Subject to compliance with requirements, provide products by one of the following:
 - a. Hussey Copper Ltd.
 - b. Revere Copper Products, Inc.
 - 2. Nonpatinated, Exposed Finish: Mill.

SECTION 07 62 00 - SHEET METAL FLASHING AND TRIM

Page 3 of 15

- C. Aluminum Sheet: **ASTM B209**, alloy as standard with manufacturer for finish required, with temper as required to suit forming operations and performance required; with smooth, flat surface.
1. Color Anodic Finish, Coil Coated: AAMA 611, AA-M12C22A42/A44, Class I, 0.018 mm or thicker.
 - a. Color: As selected by Architect from full range of industry colors and color densities .
 - b. Color Range: Noticeable variations in same piece are unacceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
 2. Exposed Coil-Coated Finish:
 - a. Siliconized Polyester: Epoxy primer and silicone-modified, polyester-enamel topcoat; with dry film thickness of not less than **0.2 mil** for primer and **0.8 mil** for topcoat.
 3. Color: As selected by Architect from manufacturer's full range .
 4. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with minimum total dry film thickness of **0.5 mil**.
- D. Stainless Steel Sheet: ASTM A240/A240M, , dead soft, fully annealed; with smooth, flat surface.
1. Finish: ASTM A480/A480M, No. 2B (bright, cold rolled) .
- E. Metallic-Coated Steel Sheet: Provide aluminum-zinc alloy-coated steel sheet in accordance with ASTM A792/A792M, **Class AZ50** coating designation, **Grade 40**; prepainted by coil-coating process to comply with ASTM A755/A755M.
1. Surface: Smooth, flat .
 2. Exposed Coil-Coated Finish:
 - a. Three-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent polyvinylidene fluoride (PVDF) resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 3. Color: As selected by Architect from manufacturer's full range .
 4. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with minimum total dry film thickness of **0.5 mil**.
- F. Lead Sheet: ASTM B749 lead sheet.

2.3 UNDERLAYMENT MATERIALS

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

SECTION 07 62 00 - SHEET METAL FLASHING AND TRIM

- B. Synthetic Underlayment: Laminated or reinforced, woven polyethylene or polypropylene, synthetic roofing underlayment; bitumen free; slip resistant; suitable for high temperatures over **220 deg F**; and complying with physical requirements of ASTM D226/D226M for Type I and Type II felts.
1. **Manufacturers:** Subject to compliance with requirements, provide products by one of the following:
 - a. Atlas Molded Products, a division of Atlas Roofing Corporation.
 - b. Intertape Polymer Group.
 - c. Kirsch Building Products.
 - d. SDP Advanced Polymer Products Inc.
- C. Self-Adhering, High-Temperature Sheet Underlayment: Minimum **30 mils** thick, consisting of a slip-resistant polyethylene- or polypropylene-film top surface laminated to a layer of butyl- or SBS-modified asphalt adhesive, with release-paper backing; specifically designed to withstand high metal temperatures beneath metal roofing. Provide primer in accordance with underlayment manufacturer's written instructions.
1. **Manufacturers:** Subject to compliance with requirements, provide products by one of the following:
 - a. Carlisle WIP Products; a brand of Carlisle Construction Materials.
 - b. GCP Applied Technologies Inc.
 - c. Henry Company.
 - d. Owens Corning.
 - e. Polyglass U.S.A., Inc.
 - f. Protecto Wrap Company.
 2. Low-Temperature Flexibility: ASTM D1970/D1970M; passes after testing at minus **20 deg F** or lower.
- D. Slip Sheet: Rosin-sized building paper, **3 lb/100 sq. ft.** minimum.

2.4 MISCELLANEOUS MATERIALS

- A. Provide materials and types of fasteners, solder, protective coatings, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and as recommended by manufacturer of primary sheet metal or manufactured item unless otherwise indicated.
- B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal or manufactured item.
1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.
 - a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating. Provide metal-backed EPDM or PVC sealing washers under heads of exposed fasteners bearing on weather side of metal.

SECTION 07 62 00 - SHEET METAL FLASHING AND TRIM

- b. Blind Fasteners: High-strength aluminum or stainless steel rivets suitable for metal being fastened.
 - c. Spikes and Ferrules: Same material as gutter; with spike with ferrule matching internal gutter width.
 - 2. Fasteners for Copper Sheet: Copper, hardware bronze or passivated Series 300 stainless steel.
 - 3. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.
 - 4. Fasteners for Stainless Steel Sheet: Series 300 stainless steel.
 - 5. Fasteners for Aluminum-Zinc Alloy-Coated Steel Sheet: Series 300 stainless steel or hot-dip galvanized steel in accordance with ASTM A153/A153M or ASTM F2329.
- C. Sealant Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape **1/2 inch** wide and **1/8 inch** thick.
- D. Elastomeric Sealant: ASTM C920, elastomeric silicone polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.
- E. Butyl Sealant: ASTM C1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.
- F. Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.
- G. Bituminous Coating: Cold-applied asphalt emulsion in accordance with ASTM D1187/D1187M.
- H. Asphalt Roofing Cement: ASTM D4586, asbestos free, of consistency required for application.
- I. Reglets: Units of type, material, and profile required, formed to provide secure interlocking of separate reglet and counterflashing pieces, and compatible with flashing indicated with factory-mitered and -welded corners and junctions and with interlocking counterflashing on exterior face, of same metal as reglet.
- 1. **Manufacturers:** Subject to compliance with requirements, provide products by one of the following:
 - a. Fry Reglet Corporation.
 - b. Heckmann Building Products, Inc.
 - c. Hohmann & Barnard, Inc.
 - d. Keystone Flashing Company, Inc.
 - e. Metal-Era, Inc.
 - 2. Material: Stainless steel, **0.0188 inch** thick .

**SECTION 07 62 00 - SHEET METAL FLASHING
AND TRIM**

3. Surface-Mounted Type: Provide with slotted holes for fastening to substrate, with neoprene or other suitable weatherproofing washers, and with channel for sealant at top edge.
4. Stucco Type: Provide with upturned fastening flange and extension leg of length to match thickness of applied finish materials.
5. Concrete Type: Provide temporary closure tape to keep reglet free of concrete materials, special fasteners for attaching reglet to concrete forms, and guides to ensure alignment of reglet section ends.
6. Masonry Type: Provide with offset top flange for embedment in masonry mortar joint.
7. Accessories:
 - a. Flexible-Flashing Retainer: Provide resilient plastic or rubber accessory to secure flexible flashing in reglet where clearance does not permit use of standard metal counterflashing or where Drawings show reglet without metal counterflashing.
 - b. Counterflashing Wind-Restraint Clips: Provide clips to be installed before counterflashing to prevent wind uplift of counterflashing's lower edge.
8. Finish: Mill With manufacturer's standard color coating .

2.5 FABRICATION, GENERAL

- A. Custom fabricate sheet metal flashing and trim to comply with details indicated and recommendations in cited sheet metal standard that apply to design, dimensions, geometry, metal thickness, and other characteristics of item required.
 1. Fabricate sheet metal flashing and trim in shop to greatest extent possible.
 2. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
 3. Verify shapes and dimensions of surfaces to be covered and obtain field measurements for accurate fit before shop fabrication.
 4. Form sheet metal flashing and trim to fit substrates without excessive oil-canning, buckling, and tool marks; true to line, levels, and slopes; and with exposed edges folded back to form hems.
 5. Conceal fasteners and expansion provisions where possible. Do not use exposed fasteners on faces exposed to view.
- B. Fabrication Tolerances:
 1. Fabricate sheet metal flashing and trim that is capable of installation to a tolerance of **1/4 inch in 20 feet** on slope and location lines indicated on Drawings and within **1/8-inch** offset of adjoining faces and of alignment of matching profiles.
 2. Fabricate sheet metal flashing and trim that is capable of installation to tolerances specified.
- C. Expansion Provisions: Form metal for thermal expansion of exposed flashing and trim.

SECTION 07 62 00 - SHEET METAL FLASHING AND TRIM

Page 7 of 15

1. Form expansion joints of intermeshing hooked flanges, not less than **1 inch** deep, filled with butyl sealant concealed within joints.
 2. Use lapped expansion joints only where indicated on Drawings.
- D. Sealant Joints: Where movable, nonexpansion-type joints are required, form metal in accordance with cited sheet metal standard to provide for proper installation of elastomeric sealant.
- E. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.
- F. Seams:
1. Fabricate nonmoving seams with flat-lock seams. Form seams and seal with elastomeric sealant unless otherwise recommended by sealant manufacturer for intended use. Rivet joints where necessary for strength.

2.6 ROOF-DRAINAGE SHEET METAL FABRICATIONS

A. Hanging Gutters:

1. Fabricate to cross section required, complete with end pieces, outlet tubes, and other accessories as required.
2. Fabricate in minimum **96-inch-** long sections.
3. Furnish flat-stock gutter brackets and flat-stock gutter spacers and straps fabricated from same metal as gutters, of size recommended by cited sheet metal standard, but with thickness not less than twice the gutter thickness .
4. Fabricate expansion joints, expansion-joint covers, gutter bead reinforcing bars, and gutter accessories from same metal as gutters. Shop fabricate interior and exterior corners.
5. Accessories: Wire-ball downspout strainer Valley baffles.
6. Gutters with Girth **16 to 20 Inches**: Fabricate from the following materials:
 - a. Aluminum-Zinc Alloy-Coated Steel: **0.028 inch** thick.

B. Downspouts: Fabricate rectangular downspouts to dimensions indicated on Drawings, complete with mitered elbows. Furnish with metal hangers from same material as downspouts and anchors . Shop fabricate elbows.

1. Hanger Style: .
2. Fabricate from the following materials:
 - a. Aluminum-Zinc Alloy-Coated Steel: **0.022 inch** thick.

2.7 LOW-SLOPE ROOF SHEET METAL FABRICATIONS

A. Roof Edge Flashing (Gravel Stop) and Fascia Cap: Fabricate in minimum **96-inch-** long, but not exceeding **12-foot-** long sections. Furnish with **6-inch-** wide, joint cover plates. Shop fabricate interior and exterior corners.

SECTION 07 62 00 - SHEET METAL FLASHING AND TRIM

1. Fabricate from the following materials:
 - a. Aluminum-Zinc Alloy-Coated Steel: 0.028 inch thick.

- B. Copings: Fabricate in minimum 96-inch- long, but not exceeding 12-foot- long, sections. Fabricate joint plates of same thickness as copings. Furnish with continuous cleats to support edge of external leg and drill elongated holes for fasteners on interior leg. Miter corners, fasten and seal watertight. Shop fabricate interior and exterior corners.
 1. Fabricate from the following materials:
 - a. Aluminum-Zinc Alloy-Coated Steel: 0.040 inch thick.

- C. Base Flashing: Shop fabricate interior and exterior corners. Fabricate from the following materials:
 1. Stainless Steel: 0.0188 inch thick.

- D. Counterflashing: Shop fabricate interior and exterior corners. Fabricate from the following materials:
 1. Stainless Steel: 0.0188 inch thick.

- E. Roof-Penetration Flashing: Fabricate from the following materials:
 1. Copper: 16 oz./sq. ft. .
 2. Stainless Steel: 0.0188 inch thick.
 3. Galvanized Steel: 0.028 inch thick.
 4. Aluminum-Zinc Alloy-Coated Steel: 0.028 inch thick.
 5. Lead: 4 lb .

- F. Roof-Drain Flashing: Fabricate from the following materials:
 1. Stainless Steel: 0.0156 inch thick.

2.8 WALL SHEET METAL FABRICATIONS

- A. Through-Wall Flashing: Fabricate continuous flashings in minimum 96-inch- long, but not exceeding 12-foot- long, sections, under copings, and at shelf angles. Fabricate discontinuous lintel, sill, and similar flashings to extend 6 inches beyond each side of wall openings; and form with 2-inch- high, end dams. Fabricate from the following materials:
 1. Stainless Steel: 0.0156 inch thick.

- B. Opening Flashings in Frame Construction: Fabricate head, sill, jamb, and similar flashings to extend 4 inches beyond wall openings. Form head and sill flashing with 2-inch- high, end dams. Fabricate from the following materials:
 1. Stainless Steel: 0.0156 inch thick.

SECTION 07 62 00 - SHEET METAL FLASHING AND TRIM

- C. Wall Expansion-Joint Cover: Fabricate from the following materials:
1. Aluminum: 0.040 inch thick.

PART 3 - EXECUTION

3.1 INSTALLATION OF UNDERLAYMENT

- A. Felt Underlayment: Install felt underlayment, wrinkle free, using adhesive to minimize use of mechanical fasteners under sheet metal flashing and trim.
1. Install in shingle fashion to shed water.
 2. Lap joints not less than 2 inches.
- B. Synthetic Underlayment: Install synthetic underlayment, wrinkle free, in accordance with manufacturers' written instructions, and using adhesive where possible to minimize use of mechanical fasteners under sheet metal.
1. Lap horizontal joints not less than 4 inches.
 2. Lap end joints not less than 12 inches.
- C. Self-Adhering, High-Temperature Sheet Underlayment:
1. Install self-adhering, high-temperature sheet underlayment; wrinkle free.
 2. Prime substrate if recommended by underlayment manufacturer.
 3. Comply with temperature restrictions of underlayment manufacturer for installation; use primer for installing underlayment at low temperatures.
 4. Apply in shingle fashion to shed water, with end laps of not less than 6 inches staggered 24 inches between courses.
 5. Overlap side edges not less than 3-1/2 inches. Roll laps and edges with roller.
 6. Roll laps and edges with roller.
 7. Cover underlayment within 14 days.
- D. Install slip sheet, wrinkle free, before installing sheet metal flashing and trim.
1. Install in shingle fashion to shed water.
 2. Lapp joints not less than 4 inches.

3.2 INSTALLATION, GENERAL

- A. Install sheet metal flashing and trim to comply with details indicated and recommendations of cited sheet metal standard that apply to installation characteristics required unless otherwise indicated on Drawings.
1. Install fasteners, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.

SECTION 07 62 00 - SHEET METAL FLASHING AND TRIM

2. Install sheet metal flashing and trim true to line, levels, and slopes. Provide uniform, neat seams with minimum exposure of sealant.
 3. Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement.
 4. Install sheet metal flashing and trim to fit substrates and to result in watertight performance.
 5. Install continuous cleats with fasteners spaced not more than **12 inches** o.c.
 6. Space individual cleats not more than **12 inches** apart. Attach each cleat with at least two fasteners. Bend tabs over fasteners.
 7. Install exposed sheet metal flashing and trim with limited oil-canning, and free of buckling and tool marks.
 8. Do not field cut sheet metal flashing and trim by torch.
- B. Metal Protection: Where dissimilar metals contact each other, or where metal contacts pressure-treated wood or other corrosive substrates, protect against galvanic action or corrosion by painting contact surfaces with bituminous coating or by other permanent separation as recommended by sheet metal manufacturer or cited sheet metal standard.
1. Coat concealed side of uncoated-aluminum and stainless steel sheet metal flashing and trim with bituminous coating where flashing and trim contact wood, ferrous metal, or cementitious construction.
 2. Underlayment: Where installing sheet metal flashing and trim directly on cementitious or wood substrates, install underlayment and cover with slip sheet.
- C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim.
1. Space movement joints at maximum of **10 feet** with no joints within **24 inches** of corner or intersection.
 2. Form expansion joints of intermeshing hooked flanges, not less than **1 inch** deep, filled with sealant concealed within joints.
 3. Use lapped expansion joints only where indicated on Drawings.
- D. Fasteners: Use fastener sizes that penetrate substrate not less than recommended by fastener manufacturer to achieve maximum pull-out resistance .
- E. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.
- F. Seal joints as required for watertight construction.
1. Use sealant-filled joints unless otherwise indicated.
 - a. Embed hooked flanges of joint members not less than **1 inch** into sealant.
 - b. Form joints to completely conceal sealant.
 - c. When ambient temperature at time of installation is between **40 and 70 deg F**, set joint members for 50 percent movement each way.
 - d. Adjust setting proportionately for installation at higher ambient temperatures.

**SECTION 07 62 00 - SHEET METAL FLASHING
AND TRIM**

- 1) Do not install sealant-type joints at temperatures below 40 deg F.
 2. Prepare joints and apply sealants to comply with requirements in Section 07 92 00 "Joint Sealants."
- G. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter.
1. Pretin edges of sheets with solder to width of 1-1/2 inches; however, reduce pretinning where pretinned surface would show in completed Work.
 2. Do not solder metallic-coated steel and aluminum sheet.
 3. Do not pretin zinc-tin alloy-coated copper.
 4. Do not use torches for soldering.
 5. Heat surfaces to receive solder, and flow solder into joint.
 - a. Fill joint completely.
 - b. Completely remove flux and spatter from exposed surfaces.
 6. Stainless Steel Soldering:
 - a. Tin edges of uncoated sheets, using solder for stainless steel and acid flux.
 - b. Promptly remove acid-flux residue from metal after tinning and soldering.
 - c. Comply with solder manufacturer's recommended methods for cleaning and neutralization.
 7. Copper Soldering: Tin edges of uncoated sheets, using solder for copper.

3.3 INSTALLATION OF ROOF-DRAINAGE SYSTEM

- A. Install sheet metal roof-drainage items to produce complete roof-drainage system in accordance with cited sheet metal standard unless otherwise indicated. Coordinate installation of roof perimeter flashing with installation of roof-drainage system.
- B. Hanging Gutters:
1. Join sections with joints sealed with sealant.
 2. Provide for thermal expansion.
 3. Attach gutters at eave or fascia to firmly anchor them in position.
 4. Provide end closures and seal watertight with sealant.
 5. Slope to downspouts.
 6. Install gutter with expansion joints at locations indicated on Drawings, but not exceeding, 50 feet apart. Install expansion-joint caps.
 7. Install continuous gutter screens on gutters with noncorrosive fasteners, removable for cleaning gutters.
- C. Built-in Gutters:
1. Join sections with joints sealed with sealant.
 2. Provide for thermal expansion.
 3. Slope to downspouts.
 4. Provide end closures and seal watertight with sealant.
 5. Install underlayment layer in built-in gutter trough and extend to drip edge at eaves and under underlayment on roof sheathing.
 - a. Lap sides minimum of 2 inches over underlying course.

SECTION 07 62 00 - SHEET METAL FLASHING AND TRIM

- b. Lap ends minimum of **4 inches**.
 - c. Stagger end laps between succeeding courses at least **72 inches**.
 - d. Fasten with roofing nails.
 - e. Install slip sheet over underlayment.
6. Install gutter with expansion joints at locations indicated on Drawings, but not exceeding, **50 feet** apart. Install expansion-joint caps.

D. Downspouts:

1. Join sections with **1-1/2-inch** telescoping joints.
2. Provide hangers with fasteners designed to hold downspouts securely to walls.
3. Locate hangers at top and bottom and at approximately **60 inches** o.c.
4. Provide elbows at base of downspout to direct water away from building.
5. Connect downspouts to underground drainage system.

E. Splash Pans:

1. Install where downspouts discharge on low-slope roofs .
2. Set in asphalt roofing cement or elastomeric sealant compatible with the substrate.

F. Parapet Scuppers:

1. Continuously support scupper, set to correct elevation, and seal flanges to interior wall face, over cants or tapered edge strips, and under roofing membrane.
2. Anchor scupper closure trim flange to exterior wall and seal with elastomeric sealant to scupper.
3. Loosely lock front edge of scupper with conductor head.
4. seal with elastomeric sealant exterior wall scupper flanges into back of conductor head.

G. Conductor Heads: Anchor securely to wall, with elevation of conductor head rim at minimum of **1 inch** below scupper or gutter discharge.

H. Expansion-Joint Covers: Install expansion-joint covers at locations and of configuration indicated on Drawings. Lap joints minimum of **4 inches** in direction of water flow.

3.4 INSTALLATION OF ROOF FLASHINGS

A. Install sheet metal flashing and trim to comply with performance requirements , sheet metal manufacturer's written installation instructions, and cited sheet metal standard.

1. Provide concealed fasteners where possible, and set units true to line, levels, and slopes.
2. Install work with laps, joints, and seams that are permanently watertight and weather resistant.

B. Roof Edge Flashing:

SECTION 07 62 00 - SHEET METAL FLASHING AND TRIM

1. Install roof edge flashings in accordance with ANSI/SPRI/FM 4435/ES-1.
2. Anchor to resist uplift and outward forces in accordance with recommendations in cited sheet metal standard unless otherwise indicated. Interlock bottom edge of roof edge flashing with continuous cleat anchored to substrate at staggered **3-inch** centers.
3. Anchor to resist uplift and outward forces in accordance with recommendations in FM Global Property Loss Prevention Data Sheet 1-49 for FM Approvals' listing for required windstorm classification.

C. Copings:

1. Install roof edge flashings in accordance with ANSI/SPRI/FM 4435/ES-1.
2. Anchor to resist uplift and outward forces in accordance with recommendations in cited sheet metal standard unless otherwise indicated.
 - a. Interlock exterior bottom edge of coping with continuous cleat anchored to substrate at **16-inch** centers.
 - b. Anchor interior leg of coping with washers and screw fasteners through slotted holes at **24-inch** centers.
3. Anchor to resist uplift and outward forces in accordance with recommendations in FM Global Property Loss Prevention Data Sheet 1-49 for specified FM Approvals' listing for required windstorm classification.

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

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

1. Insert counterflashing in reglets or receivers and fit tightly to base flashing.
2. Extend counterflashing **4 inches** over base flashing.
3. Lap counterflashing joints minimum of **4 inches**.

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

3.5 INSTALLATION OF WALL FLASHINGS

- A. Install sheet metal wall flashing to intercept and exclude penetrating moisture in accordance with cited sheet metal standard unless otherwise indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.
- B. Opening Flashings in Frame Construction: Install continuous head, sill, jamb, and similar flashings to extend **4 inches** beyond wall openings.
- C. Reglets: Installation of reglets is specified in Section 04 20 00 "Unit Masonry."

SECTION 07 62 00 - SHEET METAL FLASHING AND TRIM

3.6 INSTALLATION TOLERANCES

- A. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerance of **1/4 inch in 20 feet** on slope and location lines indicated on Drawings and within **1/8-inch** offset of adjoining faces and of alignment of matching profiles.

3.7 CLEANING

- A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
- B. Clean and neutralize flux materials. Clean off excess solder.
- C. Clean off excess sealants.

3.8 PROTECTION

- A. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions.
- B. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures, as determined by Architect.

END OF SECTION 07 62 00

SECTION 07 62 00 - SHEET METAL FLASHING AND TRIM

Page 15 of 15

SECTION 07 84 13 - PENETRATION FIRESTOPPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Penetrations in fire-resistance-rated walls.
2. Penetrations in smoke barriers.

1.2 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site .

- 1.3 All firestopping shall only be performed by a single experienced specialty entity having the specified qualifications. Fire stopping shall not be performed by the various building disciplines such as GC, Mechanical, Electrical Plumbing, etc.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Product Schedule: For each penetration firestopping system. Include location, illustration of firestopping system, and design designation of qualified testing and inspecting agency.
1. Engineering Judgments: Where Project conditions require modification to a qualified testing and inspecting agency's illustration for a particular penetration firestopping system, submit illustration, with modifications marked, approved by penetration firestopping system manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly. Obtain approval of authorities having jurisdiction prior to submittal.

1.5 INFORMATIONAL SUBMITTALS

- A. Product test reports.

SECTION 07 84 13 - PENETRATION FIRESTOPPING

1.6 CLOSEOUT SUBMITTALS

- A. Installer Certificates: From Installer indicating that penetration firestopping systems have been installed in compliance with requirements and manufacturer's written instructions.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: A firm that has been approved by FM Approval according to FM Approval 4991, "Approval of Firestop Contractors," or been evaluated by UL and found to comply with its "Qualified Firestop Contractor Program Requirements."

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics:
 - 1. Perform penetration firestopping system tests by a qualified testing agency acceptable to authorities having jurisdiction.
 - 2. Test per testing standards referenced in "Penetration Firestopping Systems" Article. Provide rated systems complying with the following requirements:
 - a. Penetration firestopping systems shall bear classification marking of a qualified testing agency.
 - 1) UL in its "Fire Resistance Directory."
 - 2) Intertek Group in its "Directory of Listed Building Products."
 - 3) FM Approval in its "Approval Guide."

2.2 PENETRATION FIRESTOPPING SYSTEMS

- A. Penetration Firestopping Systems: Systems that resist spread of fire, passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated. Penetration firestopping systems shall be compatible with one another, with the substrates forming openings, and with penetrating items if any.
 - 1. **Manufacturers:** Subject to compliance with requirements, provide products by one of the following:
 - a. 3M Fire Protection Products.
 - b. Hilti, Inc.
 - c. Tremco Incorporated.
- B. Penetrations in Fire-Resistance-Rated Walls: Penetration firestopping systems with ratings determined per ASTM E814 or UL 1479, based on testing at a positive pressure differential of **0.01-inch wg.**
 - 1. F-Rating: Not less than the fire-resistance rating of constructions penetrated.

SECTION 07 84 13 - PENETRATION FIRESTOPPING

- C. Penetrations in Smoke Barriers: Penetration firestopping systems with ratings determined per UL 1479, based on testing at a positive pressure differential of **0.30-inch wg.**
- D. Exposed Penetration Firestopping Systems: Flame-spread and smoke-developed indexes of less than 25 and 450, respectively, per ASTM E84.
- E. Accessories: Provide components for each penetration firestopping system that are needed to install fill materials and to maintain ratings required. Use only those components specified by penetration firestopping system manufacturer and approved by qualified testing and inspecting agency for conditions indicated.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of the Work.
- B. General: Install penetration firestopping systems to comply with manufacturer's written installation instructions and published drawings for products and applications.
- C. Install forming materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings.
 - 1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not forming permanent components of firestopping.
- D. Install fill materials by proven techniques to produce the following results:
 - 1. Fill voids and cavities formed by openings, forming materials, accessories and penetrating items to achieve required fire-resistance ratings.
 - 2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
 - 3. For fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.2 IDENTIFICATION

- A. Wall Identification: Permanently label walls containing penetration firestopping systems with the words "FIRE AND/OR SMOKE BARRIER - PROTECT ALL OPENINGS," using lettering not less than **3 inches** high and with minimum **0.375-inch** strokes.

SECTION 07 84 13 - PENETRATION FIRESTOPPING

Page 3 of 4

1. Locate in accessible concealed floor, floor-ceiling, or attic space at **15 feet** from end of wall and at intervals not exceeding **30 feet**.
- B. Penetration Identification: Identify each penetration firestopping system with legible metal or plastic labels. Attach labels permanently to surfaces adjacent to and within **6 inches** of penetration firestopping system edge so labels are visible to anyone seeking to remove penetrating items or firestopping systems. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:
 1. The words "Warning - Penetration Firestopping - Do Not Disturb. Notify Building Management of Any Damage."
 2. Contractor's name, address, and phone number.
 3. Designation of applicable testing and inspecting agency.
 4. Date of installation.
 5. Manufacturer's name.
 6. Installer's name.

3.3 FIELD QUALITY CONTROL

- A. Owner will engage a qualified testing agency to perform tests and inspections according to ASTM E2174.
- B. Where deficiencies are found or penetration firestopping system is damaged or removed because of testing, repair or replace penetration firestopping system to comply with requirements.
- C. Proceed with enclosing penetration firestopping systems with other construction only after inspection reports are issued and installations comply with requirements.

END OF SECTION 07 84 13

SECTION 07 92 00 - JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Silicone joint sealants.
2. Nonstaining silicone joint sealants.
3. Urethane joint sealants.
4. Immersible joint sealants.
5. Mildew-resistant joint sealants.
6. Latex joint sealants.

1.2 PREINSTALLATION MEETINGS

- ##### A. Preinstallation Conference: Conduct conference at Project site .

1.3 ACTION SUBMITTALS

- ##### A. Product Data: For each joint-sealant product.
- ##### B. Samples: For each kind and color of joint sealant required.
- ##### C. Joint-Sealant Schedule: Include the following information:
1. Joint-sealant application, joint location, and designation.
 2. Joint-sealant manufacturer and product name.
 3. Joint-sealant formulation.
 4. Joint-sealant color.

1.4 INFORMATIONAL SUBMITTALS

- ##### A. Product test reports.
- ##### B. Preconstruction laboratory test reports.
- ##### C. Preconstruction field-adhesion-test reports.
- ##### D. Field-adhesion-test reports.
- ##### E. Sample warranties.

SECTION 07 92 00 - JOINT SEALANTS

1.5 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified according to ASTM C 1021 to conduct the testing indicated.

1.6 PRECONSTRUCTION TESTING

- A. Preconstruction Laboratory Testing: Submit to joint-sealant manufacturers, for testing indicated below, samples of materials that will contact or affect joint sealants.
 - 1. Adhesion Testing: Use ASTM C 794 to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.
 - 2. Compatibility Testing: Use ASTM C 1087 to determine sealant compatibility when in contact with glazing and gasket materials.
 - 3. Stain Testing: Use ASTM C 1248 to determine stain potential of sealant when in contact with masonry substrates.
- B. Preconstruction Field-Adhesion Testing: Before installing sealants, field test their adhesion to Project joint substrates. Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1.1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.

1.7 WARRANTY

- A. Special Installer's Warranty: Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
 - 1. Warranty Period: Two years from date of Substantial Completion.
- B. Special Manufacturer's Warranty: Manufacturer agrees to furnish joint sealants to repair or replace those joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
 - 1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 JOINT SEALANTS, GENERAL

- A. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.2 SILICONE JOINT SEALANTS

- A. Silicone, S, NS, 100/50, NT: Single-component, nonsag, plus 100 percent and minus 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 100/50, Use NT.
 - 1. **Manufacturers:** Subject to compliance with requirements, undefined:
 - a. GE Construction Sealants; Momentive Performance Materials Inc.
 - b. Sika Corporation.

2.3 NONSTAINING SILICONE JOINT SEALANTS

- A. Nonstaining Joint Sealants: No staining of substrates when tested according to ASTM C 1248.
- B. Silicone, Nonstaining, S, NS, 100/50, NT: Nonstaining, single-component, nonsag, plus 100 percent and minus 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 100/50, Use NT.
 - 1. **Manufacturers:** Subject to compliance with requirements, undefined:
 - a. Pecora Corporation.
 - b. Sika Corporation.
 - c. Tremco Incorporated.

2.4 URETHANE JOINT SEALANTS

- A. Urethane, S, NS, 25, NT: Single-component, nonsag, nontraffic-use, plus 25 percent and minus 25 percent movement capability, urethane joint sealant; ASTM C 920, Type S, Grade NS, Class 25, Use NT.
 - 1. **Manufacturers:** Subject to compliance with requirements, undefined:
 - a. Bostik; Arkema.
 - b. Everkem Diversified Products, Inc.
 - c. Pecora Corporation.
 - d. Permthane; ITW Polymer Sealants North America.
 - e. Polymeric Systems, Inc.
 - f. Sherwin-Williams Company (The).
 - g. Sika Corporation.
 - h. Tremco Incorporated.

2.5 IMMERSIBLE JOINT SEALANTS

- A. Immersible Joint Sealants. Suitable for immersion in liquids; ASTM C 1247, Class 1 ; tested in deionized water unless otherwise indicated

- B. Urethane, Immersible, S, NS, 100/50, NT, I: Immersible, single-component, nonsag, plus 100 percent and minus 50 percent movement capability, nontraffic-use, urethane joint sealant; ASTM C 920, Type S, Grade NS, Class 100/50, Uses NT, and I.
 - 1. **Manufacturers:** Subject to compliance with requirements, undefined:
 - a. Tremco Incorporated.

2.6 MILDEW-RESISTANT JOINT SEALANTS

- A. Mildew-Resistant Joint Sealants: Formulated for prolonged exposure to humidity with fungicide to prevent mold and mildew growth.
- B. Silicone, Mildew Resistant, Acid Curing, S, NS, 25, NT: Mildew-resistant, single-component, nonsag, plus 25 percent and minus 25 percent movement capability, nontraffic-use, acid-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 25, Use NT.
 - 1. **Manufacturers:** Subject to compliance with requirements, undefined:
 - a. GE Construction Sealants; Momentive Performance Materials Inc.
 - b. Pecora Corporation.
 - c. Soudal USA.
 - d. The Dow Chemical Company.
 - e. Tremco Incorporated.

2.7 JOINT-SEALANT BACKING

- A. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin) Type O (open-cell material) Type B (bicellular material with a surface skin) or any of the preceding types, as approved in writing by joint-sealant manufacturer for joint application indicated, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
 - 1. **Manufacturers:** Subject to compliance with requirements, undefined:
 - a. Adfast.
 - b. Alcot Plastics Ltd.
 - c. Construction Foam Products; a division of Nomaco, Inc.
 - d. Master Builders Solutions.
- B. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer.

2.8 MISCELLANEOUS MATERIALS

- A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials.
- C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:
 - 1. Remove laitance and form-release agents from concrete.
 - 2. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion.
- B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces.

3.2 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with ASTM C 1193 and joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
- B. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
- C. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.
- D. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
 - 1. Place sealants so they directly contact and fully wet joint substrates.
 - 2. Completely fill recesses in each joint configuration.
 - 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

SECTION 07 92 00 - JOINT SEALANTS

Page 5 of 7

- E. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants to form smooth, uniform beads of configuration indicated. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
 - 1. Provide concave joint profile per Figure 8A in ASTM C 1193 unless otherwise indicated.

3.3 FIELD QUALITY CONTROL

- A. Field-Adhesion Testing: Field test joint-sealant adhesion to joint substrates as follows:
 - 1. Extent of Testing: Test completed and cured sealant joints as follows:
 - a. Perform one test for each **1000 feet** of joint length thereafter or one test per each floor per elevation.
 - 2. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.
- B. Evaluation of Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

3.4 JOINT-SEALANT SCHEDULE

- A. Joint-Sealant Application: Exterior joints in vertical surfaces and horizontal nontraffic surfaces.
 - 1. Joint Locations:
 - a. Control and expansion joints in unit masonry.
 - b. .
 - c. Other joints as indicated on Drawings.
 - 2. Joint Sealant: Silicone, nonstaining, S, NS, 50, NT .
 - 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors .
- B. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces.
 - 1. Joint Locations:
 - a. Control and expansion joints on exposed interior surfaces of exterior walls.
 - b. Vertical joints on exposed surfaces of unit masonry concrete walls and partitions.
 - c. .
 - d. Other joints as indicated on Drawings.
 - 2. Joint Sealant: Urethane, S, NS, 25, NT .

SECTION 07 92 00 - JOINT SEALANTS

3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors .
- C. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces not subject to significant movement.
1. Joint Locations:
 - a. Control joints on exposed interior surfaces of exterior walls.
 - b. .
 2. Joint Sealant: Acrylic latex .
 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors .
- D. Joint-Sealant Application: Mildew-resistant interior joints in vertical surfaces and horizontal nontraffic surfaces.
1. Joint Locations:
 - a. Joints between plumbing fixtures and adjoining walls, floors, and counters.
 - b. .
 2. Joint Sealant: Silicone, mildew resistant, acid curing, S, NS, 25, NT .
 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors .

END OF SECTION 07 92 00

SECTION 09 29 00 - GYPSUM BOARD

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

- 1. Interior gypsum board.
- 2. Exterior gypsum board for ceilings and soffits.

- B. Related Requirements:

- 1. Section 06 16 00 "Sheathing" for gypsum sheathing for exterior walls.
- 2. Section 09 21 16.23 "Gypsum Board Shaft Wall Assemblies" for metal shaft-wall framing, gypsum shaft liners, and other components of shaft-wall assemblies.
- 3. Section 09 22 16 "Non-Structural Metal Framing" for non-structural steel framing and suspension systems that support gypsum board panels.
- 4. Section 09 26 13 "Gypsum Veneer Plastering" for gypsum base for veneer plaster and for other components of gypsum-veneer-plaster finishes.
- 5. Section 09 30 13 "Ceramic Tiling" for cementitious backer units installed as substrates for ceramic tile.

1.3 ACTION SUBMITTALS

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

- B. Samples: For the following products:

- 1. Trim Accessories: Full-size Sample in **12-inch-** long length for each trim accessory indicated.

- C. Samples for Initial Selection: For each type of trim accessory indicated.

- D. Samples for Verification: For the following products:

- 1. Trim Accessories: Full-size Sample in **12-inch-** long length for each trim accessory indicated.

SECTION 09 29 00 - GYPSUM BOARD

1.4 QUALITY ASSURANCE

- A. Mockups: Build mockups of at least **100 sq. ft.** in surface area to demonstrate aesthetic effects and to set quality standards for materials and execution.
 - 1. Build mockups for the following:
 - a. Each level of gypsum board finish indicated for use in exposed locations.
 - 2. Apply or install final decoration indicated, including painting and wallcoverings, on exposed surfaces for review of mockups.
 - 3. Simulate finished lighting conditions for review of mockups.
 - 4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.

1.6 FIELD CONDITIONS

- A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written instructions, whichever are more stringent.
- B. Do not install paper-faced gypsum panels until installation areas are enclosed and conditioned.
- C. Do not install panels that are wet, moisture damaged, and mold damaged.
 - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.
- B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

SECTION 09 29 00 - GYPSUM BOARD

2.2 GYPSUM BOARD, GENERAL

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

2.3 INTERIOR GYPSUM BOARD

- A. Gypsum Wallboard: ASTM C 1396/C 1396M.

1. **Manufacturers:** Subject to compliance with requirements, provide products by one of the following:
 - a. Certainteed; SAINT-GOBAIN.
 - b. Georgia-Pacific Gypsum LLC.
 - c. National Gypsum Company.
 - d. USG Corporation.
2. Thickness: **5/8 inch.**
3. Long Edges: Tapered .

- B. Gypsum Board, Type X: ASTM C 1396/C 1396M.

1. **Manufacturers:** Subject to compliance with requirements, provide products by one of the following:
 - a. Certainteed; SAINT-GOBAIN.
 - b. Georgia-Pacific Gypsum LLC.
 - c. National Gypsum Company.
 - d. USG Corporation.
2. Thickness: **5/8 inch.**
3. Long Edges: Tapered .

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

1. **Manufacturers:** Subject to compliance with requirements, provide products by one of the following:
 - a. Certainteed; SAINT-GOBAIN.
 - b. Georgia-Pacific Gypsum LLC.
 - c. National Gypsum Company.
2. Thickness: **1/2 inch.**
3. Long Edges: Tapered.

- D. Abuse-Resistant Gypsum Board: ASTM C 1396/C 1396M gypsum board, tested according to ASTM C 1629/C 1629M.

1. **Manufacturers:** Subject to compliance with requirements, provide products by one of the following:
 - a. Certainteed; SAINT-GOBAIN.
 - b. Georgia-Pacific Gypsum LLC.
 - c. National Gypsum Company.
 - d. USG Corporation.
2. Core: As indicated on Drawings .

SECTION 09 29 00 - GYPSUM BOARD

3. Surface Abrasion: ASTM C 1629/C 1629M, meets or exceeds Level 3 requirements.
 4. Indentation: ASTM C 1629/C 1629M, meets or exceeds Level 3 requirements.
 5. Soft-Body Impact: ASTM C 1629/C 1629M, meets or exceeds Level 3 requirements.
 6. Long Edges: Tapered.
 7. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.
- E. Impact-Resistant Gypsum Board: ASTM C 1396/C 1396M gypsum board, tested according to ASTM C 1629/C 1629M.
1. **Manufacturers:** Subject to compliance with requirements, provide products by one of the following:
 - a. Certainteed; SAINT-GOBAIN.
 - b. Georgia-Pacific Gypsum LLC.
 - c. National Gypsum Company.
 - d. USG Corporation.
 2. Core: As indicated on Drawings .
 3. Surface Abrasion: ASTM C 1629/C 1629M, meets or exceeds Level 3 requirements.
 4. Indentation: ASTM C 1629/C 1629M, meets or exceeds Level 3 requirements.
 5. Soft-Body Impact: ASTM C 1629/C 1629M, meets or exceeds Level 3 requirements.
 6. Hard-Body Impact: ASTM C 1629/C 1629M, meets or exceeds Level 3 requirements according to test in Annex A1.
 7. Long Edges: Tapered.
 8. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.
- F. Mold-Resistant Gypsum Board: ASTM C 1396/C 1396M. With moisture- and mold-resistant core and paper surfaces.
1. **Manufacturers:** Subject to compliance with requirements, provide products by one of the following:
 - a. Certainteed; SAINT-GOBAIN.
 - b. Georgia-Pacific Gypsum LLC.
 - c. National Gypsum Company.
 - d. USG Corporation.
 2. Core: As indicated .
 3. Long Edges: Tapered.
 4. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.
- 2.4 SPECIALTY GYPSUM BOARD
- A. Glass-Mat Interior Gypsum Board: ASTM C 1658/C 1658M. With fiberglass mat laminated to both sides. Specifically designed for interior use.

SECTION 09 29 00 - GYPSUM BOARD

1. **Manufacturers:** Subject to compliance with requirements, provide products by one of the following:
 - a. Georgia-Pacific Gypsum LLC.
 - b. National Gypsum Company.
 - c. USG Corporation.
2. Core: As indicated .
3. Long Edges: Tapered.
4. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

B. Acoustically Enhanced Gypsum Board: ASTM C 1396/C 1396M. Multilayer products constructed of two layers of gypsum boards sandwiching a viscoelastic sound-absorbing polymer core.

1. **Manufacturers:** Subject to compliance with requirements, provide products by one of the following:
 - a. Certainteed; SAINT-GOBAIN.
 - b. National Gypsum Company.
2. Core: As indicated .
3. Long Edges: Tapered.

2.5 EXTERIOR GYPSUM BOARD FOR CEILINGS AND SOFFITS

A. Glass-Mat Gypsum Sheathing Board: ASTM C 1177/C 1177M, with fiberglass mat laminated to both sides and with manufacturer's standard edges.

1. **Manufacturers:** Subject to compliance with requirements, provide products by one of the following:
 - a. Certainteed; SAINT-GOBAIN.
 - b. Georgia-Pacific Gypsum LLC.
 - c. National Gypsum Company.
 - d. USG Corporation.
2. Core: As indicated .

2.6 TRIM ACCESSORIES

A. Interior Trim: ASTM C 1047.

1. Material: Paper-faced galvanized-steel sheet.
2. Shapes:
 - a. Cornerbead.
 - b. Bullnose bead.
 - c. LC-Bead: J-shaped; exposed long flange receives joint compound.
 - d. L-Bead: L-shaped; exposed long flange receives joint compound.
 - e. U-Bead: J-shaped; exposed short flange does not receive joint compound.
 - f. Expansion (control) joint.
 - g. Curved-Edge Cornerbead: With notched or flexible flanges.

SECTION 09 29 00 - GYPSUM BOARD

- B. Exterior Trim: ASTM C 1047.
 - 1. Material: Hot-dip galvanized-steel sheet, plastic, or rolled zinc .
 - 2. Shapes:
 - a. Cornerbead.
 - b. LC-Bead: J-shaped; exposed long flange receives joint compound.
 - c. Expansion (Control) Joint: One-piece, rolled zinc with V-shaped slot and removable strip covering slot opening.

- C. Aluminum Trim: Extruded accessories of profiles and dimensions indicated.
 - 1. **Manufacturers:** Subject to compliance with requirements, provide products by one of the following:
 - a. Fry Reglet Corporation.
 - b. Gordon Inc.
 - c. Pittcon Industries.
 - d. Tamlyn.
 - 2. Aluminum: Alloy and temper with not less than the strength and durability properties of **ASTM B 221**, Alloy 6063-T5.
 - 3. Finish: Corrosion-resistant primer compatible with joint compound and finish materials specified .

2.7 JOINT TREATMENT MATERIALS

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

- B. Joint Tape:
 - 1. Interior Gypsum Board: Paper.
 - 2. Exterior Gypsum Soffit Board: Paper.
 - 3. Glass-Mat Gypsum Sheathing Board: 10-by-10 glass mesh.

- C. Joint Compound for Interior Gypsum Board: For each coat, use formulation that is compatible with other compounds applied on previous or for successive coats.
 - 1. Prefilling: At open joints , rounded or beveled panel edges, and damaged surface areas, use setting-type taping compound.
 - 2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use setting-type taping compound.
 - a. Use setting-type compound for installing paper-faced metal trim accessories.
 - 3. Fill Coat: For second coat, use drying-type, all-purpose compound.
 - 4. Finish Coat: For third coat, use drying-type, all-purpose compound.
 - 5. Skim Coat: For final coat of Level 5 finish, use high-build interior coating product designed for application by airless sprayer and to be used instead of skim coat to produce Level 5 finish.

- D. Joint Compound for Exterior Applications:

1. Exterior Gypsum Soffit Board: Use setting-type taping compound and setting-type, sandable topping compound.
2. Glass-Mat Gypsum Sheathing Board: As recommended by sheathing board manufacturer.

2.8 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written instructions.
- B. Steel Drill Screws: ASTM C 1002 unless otherwise indicated.
 1. Use screws complying with ASTM C 954 for fastening panels to steel members from **0.033 to 0.112 inch** thick.
 2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.
- C. Sound-Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.
 1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.
- D. Acoustical Sealant: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.
- E. Vapor Retarder: As specified in Section 07 26 00 "Vapor Retarders."

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 APPLYING AND FINISHING PANELS, GENERAL

- A. Comply with ASTM C 840.
- B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.
- C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than **1/16 inch** of open space between panels. Do not force into place.
- D. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.
- E. Form control and expansion joints with space between edges of adjoining gypsum panels.
- F. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.
 - 1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than **8 sq. ft.** in area.
 - 2. Fit gypsum panels around ducts, pipes, and conduits.
 - 3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow **1/4- to 3/8-inch-** wide joints to install sealant.
- G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments. Provide **1/4- to 1/2-inch-** wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.
- H. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.
- I. Wood Framing: Install gypsum panels over wood framing, with floating internal corner construction. Do not attach gypsum panels across the flat grain of wide-dimension lumber, including floor joists and headers. Float gypsum panels over these members or provide control joints to counteract wood shrinkage.
- J. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and with manufacturer's written instructions for locating edge

SECTION 09 29 00 - GYPSUM BOARD

Page 8 of 11

trim and closing off sound-flanking paths around or through assemblies, including sealing partitions above acoustical ceilings.

- K. Install sound attenuation blankets before installing gypsum panels unless blankets are readily installed after panels have been installed on one side.

3.3 APPLYING INTERIOR GYPSUM BOARD

- A. Install interior gypsum board in the following locations:

1. Wallboard Type: As indicated on Drawings .
2. Type X: As indicated on Drawings Where required for fire-resistance-rated assembly .
3. Ceiling Type: As indicated on Drawings .
4. Abuse-Resistant Type: As indicated on Drawings .
5. Impact-Resistant Type: As indicated on Drawings .
6. Mold-Resistant Type: As indicated on Drawings .
7. Glass-Mat Interior Type: As indicated on Drawings .
8. Acoustically Enhanced Type: As indicated on Drawings .

- B. Single-Layer Application:

1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing unless otherwise indicated.
2. On partitions/walls, apply gypsum panels horizontally (perpendicular to framing) unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.
 - a. Stagger abutting end joints not less than one framing member in alternate courses of panels.
 - b. At stairwells and other high walls, install panels horizontally unless otherwise indicated or required by fire-resistance-rated assembly.
3. On Z-shaped furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.
4. Fastening Methods: Apply gypsum panels to supports with steel drill screws.

3.4 APPLYING EXTERIOR GYPSUM PANELS FOR CEILINGS AND SOFFITS

- A. Apply panels perpendicular to supports, with end joints staggered and located over supports.

1. Install with **1/4-inch** open space where panels abut other construction or structural penetrations.
2. Fasten with corrosion-resistant screws.

3.5 APPLYING TILE BACKING PANELS

- A. Where tile backing panels abut other types of panels in same plane, shim surfaces to produce a uniform plane across panel surfaces.

3.6 INSTALLING TRIM ACCESSORIES

- A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.
- B. Control Joints: Install control joints according to ASTM C 840 and in specific locations approved by Architect for visual effect.
- C. Interior Trim: Install in the following locations:
 - 1. Cornerbead: Use at outside corners unless otherwise indicated.
 - 2. LC-Bead: Use at exposed panel edges .
 - 3. L-Bead: Use where indicated .
 - 4. U-Bead: Use at exposed panel edges .
 - 5. Curved-Edge Cornerbead: Use at curved openings.
- D. Exterior Trim: Install in the following locations:
 - 1. Cornerbead: Use at outside corners.
 - 2. LC-Bead: Use at exposed panel edges .
- E. Aluminum Trim: Install in locations indicated on Drawings .

3.7 FINISHING GYPSUM BOARD

- A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.
- B. Prefill open joints , rounded or beveled edges, and damaged surface areas.
- C. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.
- D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:
 - 1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
 - 2. Level 2: Panels that are substrate for tile Panels that are substrate for acoustical tile Where indicated on Drawings .
 - 3. Level 3: Where indicated on Drawings .

SECTION 09 29 00 - GYPSUM BOARD

4. Level 4: At panel surfaces that will be exposed to view unless otherwise indicated
 - a. Primer and its application to surfaces are specified in Section 09 91 23 "Interior Painting."
 5. Level 5: Where indicated on Drawings .
 - a. Primer and its application to surfaces are specified in Section 09 91 23 "Interior Painting."
- E. Glass-Mat Gypsum Sheathing Board: Finish according to manufacturer's written instructions for use as exposed soffit board.
- F. Glass-Mat Faced Panels: Finish according to manufacturer's written instructions.

3.8 PROTECTION

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

END OF SECTION 09 29 00

SECTION 09 51 23 - ACOUSTICAL TILE CEILINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Acoustical tiles for interior ceilings.

B. Related Requirements:

1. Section 09 51 13 "Acoustical Panel Ceilings" for ceilings consisting of mineral-base and glass-fiber-base acoustical panels and exposed suspension systems.
2. Section 09 51 33 "Acoustical Metal Pan Ceilings" for ceilings consisting of metal-pan units with exposed and concealed suspension systems.

1.2 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site .

1.3 ACTION SUBMITTALS

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

- B. Samples: For each exposed product and for each color and texture specified.

- C. Delegated-Design Submittal: For seismic restraints for ceiling systems.

1. Include design calculations for seismic restraints including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.4 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Reflected ceiling plans, drawn to scale, and coordinated with each other, using input from installers of the items involved.

- B. Product test reports.

- C. Research reports.

- D. Field quality-control reports.

SECTION 09 51 23 - ACOUSTICAL TILE CEILINGS

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance data.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 01 40 00 "Quality Requirements," to design seismic restraints for ceiling systems.
- B. Seismic Performance: Suspended ceilings shall withstand the effects of earthquake motions determined according to ASCE/SEI 7 .
- C. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Flame-Spread Index: Class A according to ASTM E 1264.
 - 2. Smoke-Developed Index: 50 or less.

2.2 ACOUSTICAL TILES

- A. **Basis-of-Design Product:** Subject to compliance with requirements, provide Armstrong Cortega or comparable product by one of the following:
 - 1. Armstrong World Industries, Inc.
- B. Acoustical Tile Standard: Manufacturer's standard tiles of configuration indicated that comply with ASTM E 1264.
- C. Classification: .
- D. Color: White .
- E. Light Reflectance (LR): .82 .
- F. Noise Reduction Coefficient (NRC): .55 .
- G. Edge/Joint Detail: Beveled, kerfed, and rabbeted; tongue and grooved; or butt .
- H. Thickness: **5/8 inch** .
- I. Modular Size: As indicated on Drawings .

2.3 ACCESSORIES

- A. Attachment Devices: Size for five times the design load indicated in ASTM C 635/C 635M, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.
- B. Seismic Clips: Manufacturer's standard seismic clips designed to secure acoustical tiles in-place during a seismic event.

2.4 METAL EDGE MOLDINGS AND TRIM

- A. Basis-of-Design Product: Subject to compliance with requirements, provide or comparable product by one of the following:
 - 1. Armstrong World Industries, Inc.
- B. Roll-Formed, Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations complying with seismic design requirements; formed from sheet metal of same material, finish, and color as that used for of suspension-system runners.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Measure each ceiling area and establish layout of acoustical tiles to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width tiles at borders unless otherwise indicated.
- B. Layout openings for penetrations centered on the penetrating items.

3.2 INSTALLATION OF SUSPENDED ACOUSTICAL TILE CEILINGS

- A. Install suspended acoustical tile ceilings according to ASTM C 636/C 636M , seismic design requirements, and manufacturer's written instructions.
- B. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical tiles.
 - 1. Do not use exposed fasteners, including pop rivets, on moldings and trim.
- C. Arrange directionally patterned acoustical tiles as indicated on reflected ceiling plans.

3.3 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a qualified special inspector to perform inspections:
1. Periodic inspection during the installation of suspended ceiling grids according to ASCE/SEI 7.

END OF SECTION 09 51 23

SECTION 09 65 13 - RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Vinyl base.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For each exposed product and for each color and texture specified.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

2.2 VINYL BASE

- A. **Manufacturers:** Subject to compliance with requirements, provide products by one of the following:
1. Armstrong World Industries, Inc.
 2. Flexco.
 3. Johnsonite; a Tarkett company.
 4. Roppe Corporation.
 5. VPI Corporation.
- B. Product Standard: ASTM F 1861, Type TV (vinyl, thermoplastic).
1. Group: I (solid, homogeneous) .
 2. Style and Location:
 - a. Style B, Cove: Provide in areas with resilient floor coverings Provide in areas with carpet tile flooring .
- C. Minimum Thickness: **0.125 inch** .
- D. Height: **4 inches** .
- E. Lengths: Cut lengths **48 inches** long or coils in manufacturer's standard length.

SECTION 09 65 13 - RESILIENT BASE AND ACCESSORIES

- F. Outside Corners: Preformed .
- G. Inside Corners: Preformed .
- H. Colors and Patterns: As indicated by manufacturer's designations .

2.3 INSTALLATION MATERIALS

- A. Adhesives: Water-resistant type recommended by resilient-product manufacturer for resilient products and substrate conditions indicated.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.
- B. Concrete Substrates for Resilient Stair Accessories: Prepare horizontal surfaces according to ASTM F 710.
 - 1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
 - 2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
 - 3. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrate alkalinity falls within range on pH scale recommended by manufacturer in writing, but not less than 5 or more than 9 pH.
 - 4. Moisture Testing: Perform tests so that each test area does not exceed **200 sq. ft.** , and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.
 - a. Anhydrous Calcium Chloride Test: ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of **3 lb of water/1000 sq. ft.** in 24 hours.
 - b. Relative Humidity Test: Using in-situ probes, ASTM F 2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.
- C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.
- D. Do not install resilient products until materials are the same temperature as space where they are to be installed.

SECTION 09 65 13 - RESILIENT BASE AND ACCESSORIES

Page 2 of 4

- E. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient products.

3.2 RESILIENT BASE INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient base.
- B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.
- C. Install resilient base in lengths as long as practical without gaps at seams and with tops of adjacent pieces aligned.
- D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
- E. Do not stretch resilient base during installation.
- F. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.
- G. Preformed Corners: Install preformed corners before installing straight pieces.

3.3 RESILIENT ACCESSORY INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient accessories.
- B. Resilient Stair Accessories:
 - 1. Use stair-tread-nose filler to fill nosing substrates that do not conform to tread contours.
 - 2. Tightly adhere to substrates throughout length of each piece.
 - 3. For treads installed as separate, equal-length units, install to produce a flush joint between units.
- C. Resilient Molding Accessories: Butt to adjacent materials and tightly adhere to substrates throughout length of each piece. Install reducer strips at edges of floor covering that would otherwise be exposed.

3.4 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protecting resilient products.
- B. Floor Polish: Remove soil, adhesive, and blemishes from resilient stair treads before applying liquid floor polish.

SECTION 09 65 13 - RESILIENT BASE AND ACCESSORIES

1. Apply two coat(s).
- C. Cover resilient products subject to wear and foot traffic until Substantial Completion.

END OF SECTION 09 65 13

**SECTION 09 65 13 - RESILIENT BASE AND
ACCESSORIES**

Page 4 of 4

SECTION 09 65 19 - RESILIENT TILE FLOORING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Vinyl composition floor tile.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For each exposed product and for each color and pattern specified.

1.3 CLOSEOUT SUBMITTALS

- A. Maintenance data.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are competent in techniques required by manufacturer for floor tile installation.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics: For resilient floor tile, as determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.
 - 1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

2.2 VINYL COMPOSITION FLOOR TILE

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Armstrong Flooring, Inc.

SECTION 09 65 19 - RESILIENT TILE FLOORING

2. Armstrong World Industries, Inc.
 3. Congoleum Flooring.
 4. Johnsonite; a Tarkett company.
- B. Tile Standard: ASTM F 1066, Class 2, through pattern .
- C. Wearing Surface: Smooth .
- D. Thickness: **0.125 inch** .
- E. Size: **12 by 12 inches**.
- F. Colors and Patterns: As indicated by manufacturer's designations .

2.3 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland-cement-based or blended hydraulic-cement-based formulation provided or approved by floor tile manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by floor tile and adhesive manufacturers to suit floor tile and substrate conditions indicated.
- C. Floor Polish: Provide protective, liquid floor-polish products recommended by floor tile manufacturer.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Prepare substrates according to floor tile manufacturer's written instructions to ensure adhesion of resilient products.
- B. Concrete Substrates: Prepare according to ASTM F 710.
1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
 2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by floor tile manufacturer. Do not use solvents.
 3. Alkalinity and Adhesion Testing: Perform tests recommended by floor tile manufacturer. Proceed with installation only after substrate alkalinity falls within range on pH scale recommended by manufacturer in writing, but not less than 5 or more than 9 pH.
 4. Moisture Testing: Perform tests so that each test area does not exceed **200 sq. ft.** , and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.

SECTION 09 65 19 - RESILIENT TILE FLOORING

Page 2 of 4

- a. Anhydrous Calcium Chloride Test: ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of **3 lb of water/1000 sq. ft.** in 24 hours.
 - b. Relative Humidity Test: Using in-situ probes, ASTM F 2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.
- C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.
- D. Do not install floor tiles until materials are the same temperature as space where they are to be installed.
1. At least 48 hours in advance of installation, move resilient floor tile and installation materials into spaces where they will be installed.
- E. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient floor tile.

3.2 FLOOR TILE INSTALLATION

- A. Comply with manufacturer's written instructions for installing floor tile.
- B. Lay out floor tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.
1. Lay tiles in pattern indicated .
- C. Match floor tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles.
1. Lay tiles in pattern of colors and sizes indicated.
- D. Scribe, cut, and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.
- E. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.
- F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor tiles as marked on substrates. Use chalk or other nonpermanent marking device.
- G. Install floor tiles on covers for telephone and electrical ducts, building expansion-joint covers, and similar items in installation areas. Maintain overall continuity of color and pattern between pieces of tile installed on covers and adjoining tiles. Tightly adhere tile edges to substrates that abut covers and to cover perimeters.

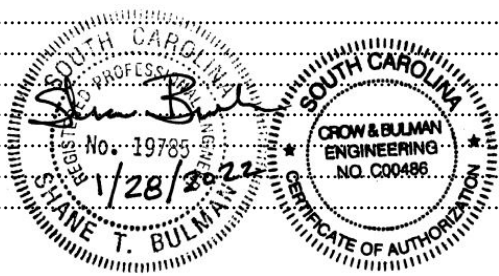
SECTION 09 65 19 - RESILIENT TILE FLOORING

- H. Adhere floor tiles to substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.
- I. Floor Polish: Remove soil, adhesive, and blemishes from floor tile surfaces before applying liquid floor polish.
 - 1. Apply two coat(s).

END OF SECTION 09 65 19

Section 23 00 01 – HEATING, VENTILATING, AND AIR CONDITIONING
TABLE OF CONTENTS

CONTRACTOR QUALIFICATIONS	2
GENERAL PROVISIONS.....	2
SHOP DRAWINGS	3
AS-BUILT DRAWINGS.....	3
SUBSTITUTE EQUIPMENT	3
ALTERNATES	4
PHASING.....	4
OWNER'S EXISTING EQUIPMENT RELOCATED.....	4
OWNER PROVIDED EQUIPMENT INSTALLATION	4
ACCEPTANCE AND COMPLETION OF JOB	4
GUARANTEE.....	5
PERMITS.....	5
CODE.....	5
CUTTING AND PATCHING.....	5
EXCAVATION AND BACKFILLING	6
UTILITY PIPING IDENTIFICATION	6
WELDING.....	6
PAINTING.....	6
FIRE STOPPING.....	7
WIND AND SEISMIC RESTRAINTS.....	7
DEMOLITION.....	8
PIPING.....	8
___ Shop Drawings.....	8
___ Sleeves and Inserts	8
___ Cleaning and Flushing Water Piping	9
___ Testing.....	10
___ Heat Pump Loop Water Piping (Above Grade, Inside Building)	10
___ Heat Pump Loop Water Piping (Niron – Polypropylene)	14
___ Natural Gas Piping	15
___ Make-up Water.....	17
___ Equipment Drains or Vents	17
___ Insulation.....	17
___ Pipe Freeze Protection	18
___ Hanger and Supports	18
___ Pipe Installation.....	20
___ Piping Specialties	20
___ Thermometers and Gauges	21
___ Pipe Labels and Valve Tags	21
___ Water Treatment.....	21
MOTORS.....	22
MOTOR STARTERS	22
___ Standard.....	22
___ Variable Speed Drives	23
ANCHOR BOLTS.....	25
VIBRATION ISOLATION.....	25
___ Pipe Flexible Connectors.....	25
___ Pipe Hangers.....	25
CONTROLS	26



___ General.....	26
___ Guarantee	26
___ Shop Drawings and Equipment Submittals	27
___ Adjusting	27
___ Record Drawings	27
___ Installation.....	27
___ Materials and Equipment.....	28
___ Program Control.....	29
___ Sequence of Operations.....	29
TESTING, ADJUSTING, AND BALANCING.....	30

Section 23 00 01 – HEATING, VENTILATING, AND AIR CONDITIONING

CONTRACTOR QUALIFICATIONS:

All Mechanical Contractors shall meet the following minimum criteria. This criteria shall be part of the contract bid documents.

1. Contractors shall have been in business a minimum of five (5) years from the duration of the project consecutively under their current name and current registration with the SC Secretary of State.
2. Contractors shall have experience in the construction of school projects in the State of SC. A list of at least five (5) years completed SC schools projects of similar scope and size which shall be submitted before issuance of a purchase order.
3. Contractors shall be individually bondable in the state of South Carolina by a surety in accordance with AIA-201.
4. Contractors, its principal operators, license holders, or corporate shareholders shall not have been involved in bankruptcy proceedings in the contracting business within the last ten (10) years or be involved in pending actions concerning bankruptcy in the contracting business.

GENERAL PROVISIONS:

The Instructions to Bidders, General Requirements, General Conditions of the Contract and the Supplementary General Conditions shall form a part of the specifications for this work insofar as they apply to these Heating, Ventilating, and Air Conditioning Specifications.

- A. The scope of work to be provided under these specifications includes the furnishing, delivering, unloading, handling, erection, adjusting, and testing of all materials, equipment and apparatus which are required for the completion and correct operation in all respects of the Heating, Ventilating, and Air Conditioning system as indicated on the drawings and specified herein.
- B. Certified vendor shop drawings shall be utilized for dimensions, connections, etc., of all equipment. Contractor shall refer to Architectural drawings for exact building dimensions, construction details, etc.

- C. The Contractor shall be responsible for coordination with all disciplines at the job to insure proper installation of the system with no interferences and with proper clearance. The progress of the work shall conform with and not delay the work of other trades. The entire installation shall be completed as soon as the condition of the building will permit.
- D. All equipment shall be installed in strict accordance with manufacturer's recommendations and instructions. These instructions shall be considered as a part of these specifications.
- E. Full opportunity shall be given to the Architect/Engineer or third party inspectors, to make any inspections as desired, of all phases of construction and equipment. Any work which is being improperly installed may be rejected as specified in the General Conditions.
- F. All mechanical equipment and materials delivered and accepted for subject job, shall become the responsibility of the contractor. Contractor shall be liable in the event of theft, loss, destruction, etc. All materials shall be properly protected from weather, moisture, or damage in any way. Water saturated fiberglass duct & pipe insulation shall be removed and replaced.
- G. Pipe and duct routing shall conform as close as possible to locations as indicated on the contract drawings. Additional offsets, fittings, etc., required due to conflicts with trades and/or to meet field conditions shall be furnished and installed as necessary.
- H. All bidders shall visit the job site and familiarize themselves with existing job conditions, as no extra cost will be allowed because of additional work necessitated or required by job conditions, unless same is brought to the attention of the Architect/Engineer prior to receipt of bids.

SHOP DRAWINGS:

After award of the contract, the successful contractor shall submit shop drawings of all items of equipment so noted in the respective sections of these specifications. Shop drawings shall be submitted as noted under the General Requirements of these specifications. Except under special permission, orders shall not be placed until shop drawings have been reviewed by the Engineer. Submittals shall be project specific; generic submittals will not be accepted.

An electronic PDF will be acceptable, but must also have at least one paper copy submitted to the engineer. Electronic copy alone is unacceptable. Paper copy must be prepared and printed by the submitting vendor.

Where required by local code officials, provide manufacturer's equipment installation literature.

AS-BUILT DRAWINGS:

Mark any changes in pipe or duct routing, equipment, or deviations from Contract Drawings on clean set of prints and a digital file; deliver to architect for transmittal to owner at completion of contract.

SUBSTITUTE EQUIPMENT:

- A. In the event the Contractor substitutes any equipment or materials in lieu of that indicated on the drawings and specified; any change in service connections (electrical, structural,

pipng, controls, drains, etc.) or fire rating or any related items, shall require the contractor to make all necessary coordination changes. The contractor shall assure that the changes do not alter the system functions as intended with original equipment.

- B. All materials and equipment shall be new and shall conform to the grade, quality and standards of those specified.
- C. Design of the system is based on installation of specified materials and equipment. Other materials and equipment may be used subject to prior approval by the Architect. Approvals granted will be issued by addenda to the specifications. Request for prior approval shall be made in writing ten (10) days prior to the bid date.
- D. The substitute manufacturers listed in these specifications shall be acceptable substitutes if they meet the specifications in all respects.

ALTERNATES:

HVAC Alternate #1:

Provide alternate price to insulate new piping on roof from exit of Mechanical Room-215A to plate and frame heat exchanger.

PHASING:

Refer to construction phase and schedule requirements in specifications section 01 10 00.

OWNER'S EXISTING EQUIPMENT RELOCATED:

Contractor shall relocate owner's existing base mounted pump and plate & frame heat exchanger to new location.

Equipment shall not be required to be warranted under the "Guarantee" section of these specifications, but the workmanship and new components shall be warranted.

OWNER PROVIDED EQUIPMENT INSTALLATION:

Contractor shall be responsible for off-loading, setting, and all connections for owner supplied cooling tower. Contractor shall not be responsible for any existing damage to the equipment, but it must be identified to the owner prior to relocation.

Equipment shall not be required to be warranted under the "Guarantee" section of these specifications, but the workmanship and new components shall be warranted.

ACCEPTANCE AND COMPLETION OF JOB:

- A. Upon completion of the job, the contractor shall furnish to the owner three complete sets, in ring binders, of all equipment instructions, including: guarantees, operation, maintenance, and installation data. Contractor shall also provide the information listed above in electronic PDF format, on a portable flash drive.

- B. After work has been completed, tested, and adjusted, the systems shall operate for five 8-hour days under normal operating conditions to demonstrate that they fulfill requirements of the plans and specifications and that they operate satisfactorily.
- C. All equipment and materials shall be thoroughly cleaned and spot painted as required.
- D. Furnish record drawings from HVAC and controls contractor.
- E. Furnish Test & Balance Report.
- F. Furnish a letter certifying testing of the gas pipe. See "Gas Pipe" in these specifications.
- G. Provide a letter from the chemical treatment contractor that all required piping systems are flushed, cleaned, and passivated.
- H. Clean all cooling and heating coils and ductwork loaded with dust/dirt during the construction phase of the work, i.e. any air handling terminals used to condition the building during the construction phase.

GUARANTEE:

The Heating, Ventilating, and Air Conditioning contractor shall guarantee the entire system for or two (2) full years from date of substantial completion. This guarantee shall include all materials and labor as required to correct any deficiencies in the equipment. The cost of said guarantee shall be a part of the original contract bid and shall not bear any additional expense to Owner. Any adjustments or corrections made within the guarantee period shall be equal to the quality of materials and workmanship originally called for and shall be subject to inspection and acceptance by the Architect/Engineer.

Where indicated in these specifications, some materials or equipment may require (or offer) an extended warranty (See individual Specification paragraphs)

Variable Speed Drives – 2 years

Equipment warranties shall commence at date of Substantial Completion.

PERMITS:

The Contractor shall obtain and pay for all permits, utility connections, and all fees otherwise required for the work.

CODE:

All work shall be installed in accordance with the SC Office of School Facilities Planning and Construction Guide, International Mechanical Code, International Fuel Gas Code, and other applicable local codes. Where specified materials and methods exceed minimum Code requirements, the drawings and specifications shall supersede the Code.

Coordinate site visits and inspections with code officials or third party inspectors.

CUTTING AND PATCHING:

Execute all necessary cutting of walls, floors, partitions, roof, etc., to properly install the work.

Care shall be exercised in cutting to avoid unnecessary damage where openings are required.

Some cutting to support the mechanical work may be accomplished by the General Contractor, refer to Architectural drawings for the extent of this work.

Cutting of building surfaces shall be accomplished with sawing and drilling, not chisels and hammer action.

Any work that compromises the existing building's fire proofing shall be patched and repaired to its original condition.

EXCAVATION AND BACKFILLING:

Execute all excavations and backfilling required for the installation of work under these specifications. Bottom of trench for underground piping shall be excavated to an even, smooth grade. All backfill shall be thoroughly tamped. All surplus earth shall be removed from building site and disposed of as directed by the owner. Provide necessary shoring for protection of trenches. Provide trench sand bed and backfill as required by other sections of these specifications.

Trench backfill shall be compacted to 90% in non-traffic areas and 95% in traffic and paved areas based on Standard Proctor Test (ASTM D 698). Backfill shall be tamped at a maximum of 12" layers.

UTILITY PIPING IDENTIFICATION:

For all outside underground piping; one foot (1 ft.) below grade and directly above each underground pipe, lay a polyethylene marking tape in the trench during the backfill. The tape shall be inscribed with a warning of "caution, underground piping below".

Additionally, adjacent to each plastic pipe and at the same elevation as the pipe, lay a single strand, 14 gauge, bare copper wire for signal location. Terminate the wire (from both directions) at the building foundation and at the entrance to the valve pit so that it will be accessible for connection to signal generator.

WELDING:

All welding shall be accomplished by certified welders, in accordance with ASME Section 9.

PAINTING:

Any exposed metal installed by this contractor and all pipe which is not insulated, galvanized or previously painted shall be properly prepared and cleaned and given a zinc rich prime coat and a final coat of black protective enamel, (except where concealed above the ceiling or located in a mechanical mezzanine).

All gas pipe (regardless of location) shall be painted as indicated above except the color shall be yellow.

FIRE STOPPING:

1. All Pipe and duct penetrations of a fire rated wall, partition or floor shall be secured against the passage of smoke and fire with a UL listed assembly.
2. Steel piping which is not subject to expansion and contraction shall be grouted solid into the wall (UL Fire Resistance Directory, 1996, System CAJ1001). This piping shall include drains and vents.
3. Steel and copper piping which is subject to expansion and contraction (because of carrying a fluid, under pressure, of varying temperatures) shall be protected with a steel sleeve (schedule 10) around the pipe, grouted solid into the wall, floor or partition, and also sealed with UL approved fire stop materials. See details on the drawings.

WIND AND SEISMIC RESTRAINTS:

1. Equipment, piping, and ductwork shall be restrained to resist wind and seismic forces. Restraints shall maintain equipment, piping, and duct work in a captive position. Restraint devices shall be designed and selected to meet the wind and seismic requirements as defined in the latest edition of the IBC (International Building Code).

Seismic Restraint:

All restraints shall be designed for an "Importance Factor", $I_p = 1.0$, except all fossil fueled equipment shall have $I_p = 1.5$. "B".

Wind Restraint:

All restraints shall be designed for a wind speed at 110 mph (3 second gust).

2. Manufacturer of seismic and wind control products shall have the following responsibilities:
 - A. Determine and submit seismic and wind restraint sizes, locations, and catalogue cut sheets.
 - B. Provide piping, ductwork and equipment seismic restraints as required by code.
 - C. Submit calculations to determine restraint loads resulting from seismic and wind forces presented in IBC, International Building Code. Seismic and wind calculations shall be certified by a licensed engineer.
 - D. Submit anchor bolt calculations, signed by a qualified engineer licensed in the State of South Carolina, showing adequacy of bolt sizing and type. Calculations shall be furnished for anchors on restraint devices, cables, isolators and rigidly mounted equipment. Calculations shall specify anchor bolt type, embedment, concrete compressive strength, minimum spacing between anchors and minimum distances of anchors from concrete edges. Concrete anchor locations shall not be near edges, stress joints, or an existing fracture. All bolts shall be ASTM A307 or better.
 - E. Roof Curb submittals shall be stamped by a qualified engineer licensed in the state of S.C.
 - F. Provide installation instructions and project site visits.

G. Provide a letter certifying installation of the seismic restraints.

H. Materials and equipment requiring restraints shall be as follows:

Seismic Category B:

- 1) Piping over 6" diameter and with pipe hangers over 12" in length

Wind:

- 1) All rooftop equipment

Specified: Seismic Control and Specialties

Substitute: Mason, Amber-Booth, Kinetics Noise Control, VMC, Vibro-Acoustics, Caldyn

DEMOLITION:

All materials and equipment removed shall become the property of the contractor and shall be disposed of by the contractor.

Any materials and equipment which the Owner wishes to salvage shall be removed by the Owner prior to the start of the Contractor's works. Coordinate with Owner.

Asbestos removal shall be by the Owner. If the Contractor suspects an area contains asbestos, the Owner/Architect should be contacted immediately.

No demolition with cutting torches shall be allowed in finished areas of the building.

See notes on drawings for extent of demolition.

PIPING:

A. Shop Drawings: Submit shop drawings for all valves, accessories, and insulation.

Quality of the Work:

With the installation of all piping and all accessories, the fit and finish shall be in accordance with a high standard of skilled craftsmanship, and with established standards of the trades and shall be neatly mounted square and plumb to the building surfaces and structures.

Unless indicated otherwise on the plans, all above ground piping and accessories shall be installed concealed in the walls or above ceilings. Any piping and accessories indicated to be installed exposed to view shall have an approved sheet metal cover, painted to match the adjacent surfaces.

B. Sleeves and Inserts: Piping passing through walls, ceilings, floors, in or under concrete slabs, beams, or any portion of the building structure, shall be free to expand and contract and shall not be embedded in plaster, concrete or masonry. Such piping shall be provided with steel sleeves or thimbles when passing through concrete or masonry walls, ceilings, floors, and such sleeves or thimbles shall be at least three-eighths (3/8) inch larger than the outside diameter of the pipe plus the insulation. Annular spaces between sleeves and pipes in the floor slab shall be filled or caulked with a non-hardening mastic.

Sleeves for insulated pipe shall be of sufficient size to allow the insulation to continue through the partition.

For pipe penetrations of fire walls refer to details on drawings.

C. Cleaning and Flushing Water Piping:

After the piping system has been tested for leaks and certified tight and leak proof, prior to making the final connections to the terminal units, the branch lines at each terminal shall be cross connected.

The entire system is to be pre-flushed for 24-48 hours (depending on the quality of water) making sure that everything is opened prior to the addition of any cleaning chemicals.

Coordinate with control contractor to insure that all control valves are open during this entire process. Where the building wings or floors are brought on in phases, due to the construction schedule, each subsequent phase added to the main shall also be flushed and treated as indicated in this specification.

Drain system until water runs clear.

Make sure system is completely filled with clean water and circulated through all parts before adding recommended amount of cleaner. Treatment company to provide cleaner. Chemical shall be a disperant for mill scale, cosmoline, cutting fluid, pipe joint compound, etc. Insure all high points have to be vented. After adding the cleaner, circulate for 48 hours, after this time clean all strainers.

Flush system completely paying special attention to all low points. This will insure all cleaner and impurities are flushed out.

Refill system with clean water and contact chemical treatment representative to test system water prior to introduction of pre-passivation and regular treatment chemical into system.

To avoid new corrosion, the water treatment representative should be present to immediately test the water to be sure that all pre-cleaner has been flushed from the system.

Pre-passivation and regular treatment chemical should be immediately added after successful testing. There should be no lapse of time between the flushing of the pre-cleaner and the refill of new clean water with pre-passivation and regular treatment chemical.

The chemical treatment representative is to be notified prior to flooding any system. This insures that the initial water treatment and corrosion inhibitors can be added to the system when it is flooded.

Provide a letter to the owner, certifying that the system has been properly cleaned, treated, and suitable for service.

At the Date of Substantial Completion demonstrate to the owner/engineer that all strainers are clean.

D. Testing:

1. General

- a. The contractor shall provide all caps, plugs, fluid flanges, temporary connections, etc., as required to meet the testing procedures. Also provide all necessary testing equipment, i.e., gauges, pumps, leak detectors, etc.
- b. The code officials and/or the owner's third party inspectors shall be contacted prior to the test and shall observe the test procedure.
- c. **Do not** test any existing piping with new piping.
- d. The contractor shall make all necessary preliminary steps to insure that the piping system is completely tight.
- e. All terminal equipment not rated for the test pressure shall be valved off or otherwise isolated from the system.

2. Hydrostatic Testing:

Fill the system with clean water and ensure all valves are open and all high points vented and with no air binding. Contractor shall then maintain the desired hydrostatic test pressure as noted in the piping specification for a period of two full hours with no drop in pressure.

3. Pneumatic Test:

Insure that all valves are open (except stop valve at terminal equipment shall be closed). Pressurize the system with air or inert gas to the pressure noted in the pipe specifications. Maintain the test pressure for a period of twenty four (24) hours with no drop in pressure. Also apply soap solution to all joints and visually inspect for bubbles.

E. Heat Pump Loop Water Piping (Above Grade, Inside Building):

1. Piping and Valves:

- a. 2" and smaller (threaded and screwed joints)

Pipe:

Schedule 40, carbon steel, ASTM A53 or A106, butt welded, or seamless, ends threaded and coupled. Pipe shall be manufactured in the U.S. of domestically sourced materials.

Fittings:

150 pound class, black malleable iron, screwed, ASTM A47, ANSI B16.3 and B2.1

Unions:

150 pound class, black malleable iron, screwed, ground joints, bronze to iron seat, ANSI B2.1, ASTM A47

Thread Sealant:

Teflon Tape 1/2" wide x 3 mil thickness, Scotch brand or approved equal

Strainers:

250 pound S.W.P., screwed, cast iron body, "Y" pattern, 20 mesh perforated stainless steel screen: Crane, Muller

Gate Valves:

125 pound S.W.P., bronze, screwed ends, inside screw, solid wedge, screwed bonnet, rising stem, repackable under pressure, U.S. made:
Hammond #640, Crane #428, NIBCO #T-111, Grinnell #3010, Stockham B-100, Milwaukee #148, Apollo #101T.

Ball Valves:

400 pound WOG, bronze, screwed ends, double TE seals and seat, full port, U.S. made: Jenkins Fig. 900-T, Crane, Hammond, Nibco, Stockham, Apollo, Milwaukee, Grinnell, Boston. Ball valves for chilled water service shall have 2" extended stem.

Globe Valves:

300 pound W.O.G., bronze screwed ends, composition disc, union bonnet, repackable under pressure, U.S. made: Hammond #IB413, Crane #7, Nibco #T-235Y, Stockham B-22, Milwaukee #590, Grinnell #3240, Apollo # 122T.

Check Valves:

125 pound S.W.P. bronze, screwed ends, screwed bonnet, swing check, U.S. made: Hammond #IB904, Crane #37, Nibco T-413B, Stockham #B-319, Milwaukee #509, Grinnell #3300, Apollo #161T.

2 1/2" and larger (welded and flanged joints)

Pipe:

Schedule 40, carbon steel, ASTM 53 or A106 Grade A or B welded or seamless, ends beveled for welding. Pipe shall be manufactured in the U.S. of domestically sourced materials.

Fittings:

150 pound class, schedule 40, carbon steel, ends beveled for welding. All elbows shall be long radius (1.5D) unless noted otherwise on the drawings. ASTM A234, ANSI B16.9

Flanges:

150 pound class, forged steel, weld neck or slip-on, flat faced and drilled

Gaskets:

1/16" red rubber

Butterfly:

150 pound WOG, fully lugged ductile iron body. Valves shall be bubble-tight shut-off, stainless steel or bronze disc, stainless steel stem, EPDMN seat, bronze

bushing, worm gear operator on valves 8" and larger, latch-lock throttling handle with memory stop on valves 6" and smaller. Valves shall have 2" extended neck and stem for insulation. Valves shall be U.S. made: Demco, Jenkins, Crane, Muller, Nibco, Stockham, Hammond, Grinnell, Watts, Milwaukee, Victaulic 300 Masterseal, Conbraco/Apollo

Gate Valve:

125 pound S.W.P. O.S. & Y., iron body, solid wedge, bolted bonnet, flanged ends, U.S. made: Nibco #F-617-0, Hammond #IR1140, Stockham G623, Crane 465-1/2, Milwaukee #T-2885, Grinnell #6020A, Apollo #611F.

Check Valve:

125 pound series, wafer (non-slam) design, iron body, bronze seat, disc and bushing stainless steel, U.S. made: Jenkins Fig. 777, Missions, Nibco Fig. W-910, Stockham Fig. WG-970, Hammond Fig. IR9253A, Grinnell Fig.300, Milwaukee, Victaulic-716

Strainers:

175 psi WOG, Y-pattern, cast iron body, flanged connection, bolted flanged covers with blow-off tapping, No. 20 mesh stainless steel wire screen or perforated metal. Mueller #751, Crane

- b. At the Contractor's option, 2 1/2" and larger steel pipe may be assembled with rigid Victaulic couplings (for above ground and below ground piping).
1. Victaulic couplings shall be self-centering and shall engage and lock in place grooved or shouldered pipe and pipe fitting ends in a positive watertight couple. Fittings shall be angular pad design for rigidity.
 2. Couplings housing clamps shall consist of two or more malleable iron castings complying with ASTM A536. Housing clamps shall hold in place a composition watersealing gasket designed so that internal water pressure serves to increase the seal's watertightness.
 3. Couplings assembly shall be securely held together by two or more trackhead, square or oval neck, steel bolts, or by single locking pin. Bolts and nuts shall be heat treated carbon steel and shall be in accordance with ASTM A183.
 4. All pipe fittings connected to mechanical pipe couplings shall be Victaulic, and shall have groove or shouldered ends and shall be fabricated or malleable iron casting in accordance with ASTM A47 or ductile iron Grade 60-45-10 in accordance with ASTM A536. Victaulic #920 mechanical style tees shall be acceptable. All elbows shall be long radius (1.5D) unless noted otherwise on the drawings.
 5. Before couplings are assembled, pipe ends and outsides or gaskets shall be lightly coated with Victaulic lubricant.

6. Pipe grooving shall be in accordance with Victaulic's specifications. Pipe may be cut-grooved or roll-grooved, except that pipe and tubing with wall thicknesses less than minimum recommended by manufacturer for cut-grooving shall be roll-grooved without removal of any metal.
 7. Valves, strainers, and suction diffusers shall be provided in accordance with paragraph E.1. or as manufactured by Victaulic.
 8. Entire coupling installation shall be in accordance with Victaulic's latest published instructions.
 9. All condenser water above and below ground piping and fittings shall be hot dipped galvanized.
 10. Substitute manufacturer: Anvil, "Gruvlok".
- c. At the Contractor's option, 2-1/2" pipe and smaller may be installed with copper pipe and fittings (sweat joint or press joint).

Piping and Valves:

a. 2" and smaller Pipe:

Type "L" copper tube, ASTM B88, with wrought copper fittings and soldered joints or press joints (Viega "Pro Press", Elkhart, Nibco).

Strainers:

250 pound S.W.P., screwed, bronze body, "Y" pattern, 20 mesh perforated stainless steel screen: Crane, Muller

Gate Valve: 125 pound S.W.P., bronze, screwed ends, inside screw, solid wedge, screwed bonnet, rising stem, repackable under pressure, U.S. made: Hammond #640, Crane #428, NIBCO #T-111, Grinnell #3010, Stockham B-100, Milwaukee #148

Ball Valves: 400 pound WOG, bronze, screwed ends, double TE seals and seats, full port, U.S. made: Jenkins Fig. 900-T, Crane, Hammond, Nibco, Stockham, Apollo, Milwaukee, Grinnell

Globe Valves: 150 pound S.W.P., bronze screwed ends, composition disc, union bonnet, repackable under pressure, U.S. made: Hammond #IB413, Crane #T-235Y, Stockham B-22, Milwaukee #590, Grinnell #3240

Check Valve:

125 pound S.W.P., bronze screwed ends, screwed bonnet, swing check, U.S. made: Hammond IB904, Crane #37, Nibco T-413B, Stockham #B-319, Milwaukee #509, Grinnell #3300

Note: Provide a brass service valve between all copper/iron connections.

2. Testing:
Test per paragraph D.2; Hydrostatic Test @ 150 psig. (prior to insulating pipe)

At the final inspection of the project, the piping system shall again be tested at 100 psig. (Excluding the boiler and other low pressure equipment).

F. Heat Pump Loop Water Piping (Niron -Polypropylene), Exterior and Underground Heat Pump Piping & Cooling Tower Piping:

1. Manufacturer's Standards:

ASTM F-2389-17a for pipe systems, CSA B137.11 for piping and fittings, ANSI 14 for piping system components. Piping and fittings shall carry a 30 year factory warranty.

2. Material:

Pipe and fittings shall be manufactured from a beta crystalline PP-RCT resin meeting the short-term properties and long-term strength requirements of ASTM F 2389 and CSA B137.11. Pipe and fittings made from a PP-RCT (PPRP) material that is made from a terpolymer, or made from standard PPR material are unacceptable.

3. Pipe:

Pipe shall be Niron Clima Pipe and shall be listed for potable water (shall have listings to NSF 14 and 61g), regardless of the whether the pipe and fittings are to be used for potable water service or HVAC service. All pipe shall be made in an extrusion process and shall be pigmented as solid steel grey in color. The piping shall be extruded with a middle layer that has glass fiber content to restrict thermal expansion.

Specified pipe is Niron Clima PP-RCT piping, SDR-11, suitable for continuous 180°F temperature and 100 PSI pressure ratings for 50 year service life.⁴

4. Fittings:

Fittings shall be manufactured from a PP-RCT resin meeting the short-term properties and long-term strength requirements of ASTM F 2389. All fittings shall comply with NSF 14, ASTM F 2389 and CSA B137.11.

The approved fittings shall be Niron Clima PP-RCT.

5. Joints:

Joints shall be electrofusion type. Transition fittings and mechanical "couplers" shall be proof-tested and approved by manufacturer. Proof of joining method qualification training is required by the construction crew staff, and shall be included with shop drawings.

6. Packaging, Handling and Storage:

The Pipe and fittings shall be packaged, handled and stored in accordance with manufacturer's recommended procedures. Piping shall be protected from exposure to UV light at all times.

7. Installation:

Install pipe materials and joints according to manufacturer's instructions and ASTM D2774 (underground piping) or ASTM F2389 (aboveground piping).

All persons conducting fusion of piping shall be certified by the pipe manufacturer and fusion equipment manufacturer for the type and size piping being installed.

- a. At the contractor's option, pipe headers may be installed full size, without reducers.
- b. All piping shall be bedded in an 18" deep clean sand bed. See detail on drawings.
- c. Pipe Marking/Locating: One foot (1 ft.) below grade and directly above each underground pipe, lay a polyethylene marking tape in the trench during the backfill. The tape shall be inscribed with a warning of "caution, underground piping below".

Additionally, adjacent to each pipe and at the same elevation as the pipe, lay a single strand, 14 gauge, bare copper wire for signal location. Terminate the wire (from both directions) in the valve pit so that it will be accessible for connection to signal generator.

8. Hydrotesting:

Test per paragraph D.2; Hydrostatic Test @ 150 psig. (prior to insulating pipe)

At the final inspection of the project, the piping system shall again be tested at 100 psig. (Excluding the boiler and other low pressure equipment).

G. Natural Gas Piping:

1. Piping and Valves

Underground:

Pipe:

All pipe sizes shall be medium density, polyethylene ASTM #D-2513, (natural gas rated).

Fittings:

Joints shall be heat fused socket, butt welded, or FM/UL approved mechanical couplings. Pipe shall be provided by the local gas utility if available.

Valves:

Medium density, PE 2406, SDR11 body, ¼ turn operation, 2" nut operator, per ANSI B16.40. Valves shall be Nordstrom #82211, KEROTEST #3PTY 11, or Perfection #46050.

All pipe, fittings, couplings, and accessories shall meet the requirements of the local gas utility authorities as well as building code officials.

Aboveground:

Pipe:

Schedule 40, wrought iron or steel pipe complying with ANSI Standard B36.10-1970, ASTM A-53 or A106

Inside Building Envelope:

2" and smaller: socket welded joints

2 1/2" and larger: welded and/or flanged joints

Outside the Building:

2" and smaller: threaded and screwed joints

2 1/2" and above: welded and/or flanged joints

Fittings:

Screwed:

150 pound class, black malleable iron

Welded:

150 pound class, Schedule 40, steel, ends beveled for welding or socket fitting

Unions:

150 pound class, black malleable iron, screwed, ground joints, bronze to iron seat

Flanges:

150 pound class, forged steel, weld neck or slip on, flat faced and drilled, with gasket

Flexible Connectors:

300 series stainless steel corrugated hose with 304 stainless steel braided cover. UL listed and CSA/AGA certified. 175 working pressure at 70°F. Maximum 18" length. By Flex-Hose, Metraflex, Mason

Thread Sealant:

Teflon tape, 1/2" wide x 3 mil thickness, scotch brand or equal

Cocks:

400 pound WOG, full port, bronze body, screwed end, rated for natural gas service, U.S. made: Crane, Hammond, Grinnell, Nibco, Stockham, Milwaukee, Apollo

Pressure Reducing Valves (or valve assemblies):

Shall comply with ANSI Z21.18 (appliance Reducing regulators) or ANSI Z21.80 (line regulators). Provide overpressure protection device (OPD) as required by ANSI Z21.18 Valves or ANSI A21.80. Where vents are required, pipe to the outside.

Pressure Reducing valves shall be sized for 1 psi inlet pressure for 2 psi meter systems or 1.5 psi inlet pressure for 5 psi meter systems.

2. Testing:

Test per paragraph D.3 Pneumatic Test at 60 psig for 2 hours.

Provide a letter to the engineer certifying that all gas pipe has been tested in accordance with the International Gas Code. The letter shall include date tested, pressure, duration, and witnesses.

3. Appliance Connections: At each appliance provide a 6" dirt leg, flexible connectors, strainer, service valve, pressure regulator (where required) and test port downstream of regulator (where regulator required).
4. Painting: Paint all exposed gas piping per "PAINTING" section of these specifications.

H. Make-up Water:

1. Pipe shall be type "L" hard copper tube, ASTM B88, with wrought copper fittings jointed with solder.
2. Testing:
Test per paragraph D.3: hydrostatic test at 150 psig.

I. Equipment Drains or Vents:

A/C Condensate: Aboveground: Unless noted otherwise on the plans, condensate drains shall be type "L" copper with wrought fittings and sweat or Pro Press joints (inside the building), or galvanized iron with threaded and screwed joints (on the roof).

Any connections with galvanized iron pipe to a stainless steel drain pan shall have a dielectric coupling.

Underground: condensate drains shall be PVC, Schedule 40. Pipe shall conform to ASTM D-2665 or D-1785, Standards and shall bear NSF seal of approval.

All Other Drains and Vents:

Galvanized iron pipe with threaded and screwed connections and fittings. Testing not required.

J. Insulation:

All cold surfaces shall be sufficiently insulated to prevent sweating.

All pipe insulation shall be installed by an independent insulating contractor. Insulate only after leak testing. Install strictly per manufacturer's recommendations.

Pipes passing thru fire rated walls and partitions and floors shall be made fire proof. Refer to detail on drawings.

Suspended piping shall have insulation saddles and rigid insulation spaces at hangers. Refer to "Hangers and Supports" section of these specifications for requirements.

Insulation shall be installed with staggered longitudinal joints.

1. Heat Pump Piping Inside Building:
Insulation not required for heat pump piping inside building.

2. Heat Exchanger and Pump installed outdoors:
Insulate with 2" of polyisocyanurate. Coat the insulation with 2 layers of mastic with an intermediate layer of glass fabric mesh. Finish shall be a .020" embossed aluminum jacket with standing seam pocket lock joints.
Before insulating, heat trace all flooded piping with Chromalox SRL (or RayChem) self-regulating pipe heating tape at one foot of tape per foot of pipe. Heat tape output shall be automatically controlled in proportion to the pipe temperature. Install the tape before insulating.

3. Piping Exposed to the Weather

- Includes piping to/from cooling tower, pump, and tower side of heat exchanger
- Provide alternate price for insulation of piping installed on roof.

Insulate with either 2" of Pittsburgh Corning "Foamglass" rigid cellular glass, or 1½" rigid isocyanurate. Pipe and fittings shall be finished with "Suran 560" 6 mil, PVDC vapor retarder film. The pipe and vapor retarder shall be covered with a jacket of .010" thickness smooth lightweight aluminum secured with aluminum bands 8" on center. All ells shall be finished with formed aluminum jackets or sunlight resistant PVC covers.

K. Pipe Freeze Protection: (for all water piping exposed to the outside or freezing weather)

- Includes piping to/from cooling tower, pump, and tower side of heat exchanger

Before insulating, heat trace all flooded piping with Chromalox SRL (or RayChem) self-regulating pipe heating tape at one foot of tape per foot of pipe. Heat tape output shall be automatically controlled in proportion to the pipe temperature. Install the tape before insulating.

Heat tape output shall be based on pipe diameter:

<u>Pipe Size</u>	<u>Heat Output</u>
3" and less	3w/ft
4" & 6"	5w/ft
8" thru 12"	8w/ft

Coordinate the heat tape junction box location with the electrical contractor.

L. Hanger and Supports:
All pipe shall be substantially supported to the building steel and/or structure. Provide hangers and insulation saddles as specified. Hangers for multiple pipes 3" and larger and run parallel shall be staggered on alternating joist and not suspended from the same joist.

Pipes racked against a wall or concrete pad shall be secured with 12 gauge, hot dipped, galvanized (outside) or plated (inside) superstrut and slide-in pipe clamps. Copper pipe shall have a rubber insert for isolation.

Piping on a roof shall have adjustable height, screw clamp, and supports with a roof pad base or contractor fabricated stand, minimum 6" above roof surface.

All suspended piping shall be hung with rods of the following sizes:

pipe	1/2" thru 2"	-3/8" threaded rods
pipe	2 1/2" thru 4"	- 1/2" threaded rods
pipe	5" and 6"	- 3/4" threaded rods
pipe	8" thru 12"	-7/8" threaded rods

All insulated piping shall have sheet metal insulation saddles at each hanger. Minimum saddle arc shall be 120°. Minimum saddle lengths shall be as follows:

pipes up to 6":	8" length metal saddle (20 ga.)
pipes 8" to 12":	14" length metal saddle (16 ga.)

Insulated pipe shall have a full perimeter, 18" length of high density, 25/50 rated, 19 psi compressive strength, isocyanurate (or 25/50 rated, 80 psi compressive strength calcium silicate for hot water or steam systems) and sheet metal insulation saddle at each pipe hanger for pipes 1-1/2" and larger. Pipes less than 1-1/2" with elastomeric insulation shall have a 12" long insert, or full perimeter section of isocyanurate insulation, or premanufactured rigid insulated pipe support by the insulation manufacturer (Armacell Ecolight or equal by other insulation manufacturer).

1. Steel Pipe:

Maximum distance between supports for steel pipe shall be as follows:

Bar joist and I beam construction:

pipe size	3/4"	1"	1-1/2"	2"	2-1/2"	3"	4"-6"	8"-12"
max. spacing	7'	7'	9'	10'	11'	12'	12'	12'

Steel pipe shall be suspended with Grinnell Fig. 260 clevis hangers, with sheet metal insulation saddles (where insulated). All insulated steel pipe shall have a section of rigid insulation at hangers as noted in the general section of "Hangers and Supports", regardless of size.

All vertical runs of piping shall be supported at each floor penetration with Fig. 241 riser clamps welded to pipe.

2. Upper Attachments:

All upper attachments shall be approved types. Submit manufacturer's literature on all attachments.

Any upper attachments suspending pipe from a roof structure with a slope greater than 2 ft. per 12 ft. shall have a pivoting hanger, Michigan Model #320 bracket and Model #35 eye nut.

Joist and beam attachments shall have a retaining strap to secure clamps against disengagement, Michigan Model 300-C.

Hanger attachments to fire protected steel shall be mounted prior to spray application of the fire protection.

M. Pipe Installation:

1. Weld-o-lets shall be acceptable in lieu of tees where branch is two sizes smaller than main.
2. All underground pipe shall have a minimum bury depth of 3 feet (top of pipe to grade) unless indicated otherwise on the plans.
3. Install water piping with a constant elevation gradient so that it shall drain to low points. Install at each low point a drain valve with hose connection.
4. Provide all sensing wells and tapings necessary to accommodate the control system, and water treatment system. Coordinate with subcontractors.
5. Locate pipe with a minimum elevation above the floor at 7'0". Where space will not allow 7' minimum, coordinate elevation with the Engineer. Mount inline pumps no higher than 8'0" above the floor, for service access.
6. All pipe mounted indicating thermometers and gages shall be installed and adjusted to be read from floor level, without need for a ladder.
7. Unless indicated otherwise on the plans, all pipe trim (strainers, valves, unions, flow balancing devices, etc.) shall be the same size as the indicated pipe size.

N. Piping Specialties:

1. Air Vents: Install air vents at all high points of water piping systems. Air vents shall be 1/4" brass cock with overflow tube piped to an accessible location. All vents shall be manual.
2. Calibrated Balancing Valves: Provide calibrated balancing valves or orifices where indicated on the drawings and at each terminal device. Valves shall have integral pointer to indicate degree of valve opening. Valve shall be rated for 125 psig working pressure, and brass body construction. Do not install with meter connections pointing downward. Bell & Gossett, Taco, Tour-Anderson, Nexus, Wheatly, Danfoss.
3. Test Ports: Provide temperature and pressure sensing ports where indicated on the drawings. Test ports shall be brass construction, 3" length to extend past insulation (or 1 1/2" in uninsulated pipe, with cap strap, EPDM Seal and NPT thread. SuperSeal by Flow Design or Petes Plug.
4. Flexible Coupling/Connectors:
Base-mounted pumps, water source heat pumps, air handling units, & refrigeration machines:

At each pipe connection 2" and larger, provide a corrugated stainless-steel hose and braid connector. Connector shall be rated at minimum 160 psi @ 70 F. Connectors shall have 150 psi ASA steel companion flanges.

Specified: 2" and larger: Metraflex

Substitute: Mason, Keflex, Amber-Booth, Flex Hose

Specified: 1-1/2" and smaller: Metraflex

Substitute: Mason, Keflex, Amber-Booth, Flex Hose

O. Thermometers and Gauges:

Furnish and install thermometers and gauges where shown on the drawings.

1. Thermometers shall be 7" scale, adjustable angle, in black case, and red spirit filled tube.

All thermometers shall be mounted in separable socket. 0 to 100 degrees F range chilled water, 30 to 240 degrees for hot water or hot and chilled water, or 0-120 degrees for water source heat pump systems. Provide extended stem at insulated pipe. Trerice BX914, Weiss, Weksler, Miljoco, or Winters.

2. Pressure Gauges: Shall have 4-1/2" steel case, 0-60 psig range (unless noted otherwise). Trerice #600C with #865-1, 300 psi gauge cock, Weiss, Weksler, Miljoco, or Winters.

Cooling tower pumps shall have a compound gauge. Thermometers and gauges shall have a minimum accuracy of 1% of scale.

P. Pipe Labels and Valve Tags:

Provide a durable color coded vinyl name tag for each pipe system. Coordinate color code with owner's code. In each mechanical room, the labels shall be a maximum of 25' on center; above ceilings, pipe labels shall be a maximum of 30' on center.

Provide a pipe label @ each main service valve.

Pipe shall be labeled as follows:

1. Heat Pump Supply; Heat Pump Return

Q. Water Treatment:

Water treatment company shall provide the following services:

1. Provide chemical agents for the initial fill and cleaning of the piping systems, hot water and chilled water. Passivate the piping. Leave the system after start-up at proper Ph, corrosion and scale inhibited, and at the proper clarity. See "Pipe Flushing" section of the specifications; provide a letter certifying initial clean and treatment.

Provide follow-up service calls as needed, but not less than quarterly, to maintain the hydronic system for one full year from date of substantial completion. Provide all required chemicals for the year.

2. Provide a condenser water treatment system to control chemical treatment and solids. A conductivity controller/timer and pump shall control biological growth thru administration of two (2) altering biocide agent (s), initiated by a time clock. The conductivity controller shall also control the pumping of chemical treatment to inhibit the formation of scale and corrosion and proportionately control dissolved solids through bleed-off. Condenser water treatment shall include the following:
 - a. Three (3) chemical pumps of corrosion-resistant materials with tubing, check valves and one (1) tank for inhibitor
 - b. One (1) conductivity controller with two timer circuits for the inhibitor pump and biocide pumps
 - c. Time clock
 - d. Solenoid valve for bleed-off
 - e. Manual control valve for bleed-off
 - f. Test kit consisting of four ml. burettes, all necessary glassware, pH color comparator, and reagents to perform the following analyses: M Alkalinity, Chloride Calcium Hardness, pH Inhibitor
 - g. One year's supply of condenser water treatment to inhibit the formations of scale, corrosion and algae, including consulting services of a water treating engineer during initial start-up and on a routine basis thereafter.
 - h. Provide necessary wiring to power and control chemical treatment components.
3. Coordinate necessary pipe taps and locations during the piping stage in the mechanical room.
4. All components shall be rigid mounted on a non-corrosive wall panel with shelf.
5. Route all wiring and flexible tubings outside of the cabinet in PVC conduit, properly secured to walls, pipes and equipment.
6. Provide a storage cabinet rated for exterior use, to house all chemical treatment hardware. Cabinet shall be PVC or Fiberglass, NEMA 4X rated, 39" H x 52" W, with double doors, wall mount, stainless or nylon lift off hinges and quarter turn latching handles. Cabinets shall be manufactured by Qube Corporation, or approved equal.

Specified: Cascade (Contact Josh Frady 864-809-9472)

Substitute: by prior approval.

MOTORS:

Unless otherwise noted, all motors shall be 40 degrees C rise, dripproof, minimum 1.15 service factor. All motors shall have overload protection.

All motors served by a variable speed drive shall be rated for variable speed service. Motors shall have motor shaft grounding protection.

MOTOR STARTERS:

A. Standard:

Provide motor starters where indicated on the equipment schedule and in the equipment specifications.

All starters shall be complete with overload protection for each line. Each starter shall be equipped with a selector switch marked "ON"- "OFF"- "AUTO". Each motor starter shall

have a control circuit transformer and holding coil. Coordinate the control voltage with controls contractor. Auxiliary contacts shall be furnished as required to fulfill the control sequence. Control transformers shall be rated at 100VA (minimum) to power the holding coil and controls.

Indoor mounted starters shall have NEMA I enclosures, outdoor mounted starters shall be NEMA 3R.

Each motor starter shall have a nameplate indicating its associated equipment and equipment no. (i.e., hot and chilled water pump). Each tag shall be black laminated phenolic plastic with engraved letters and shall be secured with screws (not glue).

Specified: Square D

Substitute: GE, Siemens, Cutler Hammer, Sprecher/Schuh

B. Variable Speed Drives:

Provide pulse width modulated, adjustable frequency drive which generates a sine-coded, adjustable voltage/frequency, three phase output for speed control of any conventional squirrel cage induction motor. The drive shall maintain a power factor of not less than .95 throughout its speed range.

1. Design Features shall include:

- a. Sine-coded, pulse width modulated output
- b. 16-bit microprocessor control logic
- c. Overload capability of 110% for 60 seconds
- d. Coast or ramp to stop
- e. Adjustable acceleration and deceleration
- f. Run and fault LEDS
- g. Run and fault contacts for customer use
- h. Controlled speed range of 10:1
- i. Process follower input: 4-20MA or 10VDC
- j. Touch pad operator controls with five digit digital frequency/speed meter
- k. Critical frequency rejection circuit
- l. Slip compensation
- m. Torque limiting circuit
- n. NEMA 1 enclosure (indoor) or NEMA 3R/FVFF (forced ventilated, fan filtered), outdoor.
- o. 5% Input A/C line reactors
- p. Speed pot for manual speed adjustments
- q. Communications board (Lon, BacNet, etc. as required to match the building control system vendor for data reports to the building control system.
- r. Output carrier frequency programmable @ 0.5,1,2,4, or 8 KHZ and randomly modulated about the selected frequency
- s. Power factor not less than .98 lagging @ any load

2. Protective Features shall include:

- a. Current limited stall prevention during acceleration, deceleration and run conditions
- b. Automatic restart after momentary power loss

- c. Start into a rotating motor with speed search
 - d. Diagnostic circuit display
 - e. DC bus CHARGE readout
 - f. Isolated operators controls
 - g. Phase to phase short circuit protection
 - h. Ground fault protection
 - i. Electronic thermal motor overload
 - j. Anti-windmill protection with DC injection before start
 - k. Heat sink over temperature protection
3. Adjustment shall include:
- a. Acceleration: 0.1 to 1800 seconds
 - b. Deceleration: 0.1 to 1800 seconds
 - c. Maximum frequency of up to 60 HZ +/- 10% via touch pad
 - d. Critical frequency rejection
 - e. Minimum frequency
 - f. Maximum frequency
 - g. Carrier frequency
 - h. Torque limit
 - i. Slip compensation
 - j. DC injection braking time
 - k. DC injection braking amplitude
 - l. Multi-step speed settings, 5 maximum
4. Environmental and Service Conditions shall be suitable for:
- a. Ambient service temperature: 10 degrees to 40 degrees C
 - b. Humidity to 90%
 - c. Service factor of 1.0
5. Starter shall be:
- a. ETL or UL listed
6. Starter Options shall include:
- a. H-O-A Switch
 - b. Ammeter
 - c. Line Bypass with Magnetic Contactors and overload protection, where indicated.
7. Provide a variable speed starter where indicated on the plans.
8. Drives shall have the following points addressable from the Building Control System:
- Motor Frequency
- a. Motor Frequency Read
 - b. Motor Current
 - c. Acceleration time
 - d. Deceleration time
 - e. Motor Rated Voltage
 - f. Motor Rated Amperag
 - g. Motor KW

- h. Drive Run
- i. Drive Status
- j. Alarms
- k. Alarm-Faults: Clear All
- l. Alarm-Faults: Notification

The drive shall carry a two (2) year "on site" warranty.

The starter shall be tested with fully loaded induction motors. The combined test data shall be analyzed to insure adherence to quality assurance specifications.

The adjustable frequency drive shall be sized for the motor horsepower and voltage as scheduled on the drawings.

Provide factory assisted start-up and check-out services. Set drives for a minimum speed of 25%.

Provide output line reactors when the distance between the drive and the motor exceeds 150 ft.

Outdoor starters shall not be mounted in direct sunlight. Provide stainless steel sun shield as required.

Factory OEM Drives:

Variable frequency drives provided and installed by the manufacturer shall meet all features, adjustments, and safeties listed above.

Independent Drives (provided separate from equipment). All drives for the HVAC equipment shall be one manufacturer.

Specified: ABB

Substitute: Danfoss/Graham, Square "D", Reliance, Toshiba, AC Tech, Siemens, Cutler-Hammer, Emerson, Yaskawa

ANCHOR BOLTS:

Provide anchor bolts for all concrete slab mounted equipment. Bolts shall be of suitable type for load and purpose and shall be accurately spaced. See "Wind and Seismic Restraints" section of these specifications for equipment requiring seismic restraints.

VIBRATION ISOLATION:

A. Pipe Flexible Connectors: (see "Piping Specialties" section of these specifications).

B. Pipe Hangers:

All pipe hangers in the cafeteria basement mechanical equipment room shall be a combination spring and neoprene element within a hanger box. The hanger shall allow 30 degrees misalignment before the rod contacts the hanger box. Hanger deflection shall match the minimum deflection specified for the equipment which it serves. Hangers shall be located as close to the overhead supports as practical. Mason #30N.

CONTROLS:

A. General:

1. It is the intent of these specifications to provide for the installation of a complete system of automatic temperature and humidity control. The system shall be designed for continuous automatic operation with a minimum of maintenance and equipment.
2. All work performed under this section shall be done by an independent controls contractor who specializes in the manufacturing, installation and servicing of automatic control systems for HVAC applications. The entire HVAC Controls scope of work shall be included in the HVAC subcontract. Controls contractor shall be Honeywell. (Contact: Windell Smith, 803-322-6397, windell.smith@honeywell.com)
3. Unless noted otherwise, all materials, labor and equipment required for the control systems hereinafter specified shall be provided by the Controls Contractor. The control vendor shall be responsible for coordination with the HVAC equipment vendor's interconnected hardware and software, as required to fulfill the specified Sequence of Operation. Provide necessary integrators, gateways, transducers, etc. or other hardware and software needed for the system operation.
4. All control wiring and conduit, including necessary transformers, relays and interlock wiring of the devices covered under this control section, shall be detailed, furnished and installed under this division of the specifications. All wiring shall be in the strict accordance with the National Electric Code and all applicable local codes.
5. All wiring in return air plenums shall be UL rated for non-combustion and smoke developed per ASTM B84.
6. All control components shall communicate via hard wired conductors (copper or fiber). This includes all communication within the HVAC building control components and communication between the HVAC controls and the building owner's local area network.
7. Provide power for all control panels, controllers, and actuators from nearest electrical panel. See electrical drawings or existing panels for locations. Where applicable, control power may be provided with the terminal equipment's motor starter or factory controls, refer to the individual equipment specs (fan coil units, heat pumps, motor starters).
8. Provide necessary assistance to Test & Balance Contractor to allow set-up and confirmation of air and water quantities; or at no cost, make available any necessary hardware and software required to set-up and/or measure maximum or minimum flow rates and temperature differentials.

B. Guarantee:

1. The control system herein specified shall be free from defects in workmanship and material under normal use and service. If within a period of twenty four (24) months from the date of completion any of the equipment herein described is proved to be

defective in workmanship or materials, it will be replaced or repaired free of charge to the Owner.

2. After completion, Contractor shall provide any service incidental to the proper performance of the control system under guarantees outlined above.

C. Shop Drawings and Equipment Submittals:

Submit the following in accordance with the requirements of paragraph entitled "Shop Drawings".

1. Submit manufacturer's literature and certified prints on each control component in the control systems.

Submittals shall include detailed valve and damper schedules.

2. Submit complete electrical wiring diagrams of the entire control systems.

a. Electrical System Wiring Diagrams:

1. Elementary Wiring Diagrams: Show the complete interconnected control system in "ladder" diagram: form with all external and internal connections and devices for motor starters, control panels, external pilot and safety devices and such other equipment terminal points with correct identification.
2. Interconnection Wiring Diagrams: Shall show all field wiring required between the various controllers, starters, panels and remote mounted devices, with conductor and terminal identification corresponding to the elementary wiring diagram.

D. Adjusting:

1. The contractor shall install, calibrate and check all control components of all systems. Contractor shall ensure proper adjustment of all controls and correct sequencing of valves and damper motors for all systems.
2. The final precise adjustments of valves, dampers and other controls to maintain design conditions shall be the sole responsibility of the controls contractor.

E. Record Drawings:

Upon completion of the work, the Contractor shall provide as-built system drawings of the entire control system. The drawings shall have certification of correctness on the face of the drawings. The as-built drawings shall become a part of the Operation and Maintenance literature.

F. Installation:

1. All control wiring, including low voltage wiring, shall be run in EMT conduit. Where a cable tray is available (by Div.26 Electrical), low voltage wire may be laid in the tray, at the contractor's option. All wiring outside the tray shall be run in conduit. At the contractor's option, where conduit is exposed above a ceiling, in a mechanical room, or in an equipment mezzanine, a section of flexible metal conduit (FMT) may be used at the end of the EMT where it connects to a terminal unit, controller, valve, or other

terminal device. The maximum length of FMT shall be 6'. Wiring shall be installed in accordance with Division 26, Electrical, of these specifications.

2. In unfinished areas, electrical conduit shall be neatly fastened to the ceiling, walls or columns with approved hangers, brackets, or straps and shall not be placed on or supported by ductwork. In finished areas all conduit shall be concealed.
3. All components of the control system shall be installed to allow ample space on all sides for maintenance of components and to permit installation of wiring by others.
4. Pipe temperature sensing devices shall be immersion type. Coordinate immersion well locations with mechanical contractor.

G. Demolition:

Remove all unused or abandoned wiring and pneumatic tubing (exposed and in cable trays or conduit) and all unused and abandoned control devices, control cabinets, and sensors. Empty conduit may remain in place where not in conflict with other wiring routes or equipment.

H. Materials and Equipment:

1. Name Plates:

- a. Nameplates outside of control cabinets shall be constructed of laminated phenolic material, black exterior with white core. All controls shall be provided with nameplates. Attach nametags with screws, pop rivets, or chains.
- b. Nameplates provided for all panel mounted "read-out" instrumentation shall also show operating ranges where applicable.

2. Control Cabinets:

a. Construction:

Control panels shall be shop fabricated with a NEMA rated enclosure, hinged and with a locking latch.

Relays shall be plug-in mounted and replaceable without disconnecting wiring connections.

All wiring within the cabinet shall be terminated on screw connected, terminal board/strips. High voltage and control voltage shall be segregated into separate wiring gutters and terminal boards. Wire and terminal strips shall be color coded or tagged for identification in conformance with the manufacturer's shop drawings. All control panel wiring shall be protected with a circuit breaker sized in accordance with the cabinet wire size. Provide a service switch.

Where required by local codes, panels shall be UL rated.

3. Two-way Control Valves (Globe Pattern) (other than fan coil or blower coil valves):

- a. Valve shall have ANSI Class IV leakage rates
- b. Service – Steam pressure below 30 psig and chilled or hot water

- c. Pattern – Globe, single seat
 - d. Body – 2 inches and smaller – screwed end brass; 2-1/2 inches and larger – flanged cast iron; 125 psi rating. Valve body size shall be not more than 2 sizes smaller than the line size.
 - e. Trim – Bronze with replaceable composition discs on bronze seats; equal percentage modulating plug, 100 to 1 rangeability
 - f. Operator –proportional control, 100 to 1 resolution, sufficient torque to provide smooth operation and tight shut-off at 50 psi differential. Operator shall have manual release for manual positioning.
4. District Network and Software:
Provide programming time necessary to upgrade the Owner's existing software to incorporate the new building controls.
5. DDC control functions, status points, and data points:
- a. Cooling Tower
 - 1) Tower water supply/return temperature
 - 2) Fan speed
 - 3) Set point adjustment, tower supply temperature
 - 4) Hi/lo water temperature alarm
 - 5) Basin heater status
- I. Program Control:
The building's HVAC equipment shall be programmed to start and stop with the time clock function of the BCS.
- J. Sequence of Operation:
- 1. General:
 - a. Controls contractor to modify existing controls system to maintain current sequence of operation and BMS monitoring on existing building and systems remaining after the Phase 2 demolition and utility relocation work. See HVAC plans for scope of work.
 - 2. Existing Cafeteria Mechanical Room:
 - a. The existing sequence and controls of the existing WSHP distribution pumps, boilers, makeup air unit, shall remain in service. See HVAC plans for equipment to be abandoned in this scope of work.
 - b. Interlock cafeteria mechanical room to 2015 mechanical room (Phase 1 Addition) to that the 2015 mechanical system is energized when the cafeteria mechanical room heat pumps system is in operation.
 - c. 2-Way Valve Control for Heat Pump Loop: When the existing WSHP loop water temperature between approximately 60°F and 90°F, the control valve shall remain fully closed. If the water temperature drops below 60°F (adjustable) or above 90°F (adjustable), the control valve shall open to its minimum open position, 10% (adjustable). The control valve shall modulate as necessary to maintain a 10°F temperature differential between the primary supply (from 2015 central plant) and

primary return. Once the exiting loop temperature, drops/rises between approximately 60°F and 90°F, the control valve shall fully close.

- d. Modify pump speed control of existing 2015 central plant heat pump loop distribution pumps in to include differential pressure inputs from cafeteria mechanical room. Heat pump loop distribution pump speed/staging shall be based on worse-case differential pressure condition of all pressure sensors connected to the 2015 mechanical system.

3. Existing Mechanical Room 215A:

- a. Existing heat pump distribution pumps, boiler pumps, and boilers shall remain as-is with their current sequence. Sequence for adding heat into heat pump loop shall remain as-is.
- b. Freeze protection: When outside temperature is below 38 F (adjustable) heat pump distribution pump shall operate to circulate water through new rooftop piping for freeze protection.
- c. New Cooling Tower and Pump: The cooling tower shall be controlled by the heat pump water loop controls. The tower fan shall be energized on low speed at 88°F loop water temperature (adjustable) and the fan speed modulate up to high at 92°F (adjustable).

A basin heater shall have an integral thermostat which shall cycle the heater to prevent the basin from freezing. Provide necessary field wiring to interlock the heater and thermostat.

Provide interlock wiring as required for the chemical treatment pump and controls, and water level controls.

TESTING, ADJUSTING, AND BALANCING:

HVAC system testing, adjusting and balancing shall be performed by an independent contractor which specializes in this work. The services required shall include:

1. verification of the performance of all equipment and automatic controls;
2. adjusting and balancing to design quantities of all air and water systems;
3. electrical power readings;
4. recording and reporting all results;
5. Field inspection during the construction phase to insure that balancing valves and dampers are installed where indicated.
6. Provide copies of all T & B site visit Deficiency Reports to the Engineer of Record at the time the report is generated.

Pre-Construction Testing:

Prior to the start of the demolition phase of work perform testing on the following existing equipment:

1. Heat pump loop pumps in Mechanical Room 215A. (GPM and head)
2. Cooling tower pump at existing cooling tower being removed. (GPM and head)
3. Measure/record differential pressure between supply and return piping at most remote 200 Wing heat pump. See HVAC plans for location.

Before final acceptance of the building, the balancing contractor shall submit to the Architect/Engineer a bound report of the balancing work containing at least the following items:

1. Schematic diagrams of the A/C systems with the balancing data keyed to the Equipment Data Sheets.
2. Equipment Data Sheets: These records shall be typewritten and submitted on AABC, or SMACNA standard forms. Recorded data shall include at least the following:
 - a. Water System:
 1. Actual and specified pressure and temperature changes across heat exchangers,
 2. Pump designation, manufacturer, impeller size, nominal H.P., voltage, amp rating.
 3. Pump actual operating amps and pressure differential.
 4. Pump flow rates and head.
 5. Flow rates for all calibrated orifice flow measuring devices and their associated set points.
 - b. Cooling Tower/Fluid Coolers:
 1. Unit manufacturer, size, and model
 2. Fan actual and full load nameplate HP, amps, and voltage (at each terminal for 3-phase)
 3. Actual and specified basin heater KW, voltage, and amps
3. A list of the test equipment and instruments used in performing the work.

Necessary software and/or assistance for coordination from the controls contractor shall be provided as noted in the CONTROLS section of these specifications.

All balancing devices shall be marked at their set points.

Mechanical Contractor shall make available plans and equipment submittals as indicated in the Equipment, General Requirements section of these specifications.

Certification:

The contractor shall submit a written certification signed by a principal of the balancing contractor's firm stating that the environmental systems have been tested, adjusted and balanced to within 10 percent of the design air flow rates.

T & B Balance Contractor shall be any AABC certified company.

END OF SECTION

SECTION 31 05 23 - CEMENT CONCRETE PAVEMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes exterior cement concrete pavement for the following:
 1. Driveways and roadways.
 2. Parking lots.
 3. Curbs and gutters.
 4. Walkways.

1.3 SUBMITTALS

- A. Product Data: For each type of manufactured material and product indicated.
- B. Design Mixes: For each concrete pavement mix. Include alternate mix designs when characteristics of materials, project conditions, weather, test results, or other circumstances warrant adjustments.
- C. Samples: 10-lb sample of exposed aggregate.
- D. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated, based on comprehensive testing of current materials:
 - 1. Cementitious materials and aggregates.
 - 2. Steel reinforcement and reinforcement accessories.
 - 3. Fiber reinforcement.
 - 4. Admixtures.
 - 5. Curing compounds.
 - 6. Applied finish materials.
 - 7. Bonding agent or adhesive.
 - 8. Joint fillers.
- F. Minutes of preinstallation conference

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has completed pavement work similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

- B. Manufacturer Qualifications: Manufacturer of ready-mixed concrete products complying with ASTM C 94 requirements for production facilities and equipment.
 - 1. Manufacturer must be certified according to the National Ready Mix Concrete Association's Plant Certification Program.
- C. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 to conduct the testing indicated, as documented according to ASTM E 548.
- D. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant and each aggregate from one source.
- E. ACI Publications: Comply with ACI 301, "Specification for Structural Concrete," unless modified by the requirements of the Contract Documents.
- F. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixes.
- G. Mockups: Cast mockups of full-size sections of concrete pavement to demonstrate typical joints, surface finish, texture, color, and standard of workmanship.
 - 1. Build mockups in the location and of the size indicated or, if not indicated, as directed by Architect.
 - 2. Notify Architect seven days in advance of dates and times when mockups will be constructed.
 - 3. Obtain Architect's approval of mockups before starting construction.
 - 4. Maintain approved mockups during construction in an undisturbed condition as a standard for judging the completed pavement.
 - 5. Demolish and remove approved mockups from the site when directed by Architect.
 - 6. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- H. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Meetings."
 - 1. Before submitting design mixes, review concrete pavement mix design and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with concrete pavement to attend, including the following:
 - a. Contractor's superintendent.
 - b. Independent testing agency responsible for concrete design mixes.
 - c. Ready-mix concrete producer.
 - d. Concrete subcontractor.

1.5 PROJECT CONDITIONS

- A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.

PART 2 - PRODUCTS

2.1 FORMS

- A. Form Materials: Plywood, metal, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, smooth exposed surfaces.
 - 1. Use flexible or curved forms for curves of a radius 100 feet or less.
- B. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

2.2 STEEL REINFORCEMENT

- A. Plain-Steel Welded Wire Fabric: ASTM A 185, fabricated from as-drawn steel wire into flat sheets.
- B. Deformed-Steel Welded Wire Fabric: ASTM A 497, flat sheet.
- C. Reinforcement Bars: ASTM A 615/A 615M, Grade 60, deformed.
- D. Steel Bar Mats: ASTM A 184/A 184M; with ASTM A 615/A 615M, Grade 60, deformed bars; assembled with clips.
- E. Plain Steel Wire: ASTM A 82, as drawn.
- F. Joint Dowel Bars: Plain steel bars, ASTM A 615/A 615M, Grade 60. Cut bars true to length with ends square and free of burrs.
- G. Tie Bars: ASTM A 615/A 615M, Grade 60, deformed.
- H. Hook Bolts: ASTM A 307, Grade A, internally and externally threaded. Design hook-bolt joint assembly to hold coupling against pavement form and in position during concreting operations, and to permit removal without damage to concrete or hook bolt.
- I. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcement bars, welded wire fabric, and dowels in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete or fiber-reinforced concrete of greater compressive strength than concrete, and as follows:
 - 1. Equip wire bar supports with sand plates or horizontal runners where base material will not support chair legs.

2.3 CONCRETE MATERIALS

- A. General: Use the same brand and type of cementitious material from the same manufacturer throughout the Project.
- B. Portland Cement: ASTM C 150, Type I or II.

1. Fly Ash: ASTM C 618, Class F or C.
 2. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.
- C. Blended Hydraulic Cement: ASTM C 595M, Type IS, portland blast-furnace slag cement.
- D. Aggregate: ASTM C 33, uniformly graded, from a single source, with coarse aggregate as follows:
1. Class: 1N.
 2. Maximum Aggregate Size: 3/4-inch nominal.
 3. Do not use fine or coarse aggregates containing substances that cause spalling.
- E. Water: ASTM C 94.

2.4 ADMIXTURES

- A. General: Admixtures certified by manufacturer to contain not more than 0.1 percent water-soluble chloride ions by mass of cement and to be compatible with other admixtures.
- B. Air-Entraining Admixture: ASTM C 260.
- C. Water-Reducing and Accelerating Admixture: ASTM C 494, Type E.

2.5 FIBER REINFORCEMENT

- A. Synthetic Fiber: Fibrillated polypropylene fibers engineered and designed for use in concrete pavement, complying with ASTM C 1116, Type III, 1/2 to 1-1/2 inches long.
- B. Products: Subject to compliance with requirements, provide one of the following:
1. Fibrillated Fibers:
 - a. Fibrasol F; Axim Concrete Technologies.
 - b. Fibermesh; Fibermesh, Div. of Synthetic Technologies.
 - c. Forta CR; Forta Corporation.
 - d. Grace Fibers; W. R. Grace & Co., Construction Products Div.

2.6 CURING MATERIALS

- A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. dry.
- B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- C. Water: Potable.
- D. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.

- E. Clear Solvent-Borne Liquid-Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B.
- F. Products: Subject to compliance with requirements, provide one of the following:
 - 1. Evaporation Retarder:
 - a. Finishing Aid Concentrate; Burke Group, LLC (The).
 - b. Aquafilm; Conspec Marketing & Manufacturing Co., Inc.
 - c. Sure Film; Dayton Superior Corporation.
 - d. Eucobar; Euclid Chemical Co.
 - e. Lambco Skin; Lambert Corporation.
 - f. E-Con; L&M Construction Chemicals, Inc.
 - g. Finishing Aid; Symons Corporation.
 - 2. Clear Solvent-Borne Liquid-Membrane-Forming Curing Compound:
 - a. Res-X Cure All Resin; Burke Group, LLC (The).
 - b. RX Cure; Conspec Marketing & Manufacturing Co., Inc.
 - c. Day-Chem Rez Cure; Dayton Superior Corporation.
 - d. Kurez DR; Euclid Chemical Co.
 - e. #64 Resin Cure; Lambert Corporation.
 - f. L&M Cure DR; L&M Construction Chemicals, Inc.
 - g. Resi-Chem C309; Symons Corporation.

2.7 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber.
- B. Pavement-Marking Paint: Alkyd-resin type; ready mixed; complying with FS TT-P-115, Type I, or AASHTO M 248, Type N.
- C. Pavement-Marking Paint: Latex, water-base emulsion; ready mixed; complying with FS TT-P-1952.
 - 1. Color: As indicated.
- D. Glass Beads: AASHTO M 247.
- E. Wheel Stops: Precast, air-entrained concrete; 2500-psi minimum compressive strength; approximately 6 inches high, 9 inches wide, and 84 inches long. Provide chamfered corners and drainage slots on underside and provide holes for dowel-anchoring to substrate.
 - 1. Dowels: Galvanized steel, diameter of 3/4 inch, minimum length 10 inches.
- F. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.
- G. Epoxy Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class and grade to suit requirements, and as follows:
 - 1. Type II, non-load bearing, for bonding freshly mixed concrete to hardened concrete.
 - 2. Types I and II, non-load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.
 - 3. Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

2.8 CONCRETE MIXES

- A. Prepare design mixes, proportioned according to ACI 211.1 and ACI 301, for each type and strength of normal-weight concrete determined by either laboratory trial mixes or field experience.
- B. Use a qualified independent testing agency for preparing and reporting proposed mix designs for the trial batch method.
 - 1. Do not use Owner's field quality-control testing agency as the independent testing agency.
- C. Proportion mixes to provide concrete with the following properties:
 - 1. Compressive Strength (28 Days): 4000 psi.
 - 2. Maximum Water-Cementitious Materials Ratio: 0.50.
- D. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement according to ACI 301 requirements for concrete exposed to deicing chemicals.
- E. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:
 - 1. Fly Ash: 25 percent.
 - 2. Combined Fly Ash and Pozzolan: 25 percent.
 - 3. Ground Granulated Blast-Furnace Slag: 50 percent.
 - 4. Combined Fly Ash or Pozzolan and Ground Granulated Blast-Furnace Slag: 50 percent portland cement minimum, with fly ash or pozzolan not exceeding 25 percent.
- F. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having an air content of 2.5 to 4.5 percent.
- G. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having an air content as follows within a tolerance of plus or minus 1.5 percent:
 - 1. Air Content: 5.5 percent for 1-1/2-inch maximum aggregate.
 - 2. Air Content: 6.0 percent for 1-inch maximum aggregate.
 - 3. Air Content: 6.0 percent for 3/4-inch maximum aggregate.
- H. Synthetic Fiber: Uniformly disperse in concrete mix at manufacturer's recommended rate, but not less than 1.0 lb/cu. yd..

2.9 CONCRETE MIXING

- A. Ready-Mixed Concrete: Comply with requirements and with ASTM C 94 and ASTM C 1116.
 - 1. When air temperature is between 85 deg F and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.
- B. Project-Site Mixing: Comply with requirements and measure, batch, and mix concrete materials and concrete according to ASTM C 94. Mix concrete materials in appropriate drum-type batch machine mixer.
 - 1. For mixers of 1 cu. yd. or smaller capacity, continue mixing at least one and one-half minutes, but not more than five minutes after ingredients are in mixer, before any part of batch is released.

2. For mixers of capacity larger than 1 cu. yd., increase mixing time by 15 seconds for each additional 1 cu. yd..
3. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mix type, mix time, quantity, and amount of water added.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Proof-roll prepared subbase surface to check for unstable areas and verify need for additional compaction. Proceed with pavement only after nonconforming conditions have been corrected and subgrade is ready to receive pavement.
- B. Remove loose material from compacted subbase surface immediately before placing concrete.

3.2 EDGE FORMS AND SCREED CONSTRUCTION

- A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides for pavement to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.
- B. Clean forms after each use and coat with form release agent to ensure separation from concrete without damage.

3.3 STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating reinforcement and with recommendations in CRSI's "Placing Reinforcing Bars" for placing and supporting reinforcement.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, or other bond-reducing materials.
- C. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement. Maintain minimum cover to reinforcement.
- D. Install welded wire fabric in lengths as long as practicable. Lap adjoining pieces at least one full mesh, and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.
- E. Install fabricated bar mats in lengths as long as practicable. Handle units to keep them flat and free of distortions. Straighten bends, kinks, and other irregularities, or replace units as required before placement. Set mats for a minimum 2-inch overlap to adjacent mats.

3.4 JOINTS

- A. General: Construct construction, isolation, and contraction joints and tool edgings true to line with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline, unless otherwise indicated.

1. When joining existing pavement, place transverse joints to align with previously placed joints, unless otherwise indicated.
- B. Construction Joints: Set construction joints at side and end terminations of pavement and at locations where pavement operations are stopped for more than one-half hour, unless pavement terminates at isolation joints.
 1. Provide preformed galvanized steel or plastic keyway-section forms or bulkhead forms with keys, unless otherwise indicated. Embed keys at least 1-1/2 inches into concrete.
 2. Continue reinforcement across construction joints, unless otherwise indicated. Do not continue reinforcement through sides of pavement strips, unless otherwise indicated.
 3. Provide tie bars at sides of pavement strips where indicated.
 4. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
 5. Use epoxy bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
- C. Isolation Joints: Form isolation joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, walks, other fixed objects, and where indicated.
 1. Locate expansion joints at intervals of 50 feet, unless otherwise indicated.
 2. Extend joint fillers full width and depth of joint.
 3. Terminate joint filler less than 1/2 inch or more than 1 inch below finished surface if joint sealant is indicated.
 4. Place top of joint filler flush with finished concrete surface if joint sealant is not indicated.
 5. Furnish joint fillers in one-piece lengths. Where more than one length is required, lace or clip joint-filler sections together.
 6. Protect top edge of joint filler during concrete placement with metal, plastic, or other temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint.
- D. Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt-coat one-half of dowel length to prevent concrete bonding to one side of joint.
- E. Contraction Joints: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of the concrete thickness, as follows:
 1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint with groover tool to the following radius. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover marks on concrete surfaces.
 - a. Radius: 1/4 inch.
 2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch-wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before developing random contraction cracks.
- F. Edging: Tool edges of pavement, gutters, curbs, and joints in concrete after initial floating with an edging tool to the following radius. Repeat tooling of edges after applying surface finishes. Eliminate tool marks on concrete surfaces.
 1. Radius: 1/4 inch.

3.5 CONCRETE PLACEMENT

- A. Inspection: Before placing concrete, inspect and complete formwork installation, reinforcement steel, and items to be embedded or cast in. Notify other trades to permit installation of their work.
- B. Remove snow, ice, or frost from subbase surface and reinforcement before placing concrete. Do not place concrete on frozen surfaces.
- C. Moisten subbase to provide a uniform dampened condition at the time concrete is placed. Do not place concrete around manholes or other structures until they are at the required finish elevation and alignment.
- D. Comply with requirements and with recommendations in ACI 304R for measuring, mixing, transporting, and placing concrete.
- E. Do not add water to concrete during delivery, at Project site, or during placement.
- F. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.
- G. Consolidate concrete by mechanical vibrating equipment supplemented by hand-spading, rodding, or tamping. Use equipment and procedures to consolidate concrete according to recommendations in ACI 309R.
 - 1. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand-spreading and consolidation. Consolidate with care to prevent dislocating reinforcement, dowels, and joint devices.
- H. Place concrete in two operations; strike off initial pour for entire width of placement and to the required depth below finish surface. Lay welded wire fabric or fabricated bar mats immediately in final position. Place top layer of concrete, strike off, and screed.
 - 1. Remove and replace portions of bottom layer of concrete that have been placed more than 15 minutes without being covered by top layer, or use bonding agent if approved by Architect.
- I. Screed pavement surfaces with a straightedge and strike off. Commence initial floating using bull floats or darbies to form an open textured and uniform surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading dry-shake surface treatments.
- J. Curbs and Gutters: When automatic machine placement is used for curb and gutter placement, submit revised mix design and laboratory test results that meet or exceed requirements. Produce curbs and gutters to required cross section, lines, grades, finish, and jointing as specified for formed concrete. If results are not approved, remove and replace with formed concrete.
- K. When adjoining pavement lanes are placed in separate pours, do not operate equipment on concrete until pavement has attained 85 percent of its 28-day compressive strength.
- L. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from

physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

1. When air temperature has fallen to or is expected to fall below 40 deg F, uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F and not more than 80 deg F at point of placement.
2. Do not use frozen materials or materials containing ice or snow.
3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators, unless otherwise specified and approved in mix designs.

M. Hot-Weather Placement: Place concrete according to recommendations in ACI 305R and as follows when hot-weather conditions exist:

1. Cool ingredients before mixing to maintain concrete temperature at time of placement below 90 deg F. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
2. Cover reinforcement steel with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
3. Fog-spray forms, reinforcement steel, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

3.6 CONCRETE FINISHING

- A. General: Wetting of concrete surfaces during screeding, initial floating, or finishing operations is prohibited.
- B. Float Finish: Begin the second floating operation when bleed-water sheen has disappeared and the concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats, or by hand floating if area is small or inaccessible to power units. Finish surfaces to true planes. Cut down high spots and fill low spots. Refloat surface immediately to uniform granular texture.
 1. Medium-to-Coarse-Textured Broom Finish: Provide a coarse finish by striating float-finished concrete surface 1/16 to 1/8 inch deep with a stiff-bristled broom, perpendicular to line of traffic.

3.7 CONCRETE PROTECTION AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and follow recommendations in ACI 305R for hot-weather protection during curing.
- B. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darning concrete, but before float finishing.
- C. Begin curing after finishing concrete, but not before free water has disappeared from concrete surface.

- D. Curing Methods: Cure concrete by moisture curing, moisture-retaining-cover curing, curing compound, or a combination of these as follows:
1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
 - a. Water.
 - b. Continuous water-fog spray.
 - c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.
 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
 3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

3.8 PAVEMENT TOLERANCES

- A. Comply with tolerances of ACI 117 and as follows:
1. Elevation: 1/4 inch.
 2. Thickness: Plus 3/8-inch, minus 1/4 inch.
 3. Surface: Gap below 10-foot- long, unlevelled straightedge not to exceed 1/4 inch.
 4. Lateral Alignment and Spacing of Tie Bars and Dowels: 1 inch.
 5. Vertical Alignment of Tie Bars and Dowels: 1/4 inch.
 6. Alignment of Tie-Bar End Relative to Line Perpendicular to Pavement Edge: 1/2 inch.
 7. Alignment of Dowel-Bar End Relative to Line Perpendicular to Pavement Edge: Length of dowel 1/4 inch per 12 inches.
 8. Joint Spacing: 3 inches.
 9. Contraction Joint Depth: Plus 1/4 inch, no minus.
 10. Joint Width: Plus 1/8 inch, no minus.

3.9 PAVEMENT MARKING

- A. Do not apply pavement-marking paint until layout, colors, and placement have been verified with Architect.
- B. Allow concrete pavement to cure for 28 days and be dry before starting pavement marking.
- C. Sweep and clean surface to eliminate loose material and dust.
- D. Apply paint with mechanical equipment to produce pavement markings of dimensions indicated with uniform, straight edges. Apply at manufacturer's recommended rates to provide a minimum wet film thickness of 15 mils.
1. Broadcast glass spheres uniformly into wet pavement markings at a rate of 6 lb/gal..

3.10 WHEEL STOPS

- A. Securely attach wheel stops into pavement with not less than two galvanized steel dowels embedded in holes cast into wheel stops. Firmly bond each dowel to wheel stop and to pavement. Extend upper portion of dowel 5 inches into wheel stop and lower portion a minimum of 5 inches into pavement.

3.11 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing and inspection agency to sample materials, perform tests, and submit test reports during concrete placement. Sampling and testing for quality control may include those specified in this Article.
- B. Testing Services: Testing shall be performed according to the following requirements:
 - 1. Sampling Fresh Concrete: Representative samples of fresh concrete shall be obtained according to ASTM C 172, except modified for slump to comply with ASTM C 94.
 - 2. Slump: ASTM C 143; one test at point of placement for each compressive-strength test, but not less than one test for each day's pour of each type of concrete. Additional tests will be required when concrete consistency changes.
 - 3. Air Content: ASTM C 231, pressure method; one test for each compressive-strength test, but not less than one test for each day's pour of each type of air-entrained concrete.
 - 4. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each set of compressive- strength specimens.
 - 5. Compression Test Specimens: ASTM C 31/C 31M; one set of four standard cylinders for each compressive-strength test, unless otherwise indicated. Cylinders shall be molded and stored for laboratory-cured test specimens unless field-cured test specimens are required.
 - 6. Compressive-Strength Tests: ASTM C 39; one set for each day's pour of each concrete class exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 50 cu. yd.. One specimen shall be tested at 7 days and two specimens at 28 days; one specimen shall be retained in reserve for later testing if required.
 - 7. When frequency of testing will provide fewer than five compressive-strength tests for a given class of concrete, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
 - 8. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, current operations shall be evaluated and corrective procedures shall be provided for protecting and curing in-place concrete.
 - 9. Strength level of concrete will be considered satisfactory if averages of sets of three consecutive compressive-strength test results equal or exceed specified compressive strength and no individual compressive-strength test result falls below specified compressive strength by more than 500 psi.
- C. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 24 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing agency, concrete type and class, location of concrete batch in pavement, design compressive strength at 28 days, concrete mix proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.

- D. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as the sole basis for approval or rejection.
- E. Additional Tests: Testing agency shall make additional tests of the concrete when test results indicate slump, air entrainment, concrete strengths, or other requirements have not been met, as directed by Architect. Testing agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42, or by other methods as directed.

3.12 REPAIRS AND PROTECTION

- A. Remove and replace concrete pavement that is broken, damaged, or defective, or does not meet requirements in this Section.
- B. Drill test cores where directed by Architect when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory pavement areas with portland cement concrete bonded to pavement with epoxy adhesive.
- C. Protect concrete from damage. Exclude traffic from pavement for at least 14 days after placement. When construction traffic is permitted, maintain pavement as clean as possible by removing surface stains and spillage of materials as they occur.
- D. Maintain concrete pavement free of stains, discoloration, dirt, and other foreign material. Sweep concrete pavement not more than two days before date scheduled for Substantial Completion inspections.

END OF SECTION 31 05 23

SECTION 31 20 00 - EARTHWORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:

1. Preparing and grading subgrades for slabs-on-grade, and landscaping.
2. Excavating and backfilling for buildings and structures.
3. Drainage and moisture-control fill course for slabs-on-grade.

- B. Related Sections: The following Sections contain requirements that relate to this Section.

1. Division 31 Section "Site Clearing" for coordination,

1.3 UNIT PRICES

- A. Rock Measurement: Colum of rock actually removed, measured in original position, but not to exceed the following:

1. 12 inches outside of concrete forms other than at footings.
2. 12 inches outside of concrete forms at footings.
3. 6 inches beneath bottom of concrete slabs on grade.

- B. Unit prices for rock excavation include replacement with approved materials.

1.4 DEFINITIONS

- A. Excavation consists of the removal of material encountered to subgrade elevations and the reuse or disposal of materials removed.

- B. Subgrade: The uppermost surface of an excavation or the top surface of a fill or backfill immediately below subbase, drainage fill, or topsoil materials.

- C. Drainage Fill: Course of washed granular material supporting slab-on-grade placed to cut off upward capillary flow of pore water.

- D. Unauthorized excavation consists of removing materials beyond indicated subgrade elevations or dimensions without direction by the Architect. Unauthorized excavation, as well as remedial work directed by the Architect, shall be at the Contractor's expense.
- E. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below ground surface.

1.5 SUBMITTALS

- A. General: Submit the following according to the Conditions of the Contract and Division 1 Specification Sections.
- B. Test Reports: In addition to test reports required under field quality control, submit the following:
 - 1. Laboratory analysis of each soil material proposed for fill and backfill from borrow sources.
 - 2. One optimum moisture-maximum density curve for each soil material.
 - 3. Report of actual unconfined compressive strength and/or results of bearing tests of each stratum tested.

1.6 QUALITY ASSURANCE

- A. Codes and Standards: Perform earthwork complying with requirements of authorities having jurisdiction.
- B. Comply with applicable requirements of NFPA 495--Explosive Materials Code.
- C. Testing and Inspection Service: Testing will be provided as described under Division 01 Section – Quality Control to provide a qualified independent geotechnical engineering testing agency to classify proposed on-site and borrow soils to verify that soils comply with specified requirements and to perform required field and laboratory testing.
- D. The Contractor shall fully comply with all provisions of the Contract Documents including, but not limited to, providing and installing such entities as the products, materials, equipment, components, or systems that were proposed at the time bids were received. Except for extenuating circumstances as determined by the Architect, notification of not being able to meet any of the provisions of the Contract Documents or communicating conflicts in the Contract Documents to the Architect will not be considered after receipt of bids; and the Contractor shall fully comply with the Contract Documents at no increase in Contract Sum or Contract Time.

1.7 PROJECT CONDITIONS

- A. Existing Utilities: Do not interrupt existing utilities serving facilities occupied by the Owner or others except when permitted in writing by the Architect and then only after acceptable temporary utility services have been provided.
 - 1. Provide a minimum 48-hours' notice to the Architect and receive written notice to proceed before interrupting any utility.
- B. Demolish and completely remove from site existing underground utilities indicated to be removed. Coordinate with utility companies to shutoff services if lines are active.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

- A. General: Provide approved borrow soil materials from off-site when sufficient approved soil materials are not available from excavations.
- B. Satisfactory Soil Materials: ASTM D 2487 soil classification groups GW, GP, GM, SW, SP, and SM; free of rock or gravel larger than 2 inches in any dimension, debris, waste, frozen materials, vegetation and other deleterious matter.
- C. Unsatisfactory Soil Materials: ASTM D 2487 soil classification groups GC, SC, ML, MH, CL, CH, OL, OH, and PT.
- D. Backfill and Fill Materials: Satisfactory soil materials.
- E. Drainage Fill: Washed, evenly graded mixture of crushed stone, or crushed or uncrushed gravel, ASTM D 448, coarse aggregate grading size 57, with 100 percent passing a 1-1/2 inch sieve and not more than 5 percent passing a No. 8 sieve.
- F. Impervious Fill: Clayey gravel and sand mixture capable of compacting to a dense state.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.
- B. Protect subgrades and foundation soils against freezing temperatures or frost. Provide protective insulating materials as necessary.

C. Erosion Control

1. Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of water runoff, soil-bearing water runoff, or airborne dust to adjacent properties, walkways, roadways, and structures. The Contractor shall be responsible for all consequential damage and resulting cleanup and repairs caused by soil erosion and discharge of water runoff, and soil-bearing water runoff, or airborne dust to adjacent properties, walkways, roadways, and structures.
2. Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
3. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.2 DEWATERING

- A. Prevent surface water and subsurface or ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.
- B. Protect subgrades and foundation soils from softening and damage by rain or water accumulation.
- C. Lower water table to a minimum depth of at least 2 feet below bearing levels and excavation bottoms during construction.

3.3 EXCAVATION

- A. Classified Excavation: Excavation is classified and includes excavation to required subgrade elevations. Excavation will be classified as earth excavation or rock excavation as follows:
 1. Earth excavation includes excavation of pavements and other obstructions visible on surface; underground structures, utilities, and other items indicated to be demolished and removed; together with soil and other materials encountered that are not classified as rock or unauthorized excavation.
 - a. Intermittent drilling or ripping to increase production and not necessary to permit excavation of material encountered will be classified as earth excavation.
 - b. The width of trench excavation for pipe shall be the equal to the pipe diameter plus 16 inches.
 2. Rock excavation includes removal and disposal of rock material and obstructions encountered that cannot be removed by the following heavy-duty rock excavating equipment without systematic drilling, blasting, or ripping.
 - a. Rock material includes boulders 1 cu. yd. or more in volume and rock in beds, ledges, unstratified masses, and conglomerate deposits.

3. Rock Excavation

- a. Massive Rock Excavation: Any material that cannot be excavated with a single tooth ripper drawn by a crawler tractor having a minimum fly wheel power rated not less than 285 horsepower (Caterpillar D-8N or equivalent) and occupying an original volume of at least one cubic yard.
 - b. Trench Excavation: Any material that cannot be excavated with a Caterpillar 325 and occupying an original volume of at least 1 cubic yard or more.
4. Rock excavation will be paid by unit prices included in the Contract Documents.
 5. Do not excavate rock until it has been classified and cross-sectioned by Architect.

3.4 STABILITY OF EXCAVATIONS

- A. Comply with local codes, ordinances, and requirements of authorities having jurisdiction to maintain stable excavations.

3.5 EXCAVATION FOR STRUCTURES

- A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1.2 inches. Extend excavations a sufficient distance from structures for placing and removing concrete formwork, installing services and other construction, and for inspections.
 1. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.

3.6 APPROVAL OF SUBGRADE

- A. Notify Architect when excavations have reached required subgrade.
- B. When Architect determines that unforeseen unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.
 1. Unforeseen additional excavation and replacement material will be paid according to the Contract provisions for changes in Work.
- C. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by the Architect.

3.7 UNAUTHORIZED EXCAVATION

- A. Fill unauthorized excavation under foundations or wall footings by extending indicated bottom elevation of concrete foundation or footing to excavation bottom, without altering required top elevation. Lean concrete fill may be used to bring elevations to proper position when acceptable to the Architect.
 - 1. Fill unauthorized excavations under other construction as directed by the Architect.
- B. Where indicated widths of utility trenches are exceeded, provide stronger pipe, or special installation procedures, as required by the Architect.

3.8 STORAGE OF SOIL MATERIALS

- A. Stockpile excavated materials acceptable for backfill and fill soil materials, including acceptable borrow materials. Stockpile soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent wind-blown dust.
 - 1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

3.9 BACKFILL

- A. Backfill excavations promptly, but not before completing the following:
 - 1. Acceptance of construction below finish grade including, where applicable, dampproofing, waterproofing, and perimeter draining, perimeter insulation.
 - 2. Surveying locations of underground utilities for record documents.
 - 3. Testing, inspecting, and approval of underground utilities.
 - 4. Concrete formwork removal.
 - 5. Removal of trash and debris from excavation.
 - 6. Removal of temporary shoring and bracing, and sheeting.
 - 7. Installing permanent or temporary horizontal bracing on horizontally supported walls.

3.10 FILL

- A. Preparation: Remove vegetation, topsoil, debris, wet and unsatisfactory soil materials, obstructions, and deleterious materials from ground surface prior to placing fills.
 - 1. Plow, strip, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing surface.
- B. When subgrade or existing ground surface to receive fill has a density less than that required for fill, break up ground surface to depth required, pulverize, moisture-condition or aerate soil and recompact to required density.
- C. Proofroll: Proofroll top surface of remaining material with a 25 to 30-ton four wheel rubber-tired roller making at least four passes over entire location with two passes at 90 degrees to each other. Undercut any areas that rut or pump and backfill as specified.
 - 1. Under building slabs, use drainage fill material.
 - 2. Under footings and foundations, use engineered fill.

3.11 MOISTURE CONTROL

- A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill layer before compaction to within 3 percent of optimum moisture content.
 - 1. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.
 - 2. Remove and replace, or scarify and air-dry satisfactory soil material that is too wet to compact to specified density.
 - a. Stockpile or spread and dry removed wet satisfactory soil material.

3.12 TOPSOIL

- A. Obtain topsoil from designated stockpile or in the absence of a stockpile provide to meet requirements.
- B. Spread topsoil 4 to 6 inches deep on all graded areas unless shown or stated otherwise. If existing topsoil is insufficient for proper backfilling, coverage and compacting, then obtain, transport, and spread suitable topsoil for other approved and acceptable sources at not additional cost.
- C. Begin spreading operation on the steepest portion of the slope and proceed to the flattest portion of the slope.

- D. After removing the topsoil from the stockpile, re-dress and re-shape the stockpile areas smooth and provide for free draining of surface water.

3.13 COMPACTION

- A. Place backfill and fill materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.
- B. Place backfill and fill materials evenly on all sides of structures to required elevations. Place backfill and fill uniformly along the full length of each structure.
- C. Percentage of Maximum Dry Density Requirements: Compact soil to not less than the following percentages of maximum dry density according to ASTM D698-00:
 - 1. Under Structures, Building Slabs, Steps, Pavement, and Walkways: Compact the top 18 inches below subgrade and each layer of backfill or fill material at a minimum of 98 percent maximum dry density.
 - 2. Under Lawns or Unpaved Areas: Compaction for all other areas shall be a minimum of 95 percent maximum dry density for all structural fill.
 - 3. All Other Areas: Compaction for all other areas shall be a minimum of 95 percent maximum dry density.

3.14 GRADING

- A. General: Uniformly grade areas to a smooth, even surface, free from irregular surface changes. Remove ridges and ruts. Fill depressions. In areas to be grassed, remove stones larger than 1.5 inches in any direction. Comply with COMPACTION requirements and grade to cross sections, lines, and elevations indicated.
 - 1. Provide a smooth transition between existing adjacent grades and new grades.
 - 2. Cut out soft spots, fill low spots, and trim high spots to conform to required surface tolerances.
 - 3. Slope finish grade away from perimeter of structure, sidewalks, pads, and pavement, to ensure positive drainage away from structures, sidewalks, pads, and pavement. Slope a minimum of 2 percent (1/4 inch per foot).

3.15 DRAINAGE FILL

- A. Under slabs-on-grade, place drainage fill course on prepared subgrade.
 - 1. Compact drainage fill to required cross sections and thickness.

2. When compacted thickness of drainage fill is 6 inches or less, place materials in a single layer.
3. When compacted thickness of drainage fill exceeds 6 inches thick place materials in equal layers, with no layer more than 6 inches thick or less than 3 inches thick when compacted.

3.16 FIELD QUALITY CONTROL

- A. Testing Agency Services: Allow testing agency to inspect and test each subgrade and each fill or backfill layer. Do not proceed until test results for previously completed work verify compliance with requirements.
1. Perform field in-place density tests according to ASTM D 1556 (sand cone method), ASTM D 2167 (rubber balloon method), or ASTM D 2937 (drive cylinder method), as applicable.
 - a. Field in-place density tests may also be performed by the nuclear method according to ASTM D 2922, provided that calibration curves are periodically checked and adjusted to correlate to tests performed using ASTM D 1556. With each density calibration check, check the calibration curves furnished with the moisture gages according to ASTM D 3017.
 - b. When field in-place density tests are performed using nuclear methods, make calibration checks of both density and moisture gages at beginning of work, on each different type of material encountered, and at intervals as directed by the Architect.
 2. Footing Subgrade: At footing subgrades, perform at least one test of each soil stratum to verify design bearing capacities. Subsequent verification and approval of other footing subgrades may be based on a visual comparison of each subgrade with related tested strata when acceptable to the Architect.
 3. Building Slab, Parking Lot, and Sidewalk Areas: At subgrade and at each compacted fill and backfill layer, perform at least one field in-place density test for every 5000 sq. ft. or less of paved area or building slab, but in no case fewer than three tests.
 4. Foundation Wall Backfill: In each compacted backfill layer, perform at least one field in-place density test for each 100 feet or less of wall length, but no fewer than two tests along a wall face.
 5. Open and Yard Areas: At each compacted layer or fill, perform at least one field in-place density test for every 15000 sq. ft. or less of open and yard areas, but in no case fewer than two tests.

6. Future Building Slab Areas: Perform tests in same manner as previously described for Building Slab areas

B. When testing agency reports that subgrades, fills, or backfills are below specified density, scarify and moisten or aerate, or remove and replace soil to the depth required, recompact and retest until required density is obtained.

3.17 PROTECTION

A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.

B. Repair and re-establish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or lose compaction due to subsequent construction operations or weather conditions.

1. Scarify or remove and replace material to depth directed by the Architect; reshape and recompact at optimum moisture content to the required density.

C. Settling: Where settling occurs during the Project correction period, remove finished surfacing, backfill with additional approved material, compact, and reconstruct surfacing.

1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to the greatest extent possible.

3.18 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Disposal

1. Transport surplus satisfactory soil to designated storage areas on the Owner's property. Stockpile or spread soil as directed by Architect.

2. Remove waste material, trash, and debris, and legally dispose of it off the Owner's property.

3. Remove unsatisfactory soil and legally dispose of it off the Owner's property.

END OF SECTION 31 20 00

SECTION 31 25 00 - ENVIRONMENTAL PROTECTION

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.
- B. Division 31 Section 31 10 00 "Site Clearing" for coordination
- C. Division 31 Section 31 20 00 "Earth Moving" for coordination

1.2 SUMMARY

- A. This Section includes guidelines pertaining to protection of the environment. Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects. Environmental protections include:
 - 1. Avoiding erosion and sedimentation.
 - 2. Avoiding air pollution.
 - 3. Avoiding water pollution.
 - 4. Avoiding noise pollution.
 - 5. General housekeeping.
- B. DHEC (South Carolina Department of Health and Environmental Control), Architect, Owner, and authority having jurisdiction may inspect periodically during construction.
- C. Related Sections include the following:
 - 1. Division 01 Section "Execution" for developing a schedule of required tests and inspections.
 - 2. Division 01 Section "Tree Protection" for treatment of vegetation to remain.

1.3 DEFINITIONS

- 1. Sediment Basin: Basin designed to collect and detain sediment-laden storm water runoff and release, at a slower rate, a much cleaner, better quality water.
- 2. Diversion Berm and Ditch: Temporary soil berm or ridge, excavated channel, or a combination berm and channel across sloping land to protect work areas or existing storm drains from upslope runoff and to divert sediment-laden water to sediment basins or traps or stable outlets.

3. Temporary Sediment Trap: Small, temporary ponding basin formed by an embankment to detain runoff and trap sediment below drainage area of 5 acres or less.
4. Silt Fence: Temporary sediment barrier constructed of filter fabric, buried at the bottom, stretched and supported by posts.
 - a. Posts, minimum 10-gauge self-fastener angle steel type, five feet in length.
 - b. Wire mesh is required unless a synthetic, extra strength filter fabric providing puncture strength of 50 psi in accordance with ASTM D751 is used, and provided a 6'-0" maximum post spacing is used.

1.4 GENERAL

- A. This section provides requirements and guidelines pertaining to protection of the environment during the construction of this project. The intent of this section is to control and thereby minimize or prevent soil erosion, sedimentation/siltation, air pollution, and water pollution as a result of this project.
- B. Contractor shall be completely responsible for controlling erosion and sedimentation and to prevent damage or nuisance to public and private property caused by erosion or sedimentation from this project. Contractor shall prevent erosion of soil on the site and on adjacent property resulting from his construction activities and shall prevent sediment from leaving the site. Effective sediment and erosion control measures shall be initiated prior to the commencement of any demolition, clearing, grading, excavation, or other operations that will disturb the site or the natural protection provided by the site.
- C. Coordination and Scheduling. Work shall be scheduled to expose areas subject to erosion for the shortest possible time, and natural vegetation shall be preserved to the greatest extent practicable. Temporary storage and construction buildings shall be located and construction traffic shall be routed to minimize soil disturbance and erosion.
 1. Install required measures where and as indicated on the drawings. If not indicated, coordinate with the Architect and locate in suitable and applicable locations to provide the necessary control measures.

1.5 RESPONSIBILITIES of THE CONTRACTOR

- A. In addition to the responsibilities and duties described on the Drawings and in the Specifications, Contractor shall also be responsible for
 1. Complying with all provision in the most current South Carolina Department of Health and Environmental Control (DHEC) regulations.
 3. Any and all fines and penalties that may be levied by DHEC applicable to site control, water management, dust and noise control, and other applicable pollution attributes.

4. Providing all necessary and required controls as necessary above and beyond those indicated on the Drawings and described in the specifications for, but not limited to, the following:
 - a. Silt
 - b. Dust
 - c. Noise
 - d. Runoff
 - e. Erosion
 - f. Sediment
 - g. Water management

B. The Contractor shall fully comply with all provisions of the Contract Documents including, but not limited to, providing and installing such entities as the products, materials, equipment, components, or systems that were proposed at the time bids were received. Except for extenuating circumstances as determined by the Architect, notification of not being able to meet any of the provisions of the Contract Documents or communicating conflicts in the Contract Documents to the Architect will not be considered after receipt of bids; and the Contractor shall fully comply with the Contract Documents at no increase in Contract Sum or Contract Time.

C. In addition to the responsibilities and duties described elsewhere in these documents, Contractor shall also be responsible to:

1. DHEC site environmental permits not already obtained by the Owner,
2. Arrange and coordinate a DHEC pre-construction meeting,
3. Comply with provisions in the most current DHEC regulations,
4. Maintain the site as stipulated in the approved DHEC permit,
5. Fines and penalties levied by DHEC applicable to site control, water management, dust and noise control, and other applicable pollution issues,
6. Site inspections and reporting,

1.6 COORDINATION

- A. Schedule Work to expose areas subject to erosion for the shortest possible time.
- B. Preserve natural vegetation beyond construction limits.
- C. Locate temporary storage and construction buildings and route construction traffic to minimize soil disturbance and erosion.

PART 2 – PRODUCTS

2.1 EROSION CONTROL MATTING

- A. Jute matting: Uniform open plain weave pattern of single jute yarn, 48 inches in width, plus or minus 1 inch.

1. Yarn of a loosely twisted construction and thickness varying no more than one-half its normal diameter.
 2. 78 warp ends, plus or minus 2, per width of the matting; 41 weft ends, plus or minus 1, per linear yard; and weight average 1.22 pounds per linear yard of the matting; tolerance of plus or minus 5 percent.
- B. Excelsior matting: Wood excelsior, 48 inches in width plus or minus 1-inch, minimum thickness of 1/4 inch, and average weight of 1.07 pounds per linear yard, with a tolerance of plus or minus 5 percent, covered on one side with a woven fabric consisting of twisted paper or cotton cord, mesh size between 1 inch by 1 inch, and 1-1/2 inch by 3 inches.
- C. Jute or excelsior matting for erosion control shall not be dyed, bleached, or otherwise treated in a manner that will result in toxicity to vegetation.
- D. Straw blanket: Landlok 407GR manufactured by Synthetic Industries, Inc. 100 percent agricultural straw, lightweight, photodegradable, polypropylene top and bottom nets. Top and bottom nets weigh 1.64 pounds per 1,000 square feet. Straw fiber weighs 0.5 pound per square yard.
- E. Filter Fabric: Burlap or synthetic. Wire mesh is required unless a synthetic, extra strength filter fabric providing puncture strength of 50 psi in accordance with ASTM D751 is used, and provided a 6'-0" maximum post spacing is used.
1. Burlap, 7.5 oz. weight and a minimum of 32 inches wide.
 2. Synthetic fabric, Mirafi 100X manufactured by Celanese Fibers Co., Bidim C34 manufactured by DuPont Co., or equivalent providing puncture strength of 50 psi in accordance with ASTM D751.
 3. For silt fencing needed more than 45 days, use synthetic type.

PART 3 – EXECUTION

3.1 AIR POLLUTION

- A. Open Burning: On-Site burning is not permitted.
- B. Dust Control. Contractor shall control dust throughout the contract period within the project area and at all other areas affected by the construction. This includes, but is not specifically limited to, paved and unpaved roads, haul roads, access roads, disposal sites, borrow pits, and material and equipment storage sites. Dust control measures may include, but are not limited to, wetting down disturbed earth surfaces or eliminating traffic across them, removing accumulations of dirt from paved areas by hand or mechanical means, and washing streets at the end of the workday. Such dust control measures shall be performed when required by the Architect or the controlling agency for streets and roadways.

3.2 NOISE AND WATER POLLUTION

- A. Noise Pollution: Avoid use of tools and equipment that produce noise above 85 dB at a distance of 25 feet. Restrict use of noise-making tools and equipment to hours that will minimize complaints from persons or firms near the site. If noise levels are above acceptable levels, erect sound barriers to control noise or conduct demolition during times that are less disturbing to the Owner or a combination of both.
- B. Water Pollution: The Contractor shall exercise every reasonable precaution throughout the construction period to prevent pollution of rivers, streams, and water impoundments. Pollutants such as chemicals, fuels, lubricants, asphalt, bitumen, concrete, grout, raw sewage, pesticides, herbicides, or any other harmful waste shall not be discharged into or alongside any watercourse, impoundment, or channel.

3.3 SEDIMENT AND EROSION CONTROL

- A. General. The project is subject to periodic inspection during construction by the Owner, Architect, OSE, City, and DHEC.
 - 1. Control measures indicated on the Drawings and Specifications consist of, but are not limited to, construction entrances, sediment basins/ponds/traps, diversion ditches and berms, erosion control matting, filter fabric silt fences, stone check dams, riprap outlet stabilization, inlet protection, and temporary fast-growing vegetation or other suitable groundcover,
 - a. The Drawings show a workable plan for controlling sediment and erosion during construction. However, they may not show all required sediment and erosion control measures due to Contractors operations, means and methods, and scheduling of the Work.
 - b. Initiate sediment and erosion control measures prior to the commencement of demolition, clearing, grading, excavation, or other operations that will disturb the site or the natural protection provided by the site.
 - c. If the prepared plan for controlling sediment and erosion proves ineffective for the above reasons, add to, change, or revise the sediment and erosion control plan, approach, or measures to make them effective, and as directed by the Architect, Owner, DHEC, or City.
 - d. Costs for additional sediment and erosion control measures shall be considered an incidental obligation of the Contractor and included in the Contract Price. Effective sediment and erosion control will be a condition for recommendation of progress payment applications.
- B. Sediment and erosion control measures shall consist of required and necessary measures and procedures. Measures, as required to control sediment, erosion, and runoff, include, but are not limited to one or a combination of the following: control construction entrances, sediment basins/ponds/traps, diversion ditches and berms, erosion control matting, filter fabric silt fences, stone check dams, riprap outlet stabilization, inlet protection, and temporary fast-growing vegetation or other suitable groundcover, shall be used as necessary to control runoff and erosion. If the plan for controlling sediment and erosion proves ineffective, the Contractor shall add to, change, or revise the sediment and erosion control plan, approach, or measures to

make them effective, and as directed by the Architect, Owner, OSE, DHEC, or City, or other local governing authorities. Costs for additional sediment and erosion control measures shall be the Contractor's responsibility. Effective sediment and erosion control will be a condition for recommendation of progress payment applications.

1. Methods. Provide sediment and erosion control practices and measures as required to prevent and control erosion.
2. Construction Entrances. Provide a gravel area or pad at all points where vehicles enter and leave a construction site. Clear the entrance and exit area of all vegetation, roots, and other objectionable material and properly grade and place gravel to the grade and dimensions shown on the plans. Provide drainage to carry water to a sediment trap or other suitable outlet.
 - a. Maintain the gravel pad in a condition to prevent mud or sediment from leaving the construction site. This may require periodic topdressing with 2-inch stone. Remove immediately objectionable materials spilled, washed, or tracked onto public roadways.
3. Maintain the gravel pad in a condition to prevent mud or sediment from leaving the construction site. This may require periodic topdressing with 2-inch stone. Contractor shall immediately remove all objectionable materials spilled, washed, or tracked onto public roadways.
4. Sediment Basins.
 - a. Sediment basins designed to collect and detain sediment-laden storm water runoff and release, at a slower rate, a much cleaner, better quality water shall be constructed as shown on the drawings. If not shown on the Drawings, coordinate with the Architect.
 - b. Inspect sediment basins after each rainfall and remove accumulated sediment as required by the notes on the drawings. Any unusual or damaging situation shall be reported immediately to the Architect in writing within 24 hours of the incident.
5. Diversion Berms and Ditches. Temporary soil berms or ridges, excavated channels, or a combination berm and channel shall be constructed across sloping land as shown to protect work areas or existing storm drains from upslope runoff and/or to divert sediment-laden water to sediment basins or traps or stable outlets.
 - a. Inspect temporary diversions once a week and after every rainfall. Remove sediment from the flow area and repair the ridge.
 - B. Report unusual or damaging situation in writing to the Architect within 24 hours of the incident.
 - C. When the protected area is permanently stabilized, remove the ridge and the channel and blend with the natural and new ground levels.
 - D. Provide permanent vegetative cover when construction completed.
6. Provide sufficient room and diversions to permit machine regrading and cleanout. Permanent seeding including reuse of existing topsoil shall be provided after construction.
8. Inspect temporary diversions once a week and after every rainfall. Remove sediment from the flow area and repair the ridge. Provide a written report of any unusual or potentially damaging conditions to Architect within 24 hours of the incident.

9. When the protected area is permanently stabilized, the ridge and the channel shall be removed and blended with the natural ground level and seeding shall be provided.
- C. Erosion Control Matting and Straw Blankets. Unless otherwise specified herein or noted on the drawings, jute and excelsior matting shall be placed where needed to aid in stabilizing disturbed areas. Jute or excelsior matting for erosion control shall not be dyed, bleached, or otherwise treated in a manner that will result in toxicity to vegetation.
1. General
 - a. Before seeding, ensure that ground surface is smooth and free from stones, clods, or debris that will prevent contact of the matting with the soil.
 - b. Place matting immediately following seeding.
 - c. Provide blankets on seeded slopes, 3 horizontal to 1 vertical and steeper. Install in accordance with the manufacturer's recommendations.
 2. Jute matting shall be of a uniform open plain weave pattern of single jute yarn, 48 inches in width, plus or minus 1 inch. The yarn shall be of a loosely twisted construction and shall not vary in thickness by more than one-half its normal diameter. There shall be 78 warp ends, plus or minus 2, per width of the matting; 41 weft ends, plus or minus 1, per linear yard; and the weight shall average 1.22 pounds per linear yard of the matting with a tolerance of plus or minus 5 percent.
 3. Excelsior matting shall be wood excelsior, 48 inches in width plus or minus 1 inch, shall have a minimum thickness of 1/4 inch, and the weight shall average 1.07 pounds per linear yard of the matting with a tolerance of plus or minus 5 percent. The excelsior matting shall be covered on one side with a woven fabric consisting of either twisted paper cord or cotton cord having a minimum mesh size of 1 inch by 1 inch, and a maximum mesh size of 1-1/2 inch by 3 inches.
 4. Unless otherwise specified herein or noted on the drawings, jute or excelsior matting may be installed where it is needed to prevent erosion and aid in stabilization of seeded areas and channels. Matting shall be placed immediately following seeding (seeding shall precede installation of matting). The ground surface shall be smooth and free from stones, clods, or debris which will prevent the contact of the matting with the soil. Matting shall be installed in accordance with the details indicated on the drawings and in accordance with the manufacturer's recommendations.
 5. Erosion control straw blankets shall be provided on all seeded slopes, 3 horizontal to 1 vertical and steeper. The erosion control straw blankets shall be constructed of 100 percent agricultural straw and lightweight, photodegradable, polypropylene top and bottom nets. The approximate weight of the top and bottom nets shall be 1.64 pounds per 1,000 square feet. The approximate weight of the straw fiber shall be approximately 0.5 pound per square yard. The erosion control straw blankets shall be Landlok 407GR as manufactured by Synthetic Industries, Inc. and installed in accordance with the manufacturer's recommendations.

- D. Silt Fence. Comply with ASTM D6461-Standard Specification for Silt Fence Materials
1. Materials
 - a. Fabric: Fibers used in the manufacture of geotextiles for silt fence, and the threads used in joining geotextiles by sewing, shall consist of long-chain synthetic polymers composed of at least 95 % by weight of polyolefin or polyester. They shall be formed into a stable network such that the filaments or yarns retain their dimensional stability relative to each other, including selvages.
 - b. Posts: Wood, steel or synthetic support posts having a minimum length of 3.3 ft. plus the burial depth may be used. They shall be of sufficient strength to resist damage during installation and to the support applied loads due to material build up behind the silt fence.
 - c. Wire or polymer support fence shall be at least 2.5 ft. high and strong enough to support applied loads. Polymer support fences shall meet the same ultraviolet degradation requirements as the geotextile.
 2. Construction:
 - a. The geotextile used for temporary silt fence may or may not be supported between posts with wire or polymeric mesh. Values for grab strength, permittivity, and ultraviolet stability shall comply with the previously referenced ASTM D6461.
 - b. Minimum Height Above Ground: 2.5 ft.
 - c. Minimum Embedment Depth: 0.5 ft.
 - d. Post Spacing: Maximum post spacing is based on the fabric support or, if unsupported, on elongation as measured in accordance with Test Method D 4632 and as follows:
 - e. Supported Silt Fence: Maximum post spacing of 4 ft.
 - f. Unsupported Silt Fence with Elongation of 50% or More: Maximum post spacing of 4 ft.
 - g. Unsupported Silt Fence with Elongation <50%: Maximum post spacing of 6.5 ft.
- E. Stone Check Dams.
1. Small temporary stone dams constructed across drainage-ways draining 2 acres or less shall be constructed as shown to reduce flow velocity and minimize erosion in small channels.
 2. Place stone on a synthetic filter fabric foundation as shown on the plans. Fabric shall be Mirafi 100 or equal providing puncture strength of 50 psi in accordance with ASTM D751.
 3. Inspect check dams and channels for drainage after each runoff event. Contractor shall repair erosion and remove sediment at check dams. Stone shall be added to dams to maintain dimensions shown. Any unusual or damaging situation shall be reported immediately to the Architect in writing within 24 hours of the incident.

F. Temporary Sediment Traps.

1. Small, temporary ponding basins formed by an embankment shall be constructed as indicated on the drawings to detain runoff and trap sediment below drainage areas that are five (5) acres or less.
2. Clear, grub, and strip the area under the embankment of all vegetation, root mat, and topsoil. Contractor shall place select fill for the embankment in 9-inch lifts and machine compact. Contractor shall overfill the embankment 6 inches to allow for settlement. Contractor shall construct a riprap spillway over Mirafi 100 or equal synthetic filter fabric. The spillway shall provide for flow discharge to an undisturbed, stable area.
3. Inspect traps after each rainfall and remove accumulated sediment when the depth exceeds one-half of the design depth. Contractor shall maintain the dimensions of the trap shown on the drawings using specified materials. Any unusual or damaging situation shall be reported immediately to the Architect in writing within 24 hours of the incident.

G. Outlet Stabilization.

1. Permanent riprap channels at the outlet of a lined channel or storm drainpipe shall be constructed as indicated on the drawings to reduce the flow velocity and dissipate energy.
2. Excavate and compact the outlet area to the density of the surrounding undisturbed material. Place filter fabric on the prepared subgrade as indicated on the drawings. Filter fabric shall overlap a minimum of one foot. Construct the riprap apron on a zero-percent slope with top elevation level with adjacent ground. Provide seeding of all disturbed areas adjacent to the riprap.

H. Inlet Protection. Temporary sediment barriers shall be constructed around storm drain inlets as shown on the drawings. Inspect structure after each rainfall and repair as required. Remove sediment when trap reaches one-half capacity. Report any unusual or potentially damaging situations to Architect in writing within 24 hours of each incident.

I. Maintenance and Removal.

1. All sediment and erosion control devices or measures shall be implemented prior to any land-disturbing activity within the drainage area where they are located and in accordance with the construction sequence indicated on the drawings. Contractor shall periodically check sediment and erosion control measures and clean or otherwise remove silt build-up as necessary to maintain them in proper working order, all in accordance with the specifications. All sediment and erosion control measures shall be maintained by the Contractor through final completion of the Work.

2. Noncompliance. Failure of the Contractor to comply with any of the preceding requirements may result in the Contractor receiving formal notification by DHEC to initiate such measures. If compliance is not forthcoming within 48 hours of receipt of notification, the Owner may suspend all or portions of the work pursuant to *South Carolina Storm Water Management and Sediment Control Regulations R.72-300*.

3.4 AIR POLLUTION

- A. Open Burning: On-Site burning is not permitted.
- B. Dust Control. Control dust throughout the Contract period within the Project area and other areas affected by the construction. This includes, but is not specifically limited to, paved and unpaved roads, haul roads, access roads, disposal sites, borrow pits, and material and equipment storage sites.
 1. Dust control measures may include, but are not limited to, wetting down disturbed earth surfaces or eliminating traffic across them, removing accumulations of dirt from paved areas by hand or mechanical means, and washing streets at the end of the workday.
 2. Perform dust control measures when required by the controlling agency for streets and roadways or the Architect.

3.5 WATER POLLUTION

- A. Exercise every reasonable precaution throughout the construction period to prevent pollution of rivers, streams, and water impoundments.
 1. Do not discharge pollutants such as chemicals, fuels, lubricants, asphalt, bitumen, concrete, grout, raw sewage, pesticides, herbicides, or other harmful waste into or alongside a watercourse, impoundment, or channel.

3.6 NOISE POLLUTION

- A. Avoid use of tools and equipment that produce noise above 85 dB at a distance of 25 feet. Restrict use of noise-making tools and equipment to hours that will minimize complaints from persons or firms near the site.
- B. If noise levels are above acceptable levels, erect sound barriers to control noise or conduct demolition during times that are less disturbing to the Owner or a combination of both.

3.7 GENERAL HOUSEKEEPING

- A. Ensure that all vehicles and equipment have proper, functional, and operable mufflers and noise control apparatus.

- B. To eliminate and control dust during and after site work activities, including demolition, water down grading and excavation areas, drives and roads, parking areas, and disturbed areas that can produce dust from any performed activity resulting from this Contract. Where demolition is a part of the Contract, the same dust and erosion controls apply to all structures being demolished. Perform as much demolition on calm days as possible without interfering with or compromising schedules.
 - 1. Water down grading and excavation areas, drives and roads, parking areas, and disturbed areas that can produce dust.
 - 2. Where demolition is a part of the Contract, the same dust and erosion controls apply to structures being demolished. Perform as much demolition on calm days as possible without interfering with or compromising schedule
- C. Hose down trucks including cargo box, wheels, axels, and chassis to remove all dust and debris that may drop during transportation.
 - 1. Keep vehicle windows clean for visibility
- D. Cover all transport trucks with heavy duty tarps that completely enclose the cargo box. Tarps with holes or rips or that do not properly fit the cargo box are not acceptable. Ensure tarps are properly tied down to prevent flapping, fluttering, or blowing debris.
- E. Ensure that no portion of debris is exposed or extends past any portion of the cargo box during transportation.
- F. Clean up all trash and debris droppings on public and private property resulting from executing this Contract.
- G. Repair all damage to public and private property including buildings, structures, landscaping, roads, and highways that results from executing this contract.
- H. Keep vehicle windows clean for clear, proper, and safe visibility.

END OF SECTION 31 25 00

SECTION 32 12 16 - HOT-MIX ASPHALT PAVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:

1. Hot-mix asphalt paving.
2. Hot-mix asphalt patching.
3. Hot-mix asphalt overlays.
4. Asphalt surface treatments:
 - a. Fog seals.
 - b. Slurries.
5. Pavement-marking paint.
6. Hot-mix asphalt curbs.
7. Wheel stops.

- B. Related Sections include the following:

1. Division 31 Section "Earth Moving" for aggregate subbase and base courses and aggregate pavement shoulders.
2. Division 7 Section "Paving Joint Sealants" for joint sealants and fillers at paving terminations.

1.3 SYSTEM DESCRIPTION

- A. Provide hot-mix asphalt pavement according to the materials, workmanship, and other applicable requirements of the standard specifications of the South Carolina Department of Transportation.

1.4 SUBMITTALS

- A. Job-Mix Designs: Certification of approval of each job mix proposed for the Work.

- B. Shop Drawings: Indicate pavement markings, lane separations, and defined parking spaces. Indicate dedicated handicapped spaces with international graphics symbol.
- C. Samples: 12 by 12 inches minimum, of paving fabric.
- D. Qualification Data: For firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
- E. Material Certificates: Certificates signed by manufacturers certifying that each material complies with requirements.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced installer who has completed hot-mix asphalt paving similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.
- B. Manufacturer Qualifications: Engage a firm experienced in manufacturing hot-mix asphalt similar to that indicated for this Project and with a record of successful in-service performance.
- C. Testing Agency Qualifications: Demonstrate to Architect's satisfaction, based on Architect's evaluation of criteria conforming to ASTM D 3666, that the independent testing agency has the experience and capability to satisfactorily conduct the testing indicated without delaying the Work.
- D. Regulatory Requirements: Conform to applicable standards of authorities having jurisdiction for asphalt paving work on public property.
- E. Asphalt-Paving Publication: Comply with AI's "The Asphalt Handbook," except where more stringent requirements are indicated.
- F. Preinstallation Conference: Conduct conference at Project site to comply with requirements of Division 1 Section "Project Meetings" Review methods and procedures related to asphalt paving.
- G. The Contractor shall fully comply with all provisions of the Contract Documents including, but not limited to, providing and installing such entities as the products, materials, equipment, components, or systems that were proposed at the time bids were received. Except for extenuating circumstances as determined by the Architect, notification of not being able to meet any of the provisions of the Contract Documents or communicating conflicts in the Contract Documents to the Architect will not be considered after receipt of bids; and the Contractor shall fully comply with the Contract Documents at no increase in Contract Sum or Contract Time.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver pavement-marking materials to Project site in original packages with seals unbroken and bearing manufacturer's labels containing brand name and type of material, date of manufacture, and directions for storage.
- B. Store pavement-marking materials in a clean, dry, protected location and within temperature range required by manufacturer. Protect stored materials from direct sunlight.

1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Do not apply asphalt materials if substrate is wet or excessively damp or if the following conditions are not met:
 - 1. Prime and Tack Coats: Minimum surface temperature of 60 deg F.
 - 2. Slurry Coat: Comply with weather limitations of ASTM D 3910.
 - 3. Asphalt Base Course: Minimum surface temperature of 40 deg F and rising at time of placement.
 - 4. Asphalt Surface Course: Minimum surface temperature of 60 deg F at time of placement.
- B. Pavement-Marking Paint: Proceed with pavement marking only on clean, dry surfaces and at a minimum ambient or surface temperature of 40 deg F for oil-based materials, 50 deg F for water-based materials, and not exceeding 95 deg F.

PART 2 - PRODUCTS

2.1 AGGREGATES

- A. General: Use locally available materials and gradations that have performed satisfactorily in previous installations.
- B. Coarse Aggregate: Sound; angular crushed stone; crushed gravel; complying with SC DOT Section 305.
 - 1. For hot-mix asphalt, limit natural sand to a maximum of 20 percent by weight of the total aggregate mass.
- C. Mineral Filler: Rock dust, hydraulic cement, or other inert material complying with ASTM D 242.

2.2 ASPHALT MATERIALS

- A. Asphalt Cement: ASTM D 3381 for viscosity-graded material.
- B. Prime Coat: ASTM D 2027; medium-curing cutback asphalt; MC-30, MC-70, or MC-250.
- C. Tack Coat: ASTM D 977, emulsified asphalt or ASTM D 2397, cationic emulsified asphalt, slow setting, factory diluted in water, of suitable grade and consistency for application.
- D. Water: Potable.

2.3 AUXILIARY MATERIALS

- A. Sand: ASTM D 1073, Grade Nos. 2 or 3.
- B. Paving Geotextile: Nonwoven polypropylene, specifically designed for paving applications, resistant to chemical attack, rot, and mildew.
- C. Pavement-Marking Paint: SC DOT Section 710.06 (less glass beads) and FWHA Federal 1952B (Latex).
- D. Pavement-Marking Paint: Latex, water-base emulsion, ready-mixed, complying with FS TT-P-1952.
 - 1. Color: Blue - Handicapped.
 - 2. Color: White.
- E. Wheel Stops: Precast, air-entrained concrete, 2500-psi minimum compressive strength, approximately 6 inches high, 9 inches wide, and 84 inches long. Provide chamfered corners and drainage slots on underside, and provide holes for anchoring to substrate.
 - 1. Dowels: Galvanized steel, diameter 3/4-inch, minimum length 10 inches.

2.4 MIXES

- A. Hot-Mix Asphalt: Provide dense, hot-laid, hot-mix asphalt plant mixes approved by SC DOT; designed according to procedures in AI's "Mix Design Methods for Asphalt Concrete and Other Hot-Mix Types"; and complying with the following requirements:
 - 1. Provide mixes with a history of satisfactory performance in geographical area where Project is located.
 - 2. Binder Course: Hot laid asphaltic concrete per SC DOT Section 402.

3. Surface Course: Hot laid asphaltic concrete per SC DOT Section 403.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that subgrade is dry and in suitable condition to support paving and imposed loads.
- B. Proof-roll subbase using heavy, pneumatic-tired rollers to locate areas that are unstable or that require further compaction.
- C. Notify Architect in writing of any unsatisfactory conditions. Do not begin paving installation until these conditions have been satisfactorily corrected.

3.2 COLD MILLING

- A. Clean existing paving surface of loose and deleterious material immediately before cold milling. Remove existing asphalt pavement, including hot-mix asphalt and, as necessary, unbound-aggregate base course, by cold milling to grades and cross sections indicated.
 1. Repair or replace curbs, manholes, and other construction damaged during cold milling.

3.3 PATCHING AND REPAIRS

- A. Patching: Saw cut perimeter of patch and excavate existing pavement section to sound base. Recompact new subgrade. Excavate rectangular or trapezoidal patches, extending 12 inches into adjacent sound pavement, unless otherwise indicated. Cut excavation faces vertically.
 1. Partially fill excavation with dense-graded, hot-mix asphalt base mix and compact while still hot. Cover asphalt base course with compacted, hot-mix surface layer finished flush with adjacent surfaces.
- B. Crack and Joint Filling: Remove existing filler material from cracks or joints to a depth of 1/4 inch. Refill with asphalt joint-filling material to restore watertight condition. Remove excess filler that has accumulated near cracks or joints.
- C. Tack Coat: Apply uniformly to existing surfaces of previously constructed asphalt or Portland cement concrete paving and to surfaces abutting or projecting into new, hot-mix asphalt pavement. Apply at a uniform rate of 0.05 to 0.15 gal. /sq. yd. of surface.
 1. Allow tack coat to cure undisturbed before paving.

2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.

3.4 SURFACE PREPARATION

- A. General: Immediately before placing asphalt materials, remove loose and deleterious material from substrate surfaces. Ensure that prepared subgrade is ready to receive paving.
 1. Sweep loose granular particles from surface of unbound-aggregate base course. Do not dislodge or disturb aggregate embedded in compacted surface of base course.
- B. Prime Coat: Apply uniformly over surface of compacted-aggregate base at a rate of 0.15 to 0.50 gal. /sq. yd. Apply enough material to penetrate and seal, but not flood, surface. Allow prime coat to cure for 72 hours minimum.
 1. If prime coat is not entirely absorbed within 24 hours after application, spread sand over surface to blot excess asphalt. Use just enough sand to prevent pickup under traffic. Remove loose sand by sweeping before pavement is placed and after volatiles have evaporated.
 2. Protect primed substrate from damage until ready to receive paving.

3.5 HOT-MIX ASPHALT PLACING

- A. Machine place hot-mix asphalt mix on prepared surface, spread uniformly, and strike off. Place asphalt mix by hand to areas inaccessible to equipment in a manner that prevents segregation of mix. Place each course to required grade, cross section, and thickness, when compacted.
 1. Place hot-mix asphalt base course in number of lifts and thicknesses indicated.
 2. Place hot-mix asphalt surface course in single lift.
 3. Spread mix at minimum temperature of 250 deg F.
 4. Begin applying mix along centerline of crown for crowned sections and on high side of one-way slopes, unless otherwise indicated.
 5. Regulate paver machine speed to obtain smooth, continuous surface free of pulls and tears in asphalt-paving mat.
- B. Place paving in consecutive strips not less than 10 feet wide, except where infill edge strips of a lesser width are required.

1. After first strip has been placed and rolled, place succeeding strips and extend rolling to overlap previous strips. Complete asphalt base course for a section before placing asphalt surface course.
- C. Promptly correct surface irregularities in paving course behind paver. Use suitable hand tools to remove excess material forming high spots. Fill depressions with hot-mix asphalt to prevent segregation of mix; use suitable hand tools to smooth surface.
- D. Construct light and heavy-duty surfaces as follows:
 1. Light Duty: Install where indicated on the Drawings. If not indicated, then install in areas subject to normal vehicular traffic such as automobiles and light duty trucks, including the trailer, having no more than 6 wheels.
 - a. Base Course Aggregate: Thickness as indicated on the Drawings. If not indicated, then 8 inches thick.
 - b. Surface Course: Thickness as indicated on the Drawings. If not indicated, then 2 inches thick per SCDOT Section 403.
 2. Heavy Duty: Install where indicated on the Drawings. If not indicated, then install in areas subject to heavy truck traffic, but are not scheduled to receive concrete paving, such as loading docks, trash receptacles, truck turn-around areas, etc.
 - a. Base Course Aggregate: Thickness as indicated on the Drawings. If not indicated, then 8 inches thick.
 - b. Binder Course: Thickness as indicated on the Drawings. If not indicated, then 2 inches thick per SCDOT Section 402.
 - c. Surface Course: Thickness as indicated on the Drawings. If not indicated, then 2 inches thick per SCDOT Section 403.

3.6 JOINTS

- A. Construct joints to ensure continuous bond between adjoining paving sections. Construct joints free of depressions with same texture and smoothness as other sections of hot-mix asphalt course.
 1. Clean contact surfaces and apply tack coat.
 2. Offset longitudinal joints in successive courses a minimum of 6 inches.
 3. Offset transverse joints in successive courses a minimum of 24 inches.
 4. Construct transverse joints by bulkhead method or sawed vertical face method as described in AI's "The Asphalt Handbook."
 5. Compact joints as soon as hot-mix asphalt will bear roller weight without excessive displacement.

6. Compact asphalt at joints to a density within 2 percent of specified course density.

3.7 COMPACTION

- A. General: Begin compaction as soon as placed hot-mix paving will bear roller weight without excessive displacement. Compact hot-mix paving with hot, hand tampers or vibratory-plate compactors in areas inaccessible to rollers.
 1. Complete compaction before mix temperature cools to 185 deg F.
- B. Breakdown Rolling: Accomplish breakdown or initial rolling immediately after rolling joints and outside edge. Examine surface immediately after breakdown rolling for indicated crown, grade, and smoothness. Repair surfaces by loosening displaced material, filling with hot-mix asphalt, and rerolling to required elevations.
- C. Intermediate Rolling: Begin intermediate rolling immediately after breakdown rolling, while hot-mix asphalt is still hot enough to achieve specified density. Continue rolling until hot-mix asphalt course has been uniformly compacted to the following density:
 1. Average Density: 96 percent of reference laboratory density according to ASTM D 1559, but not less than 94 percent nor greater than 100 percent.
- D. Finish Rolling: Finish roll paved surfaces to remove roller marks while hot-mix asphalt is still warm.
- E. Edge Shaping: While surface is being compacted and finished, trim edges of pavement to proper alignment. Bevel edges while still hot, with back of rake or smooth iron. Compact thoroughly using tamper or other satisfactory method.
- F. Repairs: Remove paved areas that are defective or contaminated with foreign materials. Remove paving course over area affected and replace with fresh, hot-mix asphalt. Compact by rolling to specified density and surface smoothness.
- G. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.
- H. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

3.8 INSTALLATION TOLERANCES

- A. Thickness: Compact each course to produce the thickness indicated within the following tolerances:
 1. Base Course: Plus or minus 1/2 inch.
 2. Surface Course: Plus 1/4 inch, no minus.

- B. Surface Smoothness: Compact each course to produce a surface smoothness within the following tolerances as determined by using a 10-foot straightedge applied transversely or longitudinally to paved areas:
 - 1. Base Course: 1/4 inch.
 - 2. Surface Course: 1/8 inch.

3.9 PAVEMENT MARKING

- A. Do not apply pavement-marking paint until layout, colors, and placement have been verified with Architect.
- B. Allow paving to cure for 30 days before starting pavement marking.
- C. Sweep and clean surface to eliminate loose material and dust.
- D. Apply paint with mechanical equipment to produce pavement markings of dimensions indicated with uniform, straight edges. Apply at manufacturer's recommended rates to provide a minimum wet film thickness of 15 mils.

3.10 WHEEL STOPS

- A. Securely attach wheel stops into pavement with not less than 2 galvanized steel dowels embedded in precast concrete at one-third points. Firmly bond each dowel to wheel stop and to pavement.
 - 1. Extend upper portion of dowel 5 inches into wheel stop and lower portion a minimum of 5 inches into pavement.

3.11 FIELD QUALITY CONTROL

- A. Testing Agency: Responsibility for an independent testing agency is defined in Section 01400 – Quality Control to perform field inspections and tests and to prepare test reports.
 - 1. Testing agency will conduct and interpret tests and state in each report whether tested Work complies with or deviates from specified requirements.
- B. Additional testing, at Contractor's expense, will be performed to determine compliance of corrected Work with specified requirements.
- C. Thickness: In-place compacted thickness of hot-mix asphalt courses will be determined according to ASTM D 3549.

- D. Surface Smoothness: Finished surface of each hot-mix asphalt course will be tested for compliance with smoothness tolerances.
- E. In-Place Density: Samples of uncompacted paving mixtures and compacted pavement will be secured by testing agency according to ASTM D 979.
 - 1. Reference laboratory density will be determined by averaging results from 4 samples of hot-mix asphalt-paving mixture delivered daily to site, prepared according to ASTM D 1559, and compacted according to job-mix specifications.
 - 2. Reference maximum theoretical density will be determined by averaging results from 4 samples of hot-mix asphalt-paving mixture delivered daily to site, prepared according to ASTM D 2041, and compacted according to job-mix specifications.
 - 3. In-place density of compacted pavement will be determined by testing core samples according to ASTM D 1188 or ASTM D 2726.
 - a. One core sample will be taken for every 1000 sq. yd. or less of installed pavement, but in no case will fewer than 3 cores be taken.
 - b. Field density of in-place compacted pavement may also be determined by nuclear method according to ASTM D 2950 and correlated with ASTM D 1188 or ASTM D 2726.
- F. Remove and replace or install additional hot-mix asphalt where test results or measurements indicate that it does not comply with specified requirements.

END OF SECTION 32 12 16

SECTION 32 31 13 - CHAIN LINK FENCES AND GATES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Chain-link fences.
 - 2. Swing gates.

1.2 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site .

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For each type of fence and gate assembly.
 - 1. Include plans, elevations, sections, details, and attachments to other work.
- C. Samples: For each exposed product and for each color and texture specified.

1.4 INFORMATIONAL SUBMITTALS

- A. Product certificates.
- B. Product test reports.
- C. Sample warranty.

1.5 WARRANTY

- A. Special Warranty: Manufacturer agrees Installer agrees to repair or replace components of chain-link fences and gates that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Five years from date of Substantial Completion.

SECTION 32 31 13 - CHAIN LINK FENCES AND GATES

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

2.2 CHAIN-LINK FENCE FABRIC

- A. General: Provide fabric in one-piece heights measured between top and bottom of outer edge of selvage knuckle or twist according to "CLFMI Product Manual" and requirements indicated below:
1. Fabric Height: As indicated on Drawings.
 2. Steel Wire for Fabric: Wire diameter of 0.148 inch .
 - a. Mesh Size: 2 inches .
 - b. Polymer-Coated Fabric: ASTM F 668, Class 2b over zinc -coated steel wire.
 - 1) Color: Black , according to ASTM F 934.
 3. Selvage: Knuckled at both selvages .

2.3 FENCE FRAMEWORK

- A. Posts and Rails : ASTM F 1043 for framework, including rails, braces, and line; terminal; and corner posts. Provide members with minimum dimensions and wall thickness according to ASTM F 1043 or ASTM F 1083 based on the following:
1. Fence Height: As indicated on Drawings .
 2. Light-Industrial-Strength Material: Group IC-L, round steel pipe, electric-resistance-welded pipe .
 - a. Line Post: 2.375 inches in diameter .
 - b. End, Corner, and Pull Posts: 2.875 inches .
 3. Horizontal Framework Members: top and bottom rails according to ASTM F 1043.
 4. Brace Rails: ASTM F 1043.
 5. Metallic Coating for Steel Framework:
 - a. Type B zinc with organic overcoat.

2.4 SWING GATES

- A. General: ASTM F 900 for gate posts and single double swing gate types.
1. Gate Leaf Width: As indicated .
 2. Framework Member Sizes and Strength: Based on gate fabric height as indicated .
- B. Pipe and Tubing:

SECTION 32 31 13 - CHAIN LINK FENCES AND GATES

1. Zinc-Coated Steel: ASTM F 1043 and ASTM F 1083; protective coating and finish to match fence framework .
2. Gate Posts: Round tubular steel .
3. Gate Frames and Bracing: Round tubular steel .

C. Frame Corner Construction: Welded or assembled with corner fittings.

D. Extended Gate Posts and Frame Members: Fabricate gate posts and frame end members to extend as indicated above top of chain-link fabric at both ends of gate frame to attach barbed wire assemblies.

E. Hardware:

1. Hinges: 360-degree inward and outward swing.
2. Latch: Permitting operation from both sides of gate with provision for padlocking accessible from both sides of gate.

2.5 FITTINGS

A. Provide fittings according to ASTM F 626.

B. Finish:

1. Metallic Coating for Pressed Steel or Cast Iron: Not less than 1.2 oz./sq. ft. of zinc.
 - a. Polymer coating over metallic coating.
2. Aluminum: Mill finish.

2.6 GROUT AND ANCHORING CEMENT

A. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107/C 1107M. Provide grout, recommended in writing by manufacturer, for exterior applications.

B. Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound. Provide formulation that is resistant to erosion from water exposure without needing protection by a sealer or waterproof coating, and that is recommended in writing by manufacturer for exterior applications.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Do not begin installation before final grading is completed unless otherwise permitted by Architect.

SECTION 32 31 13 - CHAIN LINK FENCES AND GATES

3.2 PREPARATION

- A. Stake locations of fence lines, gates, and terminal posts. Do not exceed intervals of **500 feet** or line of sight between stakes. Indicate locations of utilities, lawn sprinkler system, underground structures, benchmarks, and property monuments.

3.3 CHAIN-LINK FENCE INSTALLATION

- A. Install chain-link fencing according to ASTM F 567 and more stringent requirements specified.
- B. Post Excavation: Drill or hand-excavate holes for posts to diameters and spacings indicated, in firm, undisturbed soil.
- C. Post Setting: Set posts in concrete at indicated spacing into firm, undisturbed soil.
 - 1. Verify that posts are set plumb, aligned, and at correct height and spacing, and hold in position during setting with concrete or mechanical devices.
 - 2. Concrete Fill: Place concrete around posts to dimensions indicated and vibrate or tamp for consolidation. Protect aboveground portion of posts from concrete splatter.
 - a. Posts Set into Sleeves in Concrete: Use steel pipe sleeves preset and anchored into concrete for installing posts. After posts are inserted into sleeves, fill annular space between post and sleeve with nonshrink, nonmetallic grout or anchoring cement, mixed and placed according to anchoring material manufacturer's written instructions. Finish anchorage joint to slope away from post to drain water.
- D. Terminal Posts: Install terminal end, corner, and gate posts according to ASTM F 567 and terminal pull posts at changes in horizontal or vertical alignment of as indicated on Drawings . For runs exceeding **500 feet**, space pull posts an equal distance between corner or end posts.
- E. Line Posts: Space line posts uniformly at **10 feet** o.c.
- F. Chain-Link Fabric: Apply fabric to outside of enclosing framework. Leave **2-inch** bottom clearance between finish grade or surface and bottom selvage unless otherwise indicated. Pull fabric taut and tie to posts, rails, and tension wires. Anchor to framework so fabric remains under tension after pulling force is released.

3.4 ADJUSTING

- A. Gates: Adjust gates to operate smoothly, easily, and quietly, free of binding, warp, excessive deflection, distortion, nonalignment, misplacement, disruption, or malfunction, throughout entire operational range. Confirm that latches and locks engage accurately and securely without forcing or binding.
- B. Lubricate hardware and other moving parts.

SECTION 32 31 13 - CHAIN LINK FENCES AND GATES

END OF SECTION 32 31 13

**SECTION 32 31 13 - CHAIN LINK FENCES AND
GATES**

Page 5 of 5

SECTION 32 92 00 -GRASSING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Grassing.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Division 31 Section "Site Clearing" for protection of existing trees and planting, topsoil stripping and stockpiling, and site clearing.
 - 2. Division 31 Section "Earthwork" for excavation, filling, rough grading, and subsurface aggregate drainage and drainage backfill.

1.3 SUBMITTALS

- A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.
- B. Product certificates signed by manufacturers certifying that their products comply with specified requirements.
 - 1. Manufacturer's certified analysis for standard products.
 - 2. Analysis for other materials by a recognized laboratory made according to methods established by the Association of Official Analytical Chemists, where applicable.
- C. Certification of grass seed from seed vendor for each grass-seed mixture stating the botanical and common name and percentage by weight of each species and variety, and percentage of purity, germination, and weed seed. Include the year of production and date of packaging.

- D. Samples of each of the following:
 - 1. 5 lb of mineral mulch for each color and texture of stone required for Project, in labeled plastic bags.
 - 2. Edging materials and accessories to verify color selected.
- E. Qualification data for firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and address of architects and owners, and other information specified.
- F. Material test reports from qualified independent testing agency indicating and interpreting test results relative to compliance of the following materials with requirements indicated.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced Installer who has completed landscaping work similar in material, design, and extent to that indicated for this Project and with a record of successful landscape establishment.
 - 1. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on the Project site during times that landscaping is in progress.
- B. Topsoil Analysis: Furnish a soil analysis made by a qualified independent soil-testing agency stating percentages of organic matter, inorganic matter (silt, clay, and sand), deleterious material, pH, and mineral and plant-nutrient content of topsoil.
 - 1. Report suitability of topsoil for growth of applicable planting material. State recommended quantities of nitrogen, phosphorus, and potash nutrients and any limestone, aluminum sulfate, or other soil amendments to be added to produce a satisfactory topsoil.
- C. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination." Coordinate grass schedule with the Owner for types of grass to be planted, location of grass types, planting times, and maintenance.
- D. The Contractor shall fully comply with all provisions of the Contract Documents including, but not limited to, providing and installing such entities as the products, materials, equipment, components, or systems that were proposed at the time bids were received. Except for extenuating circumstances as determined by the Architect, notification of not being able to meet any of the provisions of the Contract Documents or communicating conflicts in the Contract Documents to the Architect will not be considered after receipt of bids; and the Contractor shall fully comply with the Contract Documents at no increase in Contract Sum or Contract Time.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Packaged Materials: Deliver packaged materials in containers showing weight, analysis, and name of manufacturer. Protect materials from deterioration during delivery and while stored at site.
- B. Seed: Deliver seed in original sealed, labeled, and undamaged containers.

1.6 PROJECT CONDITIONS

- A. Utilities: Determine location of above grade and underground utilities and perform work in a manner which will avoid damage. Hand excavate, as required. Maintain grade stakes until removal is mutually agreed upon by parties concerned.
- B. Excavation: When conditions detrimental to plant growth are encountered, such as rubble fill, adverse drainage conditions, or obstructions, notify Architect before planting.

1.7 COORDINATION AND SCHEDULING

- A. Coordinate installation of planting materials during normal planting seasons for each type of plant material required.

1.8 WARRANTY

- A. General Warranty: The special warranty specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.
- B. Special Warranty: Warrant the following living planting materials for a period of one year after date of Substantial Completion, against defects including death and unsatisfactory growth, except for defects resulting from lack of adequate maintenance, neglect, or abuse by Owner, abnormal weather conditions unusual for warranty period, or incidents that are beyond Contractor's control.

- 1. Grass.

1.9 LAWN MAINTENANCE

- A. Begin maintenance of lawns immediately after each area is planted and continue until acceptable lawn is established, but for not less than the following periods:

- 1. Seeded Lawns: 60 days after date of Substantial Completion.

- a. When full maintenance period has not elapsed before end of planting season, or if lawn is not fully established at that time, continue maintenance during next planting season.
- B. Maintain and establish lawns by watering, fertilizing, weeding, mowing, trimming, replanting, and other operations. Roll, regrade, and replant bare or eroded areas and remulch to produce a uniformly smooth lawn.
- C. Watering: Provide and maintain temporary piping, hoses, and lawn-watering equipment to convey water from sources and to keep lawns uniformly moist to a depth of 4 inches.
 1. Water lawn at the minimum rate of 1 inch per week.
- D. Mow lawns as soon as there is enough top growth to cut with mower set at specified height for principal species planted. Repeat mowing as required to maintain specified height without cutting more than 40 percent of the grass height. Remove no more than 40 percent of grass-leaf growth in initial or subsequent mowings. Do not delay mowing until grass blades bend over and become matted. Do not mow when grass is wet.
- E. Postfertilization: Apply fertilizer to lawn after first mowing and when grass is dry.
 1. Use fertilizer that will provide actual nitrogen of at least 1 lb per 1000 sq. ft. of lawn area.

PART 2 - PRODUCTS

2.1 GRASS MATERIALS

- A. Grass Seed: Fresh, clean, dry, new-crop seed complying with the Association of Official Seed Analysts' "Rules for Testing Seeds" for purity and germination tolerances.
 1. Seed Mixture: Provide seed of grass species and varieties, proportions by weight, and minimum percentages of purity, germination, and maximum percentage of weed seed as indicated on Schedules at the end of this Section.

2.2 TOPSOIL

- A. Topsoil: ASTM D 5268, pH range of 5.5 to 7, 4 percent organic material minimum, free of stones 1 inch or larger in any dimension, and other extraneous materials harmful to plant growth.
 1. Topsoil Source: Reuse surface soil stockpiled on the site. Verify suitability of surface soil to produce topsoil meeting requirements and amend when necessary. Supplement with imported topsoil when quantities are insufficient. Clean topsoil of roots, plants, sods, stones, clay lumps, and other extraneous materials harmful to plant growth.

2.3 SOIL AMENDMENTS

- A. Lime: ASTM C 602, Class T, agricultural limestone containing a minimum 80 percent calcium carbonate equivalent, with a minimum 99 percent passing a No. 8 sieve and a minimum 75 percent passing a No. 60 sieve.
- B. Aluminum Sulfate: Commercial grade, unadulterated.
- C. Sand: Clean, washed, natural or manufactured sand, free of toxic materials.
- D. Perlite: Horticultural perlite, soil amendment grade.
- E. Peat Humus: Finely divided or granular texture, with a pH range of 6 to 7.5, composed of partially decomposed moss peat (other than sphagnum), peat humus, or reed-sedge peat.
- F. Sawdust or Ground-Bark Humus: Decomposed, nitrogen-treated, of uniform texture, free of chips, stones, sticks, soil, or toxic materials.
 - 1. When site treated, mix with at least 0.15 lb of ammonium nitrate or 0.25 lb of ammonium sulfate per cu. ft. of loose sawdust or ground bark.
- G. Manure: Well-rotted, unleached stable or cattle manure containing not more than 25 percent by volume of straw, sawdust, or other bedding materials; free of toxic substances, stones, sticks, soil, weed seed, and material harmful to plant growth.
- H. Herbicides: EPA registered and approved, of type recommended by manufacturer.
- I. Water: Potable.

2.4 FERTILIZER

- A. Bonemeal: Commercial, raw, finely ground; minimum of 4 percent nitrogen and 20 percent phosphoric acid.
- B. Superphosphate: Commercial, phosphate mixture, soluble; minimum of 20 percent available phosphoric acid.
- C. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea-form, phosphorous, and potassium in the following composition:
 - 1. Composition: 1 lb per 1000 sq. ft. of actual nitrogen, 4 percent phosphorous, and 2 percent potassium, by weight.
 - 2. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing agency.

- D. Slow-Release Fertilizer: Granular fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:
1. Composition: 10 percent nitrogen, 10 percent phosphorous, and 10 percent potassium, by weight.

2.5 MULCHES

- A. Organic Mulch: Organic mulch, free from deleterious materials and suitable as a top dressing of trees and shrubs, consisting of one of the following:
1. Type: Shredded hardwood.
 2. Type: Ground or shredded bark.
 3. Type: Pine straw.
 4. Type: Salt hay or threshed straw.
 5. Type: Wood and bark chips.
 6. Type: Pine needles.
 7. Type: Peanut, pecan, and cocoa-bean shells.
- B. Asphalt Emulsion Tackifier: Asphalt emulsion, ASTM D 977, Grade SS-1, nontoxic and free of plant growth- or germination-inhibitors.
- C. Nonasphaltic Tackifier: Colloidal tackifier recommended by fiber-mulch manufacturer for slurry application, nontoxic and free of plant growth- or germination-inhibitors.

2.6 WEED-CONTROL BARRIERS

- A. Sheet Polyethylene: Black, 0.006-inch minimum thickness.
- B. Nonwoven Fabric: Polypropylene or polyester fabric, 3 oz. per sq. yd. minimum.
- C. Composite Fabric: Woven, needle-punched polypropylene substrate bonded to a nonwoven polypropylene fabric, 4.8 oz. per sq. yd.

2.7 EROSION-CONTROL MATERIALS

- A. Blankets: Biodegradable wood excelsior, straw, or coconut-fiber mat enclosed in a photodegradable plastic mesh. Include manufacturer's recommended steel wire staples, 6 inches long.
- B. Fiber Mesh: Biodegradable twisted jute or spun-coir mesh, 0.92 lb per sq. yd. minimum, with 50 to 65 percent open area. Include manufacturer's recommended steel wire staples, 6 inches long.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas to receive landscaping for compliance with requirements and for conditions affecting performance of work of this Section. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PLANTING SOIL PREPARATION

- A. Before mixing, clean topsoil of roots, plants, sods, stones, clay lumps, and other extraneous materials harmful to plant growth.
- B. Mix soil amendments and fertilizers with topsoil at rates indicated. Delay mixing fertilizer if planting does not follow placing of planting soil within a few days.
- C. For planting lawns, mix planting soil either prior to planting or apply on surface of topsoil and mix thoroughly before planting.
 1. Mix lime with dry soil prior to mixing fertilizer. Prevent lime from contacting roots of acid-tolerant plants.

3.3 LAWN PLANTING PREPARATION

- A. Limit subgrade preparation to areas that will be planted in the immediate future.
- B. Loosen subgrade to a minimum depth of 4 inches. Remove stones larger than 1-1/2 inches in any dimension and sticks, roots, rubbish, and other extraneous materials.
- C. Spread planting soil mixture to depth required to meet thickness, grades, and elevations shown, after light rolling and natural settlement. Do not spread if planting soil or subgrade is frozen.
 1. Place approximately 1/2 the thickness of planting soil mixture required. Work into top of loosened subgrade to create a transition layer and then place remainder of planting soil mixture.
- D. Preparation of Unchanged Grades: Where lawns are to be planted in areas unaltered or undisturbed by excavating, grading, or surface soil stripping operations, prepare soil as follows:
 1. Where grass cannot be reconditioned, remove and dispose of existing grass, vegetation, and turf damaged during construction activities. Do not turn over into soil being prepared for lawns.

2. Till surface soil to a depth of at least 6 inches. Apply required soil amendments and initial fertilizers and mix thoroughly into top 4 inches of soil. Trim high areas and fill in depressions. Till soil to a homogenous mixture of fine texture.
 3. Clean surface soil of roots, plants, sods, stones, clay lumps, and other extraneous materials harmful to plant growth.
 4. Remove waste material, including grass, vegetation, and turf, and legally dispose of it off the Owner's property.
- E. Grade lawn and grass areas to a smooth, even surface with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades. Limit fine grading to areas that can be planted in the immediate future. Remove trash, debris, stones larger than 1-1/2 inches in any dimension, and other objects that may interfere with planting or maintenance operations.
- F. Moisten prepared lawn areas before planting when soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.
- G. Restore prepared areas if eroded or otherwise disturbed after fine grading and before planting.

3.4 MULCHING

- A. Mulch backfilled surfaces of pits, trenches, planted areas, and other areas indicated.
- B. Weed-Control Barriers: Install the following weed-control barriers according to manufacturer's recommendations, before mulching. Completely cover area to be mulched, lapping edges a minimum of 6 inches.
1. Material and Seam Treatment: Sheet polyethylene with seams taped.
- C. Organic Mulch: Apply the following average thickness of organic mulch and finish level with adjacent finish grades. Do not place mulch against trunks or stems.
1. Thickness: 2 inches.

3.5 SEEDING NEW LAWNS

- A. Sow seed with a spreader or a seeding machine. Do not broadcast or drop seed when wind velocity exceeds 5 mph. Evenly distribute seed by sowing equal quantities in 2 directions at right angles to each other.
1. Do not use wet seed or seed that is moldy or otherwise damaged in transit or storage.
- B. Sow seed per the drawings.

- C. Rake seed lightly into top 1/8 inch of topsoil, roll lightly, and water with fine spray.
- D. Protect seeded areas with slopes less than 1:6 against erosion by mechanically spreading straw mulch after completion of seeding operations. Spread uniformly at a minimum rate of 2 tons per acre to form a continuous blanket 1-1/2 inches loose depth over seeded areas. .
 - 1. Anchor straw mulch by crimping into topsoil by suitable mechanical equipment.

3.6 HYDROSEEDING NEW LAWNS

- A. Hydroseeding: Mix specified seed, fertilizer, and fiber mulch in water, using equipment specifically designed for hydroseed application. Continue mixing until uniformly blended into homogenous slurry suitable for hydraulic application.
 - 1. Mix slurry with nonasphaltic tackifier.

3.7 RECONDITIONING LAWNS

- A. Recondition existing lawn areas damaged by Contractor's operations, including storage of materials or equipment and movement of vehicles. Also recondition lawn areas where settlement or washouts occur or where minor regrading is required. Remove all ruts and other traces of activity and restore to a condition ready for grassing.
- B. Remove sod and vegetation from diseased or unsatisfactory lawn areas; do not bury into soil. Remove topsoil containing foreign materials resulting from Contractor's operations, including oil drippings, fuel spills, stone, gravel, and other construction materials, and replace with new topsoil.
- C. Where substantial lawn remains, mow, dethatch, core aerate, and rake. Remove weeds before seeding. Where weeds are extensive, apply selective herbicides as required. Do not use pre-emergence herbicides.
- D. Remove waste and foreign materials, including weeds, soil cores, grass, vegetation, and turf, and legally dispose of it off the Owner's property.
- E. Till stripped, bare, and compacted areas thoroughly to a depth of 6 inches.
- F. Apply required soil amendments and initial fertilizers and mix thoroughly into top 4 inches of soil. Provide new planting soil as required to fill low spots and meet new finish grades.
- G. Apply seed and protect with straw mulch as required for new lawns.
- H. Water newly planted areas and keep moist until new grass is established.

3.8 CLEANUP AND PROTECTION

- A. During landscaping, keep pavements clean and work area in an orderly condition.
- B. Protect landscaping from damage due to landscape operations, operations by other contractors and trades, and trespassers. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged landscape work as directed.

3.9 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Disposal: Remove surplus soil and waste material, including excess subsoil, unsuitable soil, trash, and debris, and legally dispose of it off the Owner's property.

3.10 SEED MIXTURES SCHEDULE

- A. Full-Sun Mixture: Provide certified grass-seed blends or mixes, proportioned by weight, as follows:

Proportion	Name	Min. Pct. Germ.	Min. Pct. Pure Sd.	Max. Pct. Weed Sd.
100 pct.	Bermudagrass (Cynodon dactylon)	80	85	0.50

- B. Sun and Partial Shade: Provide certified grass-seed blends or mixes, proportioned by weight, as follows:

Proportion	Name	Min. Pct. Germ.	Min. Pct. Pure Sd.	Max. Pct. Weed Sd.
50 pct.	Kentucky bluegrass (Poa pratensis)	80	85	0.50
30 pct.	Chewings red fescue (Festuca rubra variety)	85	98	0.50
10 pct.	Perennial rye grass (Lolium perenne)	90	98	0.50
10 pct.	Redtop (Agrostis alba)	85	92	1.00

C. Heavy Shade: Provide certified grass-seed blends or mixes, proportioned by weight, as follows:

Proportion	Name	Min. Pct. Germ.	Min. Pct. Pure Sd.	Max. Pct. Weed Sd.
50 pct.	Chewings red fescue (Festuca rubra variety)	85	98	0.50
35 pct.	Rough bluegrass (Poa trivialis)	80	85	1.00
15 pct.	Redtop (Agrostis alba)	85	92	1.00

END OF SECTION 32 92 00

SECTION 32 92 01 –TEMPORARY GRASS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes installing temporary grass as indicated on the Drawings.
- B. Related Sections: The following Sections contain requirements that relate to this Section:

1.3 SUBMITTALS

- A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.
 - 1. Division 31 Section "Site Clearing" for protection of existing trees and planting, topsoil stripping and stockpiling, and site clearing.
 - 2. Division 31 Section "Earthwork" for excavation, filling, rough grading, and subsurface aggregate drainage and drainage backfill.
- B. Product certificates signed by manufacturers certifying that their products comply with specified requirements.
 - 1. Manufacturer's certified analysis for standard products.
 - 2. Analysis for other materials by a recognized laboratory made according to methods established by the Association of Official Analytical Chemists, where applicable.
- C. Certification of grass seed from seed vendor for each grass-seed mixture stating the botanical and common name and percentage by weight of each species and variety, and percentage of purity, germination, and weed seed. Include the year of production and date of packaging.
- D. Samples of each of the following:
 - 1. 5 lb of mineral mulch for each color and texture of stone required for Project, in labeled plastic bags.
 - 2. Edging materials and accessories to verify color selected.

- E. Qualification data for firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and address of architects and owners, and other information specified.
- F. Material test reports from qualified independent testing agency indicating and interpreting test results relative to compliance of the following materials with requirements indicated.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Packaged Materials: Deliver packaged materials in containers showing weight, analysis, and name of manufacturer. Protect materials from deterioration during delivery and while stored at site.
- B. Seed: Deliver seed in original sealed, labeled, and undamaged containers.

1.5 COORDINATION AND SCHEDULING

- A. Coordinate installation of planting materials during normal planting seasons for each type of plant material required.

1.6 GRASS MAINTENANCE

- A. Begin maintenance of grass immediately after each area is planted and continue until acceptable grass is established, but for not less than the following periods:
- B. Maintain and establish grass by watering, fertilizing, weeding, mowing, trimming, replanting, and other operations. Roll, regrade, and replant bare or eroded areas and mulch to produce a uniformly smooth grass.
- C. Watering: Provide and maintain temporary piping, hoses, and grass watering equipment to convey water from sources and to keep grass uniformly moist.
- D. Mow grass as soon as there is enough top growth to cut with mower set at specified height for principal species planted. Repeat mowing as required to maintain specified height without cutting more than 40 percent of the grass height. Remove no more than 40 percent of grass-leaf growth in initial or subsequent mowings. Do not delay mowing until grass blades bend over and become matted. Do not mow when grass is wet.
- E. Post fertilization: Apply fertilizer to grass after first mowing and when grass is dry.
 - 1. Use fertilizer that will provide actual nitrogen of at least 1 lb per 1000 sq. ft. of grass area.

PART 2 - PRODUCTS

2.1 GRASS MATERIALS

- A. Grass Seed: Fresh, clean, dry, new-crop seed complying with the Association of Official Seed Analysts' "Rules for Testing Seeds" for purity and germination tolerances.
 - 1. Seed Mixture: Provide seed of grass species and varieties, proportions by weight, and minimum percentages of purity, germination, and maximum percentage of weed seed as indicated on Schedules at the end of this Section.

2.2 TOPSOIL

- A. Topsoil: ASTM D 5268, pH range of 5.5 to 7, 4 percent organic material minimum, free of stones 1 inch or larger in any dimension, and other extraneous materials harmful to plant growth.
 - 1. Topsoil Source: Reuse surface soil stockpiled on the site. Verify suitability of surface soil to produce topsoil meeting requirements and amend when necessary. Supplement with imported topsoil when quantities are insufficient. Clean topsoil of roots, plants, sods, stones, clay lumps, and other extraneous materials harmful to plant growth.

2.3 SOIL AMENDMENTS

- A. Lime: ASTM C 602, Class T, agricultural limestone containing a minimum 80 percent calcium carbonate equivalent, with a minimum 99 percent passing a No. 8 sieve and a minimum 75 percent passing a No. 60 sieve.

2.4 FERTILIZER

- A. Bone meal: Commercial, raw, finely ground; minimum of 4 percent nitrogen and 20 percent phosphoric acid.
- B. Superphosphate: Commercial, phosphate mixture, soluble; minimum of 20 percent available phosphoric acid.
- C. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea-form, phosphorous, and potassium in the following composition:
 - 1. Composition: 1 lb per 1000 sq. ft. of actual nitrogen, 4 percent phosphorous, and 2 percent potassium, by weight.
 - 2. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing agency.

- D. Slow-Release Fertilizer: Granular fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:
 - 1. Composition: 10 percent nitrogen, 10 percent phosphorous, and 10 percent potassium, by weight.

2.5 EROSION-CONTROL MATERIALS

- A. Blankets: Biodegradable pine straw, or pine needles.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas that are to receive temporary grassing to ensure that they are suitable for seeding. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PLANTING SOIL PREPARATION

- A. Recondition existing grass areas damaged by Contractor's operations, including storage of materials or equipment and movement of vehicles. Also recondition grass areas where settlement or washouts occur or where minor regrading is required. Remove all ruts and other traces of activity and restore to a condition ready for grassing.
- B. Prepare areas as follows:
 - 1. Grade grass areas to a smooth, even surface with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades. Limit fine grading to areas that can be planted in the immediate future. Remove trash, debris, stones larger than 1-1/2 inches in any dimension, and other objects that may interfere with planting or maintenance operations.
 - 2. Remove sod and vegetation; do not bury into soil. Remove topsoil containing foreign materials resulting from Contractor's operations, including oil drippings, fuel spills, stone, gravel, and other construction materials, and replace with new topsoil.
 - a. Remove waste and foreign materials, including weeds, soil cores, grass, vegetation, and turf, and legally dispose of it off the Owner's property.
 - 5. Till surface soil to a depth of at least 6 inches. Apply required soil amendments and initial fertilizers and mix thoroughly into top 4 inches of soil. Trim high areas and fill in depressions. Till soil to a homogenous mixture of fine texture.
 - 6. Before mixing seed, clean topsoil of roots, plants, sods, stones, clay lumps, and other extraneous materials harmful to plant growth.

7. Mix soil amendments and fertilizers with topsoil at rates indicated. Delay mixing fertilizer if planting does not follow placing of planting soil within a few days.
8. Mix planting soil either prior to planting or apply on surface of topsoil and mix thoroughly before planting.
 - a. Mix lime with dry soil prior to mixing fertilizer. Prevent lime from contacting roots of acid-tolerant plants.
9. Limit subgrade preparation to areas that will be planted in the immediate future.
10. Loosen subgrade to a minimum depth of 4 inches. Remove stones larger than 1-1/2 inches in any dimension and sticks, roots, rubbish, and other extraneous materials.
 - a. Clean surface soil of roots, plants, sods, stones, clay lumps, and other extraneous materials harmful to plant growth.
 - b. Remove waste material, including grass, vegetation, and turf, and legally dispose of it off the Owner's property.
11. Spread planting soil mixture to depth required to meet original thickness, grades, and after light rolling and natural settlement. Do not spread if planting soil or subgrade is frozen.
 - a. Place approximately 1/2 the thickness of planting soil mixture required. Work into top of loosened subgrade to create a transition layer and then place remainder of planting soil mixture.
 - b. Restore prepared areas if eroded or otherwise disturbed after fine grading and before planting.
12. Moisten prepared grassing areas before planting when soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

3.3 SEEDING

- A. Sow seed with a spreader or a seeding machine. Do not broadcast or drop seed when wind velocity exceeds 5 mph. Evenly distribute seed by sowing equal quantities in 2 directions at right angles to each other.
 1. Do not use wet seed or seed that is moldy or otherwise damaged in transit or storage.
- B. Rake seed lightly into top 1/8 inch of topsoil, roll lightly, and water with fine spray.

- C. Protect seeded areas with slopes less than 1:6 against erosion by spreading straw mulch after completion of seeding operations. Spread uniformly at a minimum rate of 2 tons per acre to form a continuous blanket 1-1/2 inches loose depth over seeded areas. Spread by hand, blower, or other suitable equipment.

- 1. Anchor straw mulch by crimping into topsoil by suitable mechanical equipment.

3.4 HYDROSEEDING

- A. Hydroseeding: Mix specified seed, fertilizer, and fiber mulch in water, using equipment specifically designed for hydroseed application. Continue mixing until uniformly blended into homogenous slurry suitable for hydraulic application.

- 1. Mix slurry with nonasphaltic tackifier.

3.5 CLEANUP AND PROTECTION

- A. During grassing, keep pavements clean and work area in an orderly condition.
- B. Protect landscaping from damage due to grassing operations, operations by other contractors and trades, and trespassers. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged landscape work as directed.

3.6 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Disposal: Remove surplus soil and waste material, including excess subsoil, unsuitable soil, trash, and debris, and legally dispose of it off the Owner's property.

3.7 SEED MIXTURES SCHEDULE

- A. Provide a seed mixture as indicated on the Drawings. If not indicated, then comply with the following schedule:
- B. Full-Sun Mixture: Provide certified grass-seed blends or mixes, proportioned by weight, as follows:

Proportion	Name	Min. Pct. Germ.	Min. Pct. Pure Sd.	Max. Pct. Weed Sd.
100 pct.	Bermudagrass (Cynodon dactylon)	80	85	0.50

C. Sun and Partial Shade: Provide certified grass-seed blends or mixes, proportioned by weight, as follows:

Proportion	Name	Min. Pct. Germ.	Min. Pct. Pure Sd.	Max. Pct. Weed Sd.
50 pct.	Kentucky bluegrass (Poa pratensis)	80	85	0.50
30 pct.	Chewings red fescue (Festuca rubra variety)	85	98	0.50
10 pct.	Perennial rye grass (Lolium perenne)	90	98	0.50
10 pct.	Redtop (Agrostis alba)	85	92	1.00

D. Heavy Shade: Provide certified grass-seed blends or mixes, proportioned by weight, as follows:

Proportion	Name	Min. Pct. Germ.	Min. Pct. Pure Sd.	Max. Pct. Weed Sd.
50 pct.	Chewings red fescue (Festuca rubra variety)	85	98	0.50
35 pct.	Rough bluegrass (Poa trivialis)	80	85	1.00
15 pct.	Redtop (Agrostis alba)	85	92	1.00

END OF SECTION 32 92 00

SECTION 33 31 00 - SANITARY SEWER

PART 1 GENERAL

1.1 SECTION INCLUDES:

- A. Sanitary sewer pipes & fittings.
- B. Excavation for pipe trenches.
- C. Manholes, covers, and grease traps.
- D. Requirements for documentation.

1.2 REFERENCES

- A. ANSI/AWWA C110, American National Standard for Ductile-Iron and Gray-Iron Fittings, 3 in. through 48 in. (75 mm through 1200 mm), for Water and Other Liquids
- B. ANSI/AWWA C151/A21.51, American National Standard for Ductile-Iron Pipe, Centrifugally Cast, for Water
- C. ANSI/AWWA C900, Polyvinyl Chloride (PVC) Pressure Pipe, 4 in. through 12 in., for Water Distribution and Force Main
- D. ANSI/AWWA C905, Polyvinyl Chloride (PVC) Water Transmission Pipe, Nominal Diameters 14 In. through 36 In
- E. ASTM A48, Standard Specification for Gray Iron Castings
- F. ASTM C62, Standard Specification for Building Brick (Solid Masonry Units Made From Clay or Shale
- G. ASTM D1782. Standard Test Method for Operating Performance of Particulate Cation-Exchange Materials
- H. ASTM D1784, Standard Specification for Rigid Poly (PVC) Compounds and Chlorinated Poly (CPVC) Compounds
- I. ASTM D2321, Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications
- J. ASTM D3034, Standard Specification for Type PSM Poly (PVC) Sewer Pipe and Fittings

1.3 EXISTING UTILITIES

- A. The contractor shall obtain a PUPS Certification number at least 48 hours prior to beginning any excavation.
- B. Prior to beginning construction, the Contractor shall verify the size, location, elevation, and material of all existing utilities within the area of construction by use of record drawings and/or electronic locating devices.
- C. Existing utility locations shown on the plans are approximate and based on available records.
 - 1. The Contractor is responsible for verifying all utilities, and notifying the Architect of conflicts and variations.
- D. The Contractor is responsible for damage to any existing utilities for which he fails to request locations from the utility owner, and for damage to existing utilities that are properly located.
- E. The Contractor shall immediately notify the Architect, if upon excavation finds the existing utility in conflict with the proposed construction or of a different size or material from that shown on the plans.

1.4 SHOP DRAWINGS AND SUBMITTALS

- A. Submit under provisions of Section 01 33 00.
- B. Prior to installation, the Contractor shall furnish to the Architect the manufacturers' literature and data for all materials installed under this section for his approval.

- C. Complete As-Built information and plans required before final acceptance of the system.
 - 1. Contractor shall provide accurate record of complete system relative to manholes, cleanouts, services, fittings, pipe size, pipe material, pipe lengths, and the like.
 - 2. Registered Surveyor shall provide all horizontal and vertical information in the Contractor's As-Built information.
 - 3. Final approval of the project "As-Built" information from the regulatory agencies having jurisdiction.
 - 4. Contractor shall camera the sewer lines and provide the District with a copy of the videotape.

1.5 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to work in this section.
- B. Section 31 20 00 – Earthwork

1.6 APPLICABLE CODES

- A. General: All construction and materials shall conform to all local and national codes where applicable.
- B. Town of Lyman Sewer and SCDHEC Minimum Engineering and Construction Standards.
- C. Construction Safety: Perform all construction in a safe manner; follow Occupational Safety and Health Administration (OSHA) and the Manual of Uniform Traffic Control Devices (MUTCD) regulations.
- D. Survey Data: All elevations on the plans or referenced in the specifications are based on National Geodetic Vertical Datum of 1929 (NGVD).

1.7 SANITARY SEWER SYSTEM

- A. Gravity sewer shall comply with Town of Lyman Sewer and SCDHEC Minimum Engineering and Construction, Water and Sewer Systems, or the construction standards of the municipality having jurisdiction.

PART 2 PRODUCTS

2.1 SEWER PIPE AND FITTINGS

- A. All gravity sewer pipe and fittings shall be non-pressure polyvinyl chloride (PVC) pipe conforming to ASTM D3034, SDR 35, with push-on rubber gasket joints or ductile iron pipe with a ceramic epoxy lining and bituminous exterior coating.
- B. Fittings: PVC and DI pipe, over 4", use ductile iron mechanical joint fittings complying with AWWA/ANSI-C110 and having coating/lining per B. Above.
 - 1. All fittings and accessories shall be as manufactured or supplied by the pipe manufacturer or approved equal.
- C. In addition to the above-cited specifications, all gravity PVC sewers shall conform to the following additional requirements:
 - 1. The PVC gravity sewer piping shall be of a product having a dimension ratio (DR) of 35 and minimum pipe stiffness (PS) of 46 psi.

2. Joints: Use an integral bell gasket joint, designed so that when assembled, the elastomeric gasket inside the bell is compressed radially on the pipe spigot to form a positive seal.
 - a. The joint shall avoid displacement of the gasket when installed in accordance with the manufacturer's recommendation.
 3. Use manufacturer's recommended lubricants for joining of the pipes.
 - a. No solvent cement joints accepted.
 - b. Follow the pipe manufacturer's instructions for the joining of the pipe on the job, complete in the trench unless otherwise directed by the Architect.
 4. Gaskets: Mold all gaskets in a circular form or extruded to the proper section and then splice into circular form, and have a properly vulcanized high-grade elastomeric compound.
 - a. The basic polymer being natural rubber, synthetic elastomer or a blend of both.
 - b. The gaskets shall be of materials resistant to domestic sewage and as recommended by the manufacturer, with an adequate compressive force so as to affect a positive seal under all combinations of joint tolerance, as the gasket shall be the only element depended upon to make the joint flexible and watertight.
 5. Pipe and Fittings: The pipe shall be made of PVC plastic having a cell classification of 12454-B or 12454-C or 13364-B (with minimum tensile modulus of 500,000 psi) as defined in ASTM D1784.
 - a. The fittings shall be made of PVC plastic having a cell classification of 12454-B, 12454-C or 13343-C as defined in ASTM D1782.
 - b. Compounds that have different cell classifications because one or more properties are superior to those of the specified compounds are also acceptable.
 - c. Clean rework material generated by the manufacturer's own production may be used so long as the pipe or fittings produced meet all the requirements of the specification.
 6. The pipe and fittings shall be homogenous throughout and free from visible cracks, holes, foreign inclusions or other injurious defects.
 - a. The pipe shall be as uniform as commercially practical in color, capacity, density and other physical properties.
 - b. PVC pipe and fittings showing signs of ultra-violet degradation are not allowed.
 7. Pipe Marking: Clearly mark each standard and random length of pipe in accordance with the following example at intervals of 1.5 M (5') or less:
 - a. Manufacturer's Name or Trademark
 - b. Nominal Pipe Size
 - c. The PVC Cell Classification
 - d. The Legend Type e.g.- DR 35 PVC Sewer Pipe
 - e. Color: Green.
 8. Fittings Marking: The fittings in compliance with this standard shall be clearly marked per the following example:
 - a. Manufacturer's Name or Trademark
 - b. Nominal Pipe Size
 - c. The Material Designation PVC PSM
 9. Adapters: If field conditions require adapters, install per Architect's direction.
 10. Plugs: Service plugs shall be flexible virgin polyvinyl chloride as supplied by Fernco Joint Sealer Company.
- D. All force main piping shall be C-900 Class 150 PVC with mechanical joint fittings and thrust blocking unless shown otherwise.

PART 3 EXECUTION

3.1 INSTALLATION GENERAL

- A. The contractor shall provide for the furnishing of all labor, equipment, and materials to perform all operations necessary to construct and test the wastewater collection system in accordance with the plans and specifications.
- B. Obtain permission from the Health Department and utility company having jurisdiction before install the sewerage systems.
- C. Construct on site utilities in accordance with Town of Lyman Sewer and SCDHEC Minimum Engineering and Construction Standards.
 - 1. Materials, installation, cleaning, testing, and disinfection.
- D. Waterproof interior of manholes, do not provide ladder rungs, and label covers.

3.2 EXCAVATIONS

- A. Keep trenches as nearly vertical as possible and if required, provide sheeting and bracing.
 - 1. Keep sheeting in place if in the opinion of the Architect or Contractor, damage could result from its removal.
- B. Except in rock, water-bearing earth, or where a granular or concrete base is used, stop mechanical excavation of trenches above the final grade elevation laying of pipe on a firm, undisturbed native earth bed.
 - 1. If over digging occurs, remove all loosened earth and bring the trench bottom back to grade with granular material.
- C. Carry excavations and trenches in rock to a depth of not less than 4" below the pipe bottom, and then fill with granular material or washed rock.
- D. Width of trenches shall be such as to provide adequate space for placing and jointing pipe properly, keep trench to a minimum width.
- E. Remove any unstable soil encountered and replace with gravel, crushed rock, or rock and sand suitably compacted.
- F. All excavations shall be in conformance with Section 312000, Earth Moving.

3.3 DEWATERING

- A. The Contractor shall provide adequate equipment for the removal of storm or surface water that may accumulate in the excavation areas.
- B. If the contractor encounters subsurface water, he shall use an approved method to adequately dewater the excavation site so that it is suitably dry for working, form setting, concrete pouring, and pipe installation.
- C. This method shall be in place as necessary to maintain the excavation in a dry condition for such operations.
- D. All cost for this equipment and work shall be at the Contractor's expense.

3.4 PREPARATION OF TRENCH BOTTOM

- A. Do not allow water in the trenches during preparation of the trench bottom or during installation of pipe, unless authorized by the Architect.
- B. Shape a continuous trough to receive the bottom quadrant of the pipe barrel.
 - 1. Excavate bell holes so that after placement, only the barrel of the pipe receives bearing pressure from the trench bottom.

- C. Carefully prepare the trench bottom and place the pipe so that when in final position, the pipe is true to line and grade.
- D. When sand, crushed rock, gravel or pea rock are used to support the pipe, place such material in the trench bottom a minimum of 4" below the bottom of the pipe, and form the trough as described above to uniformly support the bottom quadrant of the pipe barrel.

3.5 INSTALLATION OF SEWER PIPE

- A. Install sewer pipe in accordance with ASTM D2321 and the Uni-Bell Plastic Pipe Association's Recommended Practice for the Installation of PVC Sewer Pipe.
- B. Protect pipe during handling against impact shocks and free falls.
 - 1. Keep pipe clean at all times and do not use pipe that does not conform to the specifications.
- C. Start laying the pipe at the lowest point, with spigot ends pointing in the direction of flow.
 - 1. Lay all pipes with ends abutting and true to line and grade.
 - 2. Carefully center pipe so that when laid, they will form a sewer with a uniform invert.
 - 3. Lay pipe in accordance with manufacturer's requirements as reviewed by the Architect.
- D. Lay pipe accurately to the line and grade as shown on the plans.
 - 1. Preparatory to making pipe joints, all surfaces of the portions of the pipe to be jointed or of the factory-made jointing material shall be clean and dry.
 - 2. Use lubricant, primers, adhesives, etc., as recommended by the pipe or joint manufacturer's specifications.
 - 3. The jointing materials or factory-fabricated joints shall be placed, fitted, joined and adjusted in such a manner as to obtain a watertight line.
 - 4. As soon as possible after making the joint, place sufficient backfill material along each side of the pipe to prevent movement of pipe off line and grade.
- E. Properly plug the exposed ends of pipe to prevent earth, water or other substances from entering the pipe when construction is not in progress.
- F. Properly grout the Harco or approved equal manhole couplings in place at each pipe connection into a manhole wall.

3.6 BACKFILLING TRENCHES

- A. Backfill all trenches and excavations immediately after laying pipe unless directed otherwise.
 - 1. Do not permit water to rise in open trenches after placement of pipe.
 - 2. Backfilling shall be in compliance with Section 312000.
- B. Backfill trenches with approved material free from large clods, stones or rocks larger than 1" in diameter, and carefully deposited in layers, not exceeding 6", until enough fill is placed to provide a cover of not less than 12" above the pipe.
 - 1. Place each layer, and then carefully and uniformly tamp, so as to eliminate the possibility of pipe displacement.
 - 2. Place the remainder of backfill material, moisten, and compacted, to 95% of AASHTO Specifications T-180 in landscaped areas and 98% of maximum density in paved areas.
- C. Refill, compact, smooth, and make to conform to surrounding grade any trenches improperly filled or settled.
- D. Unless otherwise directed, or shown on the plans, backfill in trenches in or through roadways shall be made as specified above, except that the entire fill above 1" over the pipe shall be deposited in layers not to exceed 12" thickness, moistened, and compacted to density equal to greater than that of adjacent material so that pavement can be placed immediately.

3.7 CONCRETE ENCASUREMENT OF SEWER PIPE

- A. May use mechanical equipment to completely excavate trenches for pipe encasements.
- B. Prior to formation of the encasement, in at least two places provide temporary supports consisting of timber, wedges or masonry to support the pipe, one at the bottom of the barrel of the pipe adjacent to the shoulder of the socket, and the other near the spigot end.
- C. After the completion of jointing the pipe, uniformly pour concrete beneath and on both sides of the pipe.
 - 1. Use sufficient concrete so that encasement is at least 4" thick at all points.

3.8 MANHOLES

- A. Provide pre-cast concrete manholes with 4000-psi min compressive strength and grade-60 steel.
- B. May use other materials with prior approval of the Architect.
- C. Construct the manholes to ASTM C-478 requirements and the following:
 - 1. Minimum wall thickness shall be 8", and the inside diameter of base sections 48".
 - 2. Provide minimum 8" thick pre-cast reinforced base monolithically casted with the bottom section of manhole walls.
 - a. Extend the base slab a minimum of 4" from the outside of the manhole.
 - 3. Lifting holes through the structures are not permitted.
 - a. All holes shall be grout filled to a smooth surface.
 - 4. Minimum height of base sections shall be 3' from the bottom of base slab.
 - 5. Join manhole sections with a mastic compound or a round compression ring of neoprene material set in annular spaces cast into the spigot end of a bell spigot-type joint.
 - a. Uniformly compress the mastic compound or ring between the sections to form a watertight joint.
 - b. After the assembling the sections, point and fill the remaining space in the joint with a dense cement mortar and finish to a smooth, continuous surface inside and outside the wall sections.
 - 6. Pre-cast manhole cones, when used, shall terminate at such elevations as will permit laying up a minimum of two and maximum of four courses of clay brick under the manhole frame to make allowance for future street grade adjustment.
 - a. Approved HDPE adjusting rings may be used in-lieu of brick.
 - b. Mechanically attach HDPE rings to the marble frame and the cone.
 - c. Submit detail for approval prior to construction.
 - 7. Use dense, hard burned, common clay brick conforming to ASTM C62 latest revision for manhole construction, brick absorption shall be between 5 and 25 grams of water in one minute by dried brick, set flat face down, in 1/8" of water.
 - a. Thoroughly slush all brick with mortar at every corner.
 - 8. Construction of invert channels shall be:
 - a. Smooth and semicircular in shape conforming to inside of adjacent sewer section.
 - b. Changes in direction of flow shall be smooth curve of as large a radius as the size of the manhole will permit.
 - c. Changes in size and grade of channels shall be gradual and even.
 - d. Form invert channels by one of the following methods:
 - i) Directly into concrete manhole base, build up with block and mortar, lay half tile in concrete, or
 - ii) Lay full section of sewer pipe through manhole and cut out top half after the surrounding concrete has cured; cut shall be smooth and even.

- e. Make the manhole floor outside of channels smooth, and slope toward channels at a slope of 1" per foot.
9. Where shown on the drawings, the contractor shall place stub outs for future extensions, with a plug marked with a metallic locating device.
10. Service laterals not permitted through manhole walls.
11. Outside drop connections are required when the vertical distance between pipe inverts exceeds 2'.
 - a. Cast required drop connections monolithically with the manhole elements.
12. Cover the entire inside of the manhole with two coats (8 mil each) of Koppers 300M Bitumastic Paint.
 - a. Remove all dirt, dust, oils, compounds and other foreign matter, and etch the surfaces with 18% to 20% muriatic acid solution.
 - b. Then thoroughly rinsed all surfaces with clean, clear water prior to paint application. Completely dilute the acid solution prior to removal from the system.
13. Jointing and Plastering: Mortar for jointing and plastering shall consist of one part Portland cement and two parts of fine sand.
14. Grout the influent and effluent sewers in place using a waterproof, expanding grout, acceptable to the Architect.
 - a. Seal all openings and joints watertight.
15. Make all castings for manhole frames and covers of clean even grain, tough gray cast iron.
 - a. The castings shall be smooth, true to pattern, and free from projects, sand holes, warp and other defects.
 - b. The horizontal surfaces of the frame cover seat and the under surface of the cover which rests upon the cover seat shall be machined.
 - c. The cover shall not rock after seating in any position of its associated frame.
 - d. Machining is required only on those frames and covers intended for vehicular traffic.
16. Coat castings with coal tar pitch varnish that shall make a smooth coating, tough and tenacious when cold, not tacky and not brittle.
 - a. Iron used for castings shall conform to ASTM A48 for Class 30, gray iron.
17. Cast the words "Sanitary Sewer", and the name of the Owner in the cover.
 - a. Set the manhole frames and covers so that the top cover is flush with the finished grade or as indicated on the drawings.
 - b. The manhole frame and cover type shall be as indicated on the drawings.
 - c. Frames will be suitable for the future addition of cast iron rings for upward adjustment of top elevation.
 - d. Machine the seating surfaces between frames and covers to fit true.
 - e. No plugging or filling is allowed.
 - f. Cast pick type lifting holes into lids, but do not go clear through the lid.
18. When a manhole is in low-lying areas or when in the opinion of the Architect an unusual condition exists, a sealed locking type lid may be required.
 - a. Installation of this type as directed by the Architect.

3.9 GREASE TRAPS/OIL SEPARATORS (N/A)

- A. Provide concrete grease trap tanks, 1250-gallon max per tank, with 2½" drop between tanks.
 1. Capacity = seats in dining room x part of day x loading factor.
 2. Internal concrete baffle is not required for multiple tanks.
- B. Grease traps shall resist floatation at all times, even when empty.
- C. In paved vehicle traffic areas, grease trap shall meet H-20 truck loading requirements.
 1. Place top slab reinforcing in the bottom of the slab, not the top.

- D. Connect dumpster pad drain to the grease trap.
- E. Place two-way cleanouts before, after, and between tanks.
- F. Provide traffic covers and drop pipes as required.
- G. Provide a neutralizing tank for acid waste pipes before draining into the sanitary system.
- H. The effluent from the oil/water separator for vehicle wash down and garage areas shall drain into the sanitary sewer system.
 - 1. The tank shall be as manufactured by Highland Tank Co., Storytown, Pa. or approved equal.
 - 2. The tank shall be doubled wall with a 30-mil thick exterior coating.
 - 3. Have metallic risers with a corrosion-resistant coating, watertight manhole cover (fiber-lite if over 36" dia.), and an electronic alarm panel installed inside the building.
 - 4. Contractor to provide the required dead-man anchors

3.10 CROSSING OF WATER LINES WITH SEWERS

- A. Use ductile iron pipe in lieu of PVC pipes in the following conditions.
 - 1. When sewer line is less than 18" under a water line.
 - 2. When a sewer line is above a water line.
 - 3. The pipe is less than 4' from the top grade to the invert of the pipe.
 - 4. When there is less than 10' of horizontal separation between the water and sewer pipes.

3.11 SEWER TEST

- A. On completion of each block or section of sewer, or such other times as the Architect may direct, the block or section of sewer is to be cleaned, tested and mandrel pulled.
 - 1. Each section of the sewer is to have a mandrel of proper size pulled through it.
 - 2. Each manhole, or other appurtenance to the system, shall be of the specified size and form, to be watertight, neatly and substantially constructed, with the top set permanently to exact position and grade.
 - 3. All repairs shown necessary by the inspection are to be made; broken or cracked pipe replaced, all deposits removed, and the sewers left true to line and grade, entirely clean and ready for use.
 - 4. The Architect of Record and the City/County shall witness the mandrel pull and air tests.
 - 5. Vacuum tests are required on all new sewer manholes.
 - 6. Owner is to be provided a videotape or DVD of a camera run of the entire sewer system.
- B. The allowable limits of infiltration or exfiltration for the system, or any portion thereof, shall not exceed a rate of 100 gallons per inch of inside pipe diameter per mile of pipe per 24 hours.
 - 1. No additional allowance allowed for house service lines.
 - 2. The allowable limits of infiltration or exfiltration of manholes shall not exceed a rate of four gallons per manhole per 24 hours.
 - 3. The Architect may direct testing of part or the entire system for infiltration or exfiltration.
 - 4. Prior to testing for infiltration, pump out the system so that normal infiltration conditions exist at the time of testing.
 - 5. The amounts of infiltration or exfiltration shall be determined by pumping into or out of calibrated drums, or other Architect approved methods.
- C. Conduct the exfiltration test by filling the portion of the system being tested with water to a level equal to the lowest part of the manhole frame.
 - 1. May substitute an air test for the water exfiltration test upon the Architect, District's Building Department, and Town of Lyman Sewer's approval.
- D. Conduct tests on portions of the system not exceeding three manhole sections or 1000'; whichever is greater, unless directed by the Architect.
 - 1. Run tests continuously for 2 hours.

- E. Where infiltration or exfiltration exceeds the allowable limits specified herein, the Contractor shall locate and repair the defective pipe, joints, or other faulty construction.
 - 1. If the defective portions cannot be located, the Contractor shall remove and reconstruct as much of the work as is necessary in order to conform to the specified allowable limits.
 - 2. Repair all visible infiltration regardless of test results.
- F. The Contractor shall provide all labor, equipment and materials and shall conduct all testing required under the direction of the Architect.
 - 1. The Contractor shall include the cost of this work in the base bid.

3.12 INSPECTIONS

- A. The Contractor shall notify the Architect of Record at least 24 hours prior to beginning construction in order to arrange inspection of the sanitary sewer.

3.13 RESTORATION OF SURFACES AND/OR STRUCTURES

- A. The Contractor shall restore and/or replace paving, curbing, sidewalks, fences, sod, survey points, or any other disturbed surfaces or structures to a condition equal to that before the work began and to the satisfaction of the Architect and shall furnish all labor and materials incidental thereto.
- B. Restoration of surfaces and/or structures shall comply with all requirements of the applicable governing agencies.

3.14 PROJECT RECORD DOCUMENTS

- A. The Contractor shall maintain accurate and complete records of work items completed.
- B. All as-built information submitted to the Architect shall be sufficiently accurate, clear and legible to satisfy the Architect that the information provides a true representation of the improvements constructed.
- C. Upon completion of construction, the Contractor shall submit to the Architect one complete set of as-built construction drawings.
 - 1. These drawings shall be marked to show as-built construction changes and dimensional locations and elevations of all improvements and signed by the Contractor.
- D. A registered land surveyor shall certify all as-built information for water and sewer lines and submit in a format acceptable to all local reviewing agencies.
- E. Contractors shall camera the sewer lines and provide the District with a copy of the videotape.

END OF SECTION 33 31 00

SECTION 33 41 00 - STORM UTILITY DRAINAGE PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Pipe and fittings.
2. Channel drainage systems.
3. Encasement for piping.
4. Manholes.
5. Cleanouts.
6. Nonpressure transition couplings.
7. Expansion joints.
8. Catch basins.
9. Stormwater inlets.
10. Pipe outlets.

1.2 ACTION SUBMITTALS

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

B. Shop Drawings:

1. Manholes: Include plans, elevations, sections, details, frames, and covers.
2. Catch basins and stormwater inlets: Include plans, elevations, sections, details, frames, covers, and grates.

1.3 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Show pipe sizes, locations, and elevations. Show other piping in same trench and clearances from storm drainage system piping. Indicate interface and spatial relationship between manholes, piping, and proximate structures.
- B. Profile Drawings: Show system piping in elevation. Draw profiles at horizontal scale of not less than 1 inch equals 50 feet and vertical scale of not less than 1 inch equals 5 feet. Indicate manholes and piping. Show types, sizes, materials, and elevations of other utilities crossing system piping.
- C. Product Certificates: For each type of cast-iron soil pipe and fitting, from manufacturer.
- D. Field quality-control reports.

1.4 PROJECT CONDITIONS

- A. Interruption of Existing Storm Drainage Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:
 - 1. Notify Architect and Owner no fewer than two business days in advance of proposed interruption of service.
 - 2. Do not proceed with interruption of service without Architect's written permission.

PART 2 - PRODUCTS

2.1 DUCTILE-IRON, CULVERT PIPE AND FITTINGS

- A. Pipe: ASTM A 716, for push-on joints.
- B. Standard Fittings: AWWA C110, ductile or gray iron, for push-on joints.
- C. Compact Fittings: AWWA C153, for push-on joints.
- D. Gaskets: AWWA C111, rubber.

2.2 PE PIPE AND FITTINGS

- A. Corrugated PE Drainage Pipe and Fittings **NPS 3 to NPS 10 (DN 80 to DN 250)**: AASHTO M 252M, Type S, with smooth waterway for coupling joints.
 - 1. Silttight Couplings: PE sleeve with ASTM D 1056, Type 2, Class A, Grade 2 gasket material that mates with tube and fittings.
 - 2. Soiltight Couplings: AASHTO M 252M, corrugated, matching tube and fittings.
- B. Corrugated PE Pipe and Fittings **NPS 12 to NPS 60 (DN 300 to DN 1500)**: AASHTO M 294M, Type S, with smooth waterway for coupling joints.
 - 1. Silttight Couplings: PE sleeve with ASTM D 1056, Type 2, Class A, Grade 2 gasket material that mates with pipe and fittings.
 - 2. Soiltight Couplings: AASHTO M 294M, corrugated, matching pipe and fittings.

2.3 PVC PIPE AND FITTINGS

- A. PVC Corrugated Sewer Piping:
 - 1. Pipe: ASTM F 949, PVC, corrugated pipe with bell-and-spigot ends for gasketed joints.
 - 2. Fittings: ASTM F 949, PVC molded or fabricated, socket type.
 - 3. Gaskets: ASTM F 477, elastomeric seals.

2.4 CONCRETE PIPE AND FITTINGS

- A. Reinforced-Concrete Sewer Pipe and Fittings: **ASTM C 76**.
 - 1. **Bell-and-spigot or tongue-and-groove** ends and **gasketed joints with ASTM C 443, rubber gaskets or sealant joints with ASTM C 990, bitumen or butyl-rubber sealant**
 - 2. Class II
 - 3. Class III.
 - 4. Class IV.
 - 5. Class V.

2.5 NONPRESSURE TRANSITION COUPLINGS

- A. Comply with ASTM C 1173, elastomeric, sleeve-type, reducing or transition coupling, for joining underground nonpressure piping. Include ends of same sizes as piping to be joined, and corrosion-resistant-metal tension band and tightening mechanism on each end.
- B. Sleeve Materials:
 - 1. For Concrete Pipes: **ASTM C 443**, rubber.
 - 2. For Cast-Iron Soil Pipes: ASTM C 564, rubber.
 - 3. For Plastic Pipes: ASTM F 477, elastomeric seal or ASTM D 5926, PVC.
 - 4. For Dissimilar Pipes: ASTM D 5926, PVC or other material compatible with pipe materials being joined.
- C. Unshielded, Flexible Couplings:
 - 1. Description: Elastomeric sleeve with corrosion-resistant-metal tension band and tightening mechanism on each end.
- D. Shielded, Flexible Couplings:
 - 1. Description: ASTM C 1460, elastomeric or rubber sleeve with full-length, corrosion-resistant outer shield and corrosion-resistant-metal tension band and tightening mechanism on each end.
- E. Ring-Type, Flexible Couplings:
 - 1. Description: Elastomeric compression seal with dimensions to fit inside bell of larger pipe and for spigot of smaller pipe to fit inside ring.

2.6 CLEANOUTS

- A. Cast-Iron Cleanouts:

1. Description: ASME A112.36.2M, round, gray-iron housing with clamping device and round, secured, scoriated, gray-iron cover. Include gray-iron ferrule with inside calk or spigot connection and countersunk, tapered-thread, brass closure plug.
2. Top-Loading Classification(s): Medium Duty and Heavy Duty.
3. Sewer Pipe Fitting and Riser to clean out: ASTM a 74, Service class, cast-iron soil pipe and fittings.

B. Plastic Cleanouts:

1. Description: PVC body with PVC threaded plug. Include PVC sewer pipe fitting and riser to clean out of same material as sewer piping.

2.7 ENCASEMENT FOR PIPING

- A. Standard: ASTM A 674 or AWWA C105.
- B. Material: High-density, cross-laminated polyethylene film of 0.004-inch minimum thickness.
- C. Form: Sheet or tube.
- D. Color: Black.

2.8 MANHOLES

A. Standard Precast Concrete Manholes:

1. Description: ASTM C 478, precast, reinforced concrete, of depth indicated, with provision for sealant joints.
2. Diameter: 48 inches minimum unless otherwise indicated.
3. Ballast: Increase thickness of precast concrete sections or add concrete to base section as required to prevent flotation.
4. Base Section: 6-inch minimum thickness for floor slab and 4-inch minimum thickness for walls and base riser section, and separate base slab or base section with integral floor.
5. Riser Sections: 4-inch minimum thickness and lengths to provide depth indicated.
6. Top Section: Eccentric-cone type unless concentric-cone or flat-slab-top type is indicated, and top of cone of size that matches grade rings.
7. Joint Sealant: ASTM C 990, bitumen or butyl rubber.
8. Resilient Pipe Connectors: ASTM C 923, cast or fitted into manhole walls, for each pipe connection.
9. Steps: Individual FRP steps; FRP ladder; or ASTM A 615/A 615M, deformed, 1/2-inch steel reinforcing rods encased in ASTM D 4101, PP, wide enough to allow worker to place both feet on one step and designed to prevent lateral slippage off step. Cast or anchor steps into sidewalls at 12- to 16-inch intervals.

Omit steps if total depth from floor of manhole to finished grade is less than 60 inches.

10. Adjusting Rings: Interlocking HDPE rings with level or sloped edge in thickness and diameter matching manhole frame and cover, and of height required to adjust manhole frame and cover to indicated elevation and slope. Include sealant recommended by ring manufacturer.
11. Grade Rings: Reinforced-concrete rings, 6- to 9-inch total thickness, to match diameter of manhole frame and cover, and height as required to adjust manhole frame and cover to indicated elevation and slope.

B. Manhole Frames and Covers:

1. Description: Ferrous; 24-inch ID by 7- to 9-inch riser with 4-inch-minimum width flange and 26-inch-diameter cover. Include indented top design with lettering cast into cover, using wording equivalent to "STORM SEWER."
2. Material: ASTM A 536, Grade 60-40-18 ductile iron unless otherwise indicated.

2.9 CONCRETE

A. General: Cast-in-place concrete according to ACI 318, ACI 350/350R, and the following:

1. Cement: ASTM C 150, Type II.
2. Fine Aggregate: ASTM C 33, sand.
3. Coarse Aggregate: ASTM C 33, crushed gravel.
4. Water: Potable.

B. Portland Cement Design Mix: 4000 psi minimum, with 0.45 maximum water/cementitious materials ratio.

1. Reinforcing Fabric: ASTM A 185/A 185M, steel, welded wire fabric, plain.
2. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (420 MPa) deformed steel.

C. Manhole Channels and Benches: Factory or field formed from concrete. Portland cement design mix, 4000 psi minimum, with 0.45 maximum water/cementitious materials ratio. Include channels and benches in manholes.

1. Channels: Concrete invert, formed to same width as connected piping, with height of vertical sides to three-fourths of pipe diameter. Form curved channels with smooth, uniform radius and slope.
 - a. Invert Slope: 2 percent through manhole.
2. Benches: Concrete, sloped to drain into channel.
 - a. Slope: 4 percent.

- D. Ballast and Pipe Supports: Portland cement design mix, 4000 psi minimum, with 0.58 maximum water/cementitious materials ratio.
 - 1. Reinforcing Fabric: ASTM A 185/A 185M, steel, welded wire fabric, plain.
 - 2. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (420 MPa) deformed steel.

2.10 CATCH BASINS

A. Standard Precast Concrete Catch Basins:

- 1. Description: ASTM C 478, precast, reinforced concrete, of depth indicated, with provision for sealant joints.
- 2. Base Section: 6-inch minimum thickness for floor slab and 4-inch minimum thickness for walls and base riser section, and separate base slab or base section with integral floor.
- 3. Riser Sections: 4-inch minimum thickness, 48-inch diameter, and lengths to provide depth indicated.
- 4. Top Section: Eccentric-cone type unless concentric-cone or flat-slab-top type is indicated. Top of cone of size that matches grade rings.
- 5. Joint Sealant: ASTM C 990, bitumen or butyl rubber.
- 6. Adjusting Rings: Interlocking rings with level or sloped edge in thickness and shape matching catch basin frame and grate. Include sealant recommended by ring manufacturer.
- 7. Grade Rings: Include two or three reinforced-concrete rings, of 6- to 9-inch total thickness, that match 24-inch diameter frame and grate.
- 8. Steps: Individual FRP steps; FRP ladder; or ASTM A 615/A 615M, deformed, 1/2-inch steel reinforcing rods encased in ASTM D 4101, PP, wide enough to allow worker to place both feet on one step and designed to prevent lateral slippage off step. Cast or anchor steps into sidewalls at 12- to 16-inch intervals. Omit steps if total depth from floor of catch basin to finished grade is less than 60 inches.
- 9. Pipe Connectors: ASTM C 923, resilient, of size required, for each pipe connecting to base section.

B. Frames and Grates: ASTM A 536, Grade 60-40-18, ductile iron designed for A-16, structural loading. Include flat grate with small square or short-slotted drainage openings.

- 1. Size: 24 by 24 inches minimum unless otherwise indicated.
- 2. Grate Free Area: Approximately 50 percent unless otherwise indicated.

C. Frames and Grates: ASTM A 536, Grade 60-40-18, ductile iron designed for A-16, structural loading. Include 24-inch ID by 7- to 9-inch riser with 4-inch minimum width flange, and 26-inch-diameter flat grate with small square or short-slotted drainage openings.

- 1. Grate Free Area: Approximately 50 percent unless otherwise indicated.

2.11 STORMWATER INLETS

- A. Curb Inlets: Made with vertical curb opening, of materials and dimensions according to utility standards.
- B. Gutter Inlets: Made with horizontal gutter opening, of materials and dimensions according to utility standards. Include heavy-duty frames and grates.
- C. Combination Inlets: Made with vertical curb and horizontal gutter openings, of materials and dimensions according to utility standards. Include heavy-duty frames and grates.
- D. Frames and Grates: Heavy duty, according to utility standards.

2.12 PIPE OUTLETS

- A. Head Walls: Cast-in-place reinforced concrete, with apron and tapered sides.
- B. Riprap Basins: Broken, irregularly sized and shaped, graded stone according to NSSGA's "Quarried Stone for Erosion and Sediment Control."
 - 1. Average Size: NSSGA No. R-3, screen opening 2 inches.
 - 2. Average Size: NSSGA No. R-4, screen opening 3 inches.
 - 3. Average Size: NSSGA No. R-5, screen opening 5 inches.
- C. Filter Stone: According to NSSGA's "Quarried Stone for Erosion and Sediment Control," No. FS-2, No. 4 screen opening, average-size graded stone.
- D. Energy Dissipaters: According to NSSGA's "Quarried Stone for Erosion and Sediment Control," No. A-1, 3-ton average weight armor stone, unless otherwise indicated.

PART 3 - EXECUTION

3.1 EARTHWORK

- A. Excavation, trenching, and backfilling are specified in Section 312000 "Earth Moving."

3.2 PIPING INSTALLATION

- A. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground storm drainage piping. Location and arrangement of piping layout take into account design considerations. Install piping as indicated, to extent practical. Where specific installation is not indicated, follow piping manufacturer's written instructions.
- B. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets,

seals, sleeves, and couplings according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements.

- C. Install manholes for changes in direction unless fittings are indicated. Use fittings for branch connections unless direct tap into existing sewer is indicated.
- D. Install proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.
- E. When installing pipe under streets or other obstructions that cannot be disturbed, use pipe-jacking process of microtunneling.
- F. Install gravity-flow, nonpressure drainage piping according to the following:
 - 1. Install piping pitched down in direction of flow.
 - 2. Install piping NPS 6 (DN 150) and larger with restrained joints at tee fittings and at changes in direction. Use corrosion-resistant rods, pipe or fitting manufacturer's proprietary restraint system, or cast-in-place concrete supports or anchors.
 - 3. Install piping with 48-inch minimum cover.
 - 4. Install hub-and-spigot, cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook."
 - 5. Install hub less cast-iron soil piping according to CISPI 310 and CISPI's "Cast Iron Soil Pipe and Fittings Handbook."
 - 6. Install ductile-iron piping and special fittings according to AWWA C600 or AWWA M41.
 - 7. Install PE corrugated sewer piping according to ASTM D 2321.
 - 8. Install PVC sewer piping according to ASTM D 2321 and ASTM F 1668.
 - 9. Install nonreinforced-concrete sewer piping according to ASTM C 1479 and ACPA's "Concrete Pipe Installation Manual."
 - 10. Install reinforced-concrete sewer piping according to ASTM C 1479 and ACPA's "Concrete Pipe Installation Manual."
- G. Install corrosion-protection piping encasement over the following underground metal piping according to ASTM A 674 or AWWA C105:
 - 1. Hub-and-spigot, cast-iron soil pipe and fittings.
 - 2. Hub less cast-iron soil pipe and fittings.
 - 3. Ductile-iron pipe and fittings.
 - 4. Expansion joints.

3.3 PIPE JOINT CONSTRUCTION

- A. Join gravity-flow, nonpressure drainage piping according to the following:
 - 1. Join hub-and-spigot, cast-iron soil piping with gasketed joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for compression joints.

2. Join hub-and-spigot, cast-iron soil piping with calked joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for lead and oakum calked joints.
3. Join hub less cast-iron soil piping according to CISPI 310 and CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for hub less-coupling joints.
4. Join ductile-iron culvert piping according to AWWA C600 for push-on joints.
5. Join ductile-iron piping and special fittings according to AWWA C600 or AWWA M41.
6. Join corrugated PE piping according to ASTM D 3212 for push-on joints.
7. Join PVC corrugated sewer piping according to ASTM D 2321 for elastomeric-seal joints.
8. Join nonreinforced-concrete sewer piping according to ASTM C 14 and ACPA's "Concrete Pipe Installation Manual" for rubber-gasketed joints.
9. Join reinforced-concrete sewer piping according to ACPA's "Concrete Pipe Installation Manual" for rubber-gasketed joints.
10. Join dissimilar pipe materials with nonpressure-type flexible couplings.

3.4 CLEANOUT INSTALLATION

- A. Install cleanouts and riser extensions from sewer pipes to cleanouts at grade. Use cast-iron soil pipe fittings in sewer pipes at branches for cleanouts and cast-iron soil pipe for riser extensions to cleanouts. Install piping so cleanouts open in direction of flow in sewer pipe.
 1. Use Medium-Duty, top-loading classification cleanouts in unpaved or paved foot-traffic areas.
 2. Use Heavy-Duty, top-loading classification cleanouts in vehicle-traffic service areas.
 3. Use Extra-Heavy-Duty, top-loading classification cleanouts in roads.
- B. Set cleanout frames and covers in earth in cast-in-place concrete block. Set with tops 1/2 inch above surrounding earth grade.
- C. Set cleanout frames and covers in concrete pavement and roads with tops flush with pavement surface.

3.5 MANHOLE INSTALLATION

- A. General: Install manholes, complete with appurtenances and accessories indicated.
- B. Install precast concrete manhole sections with sealants according to ASTM C 891.
- C. Where specific manhole construction is not indicated, follow manhole manufacturer's written instructions.
- D. Set tops of frames and covers flush with finished surface of manholes that occur in pavements. Set tops 3 inches above finished surface elsewhere unless otherwise indicated.

3.6 CATCH BASIN INSTALLATION

- A. Set frames and grates to elevations indicated.

3.7 STORMWATER INLET AND OUTLET INSTALLATION

- A. Construct inlet head walls, aprons, and sides of reinforced concrete, as indicated.
- B. Construct riprap of broken stone, as indicated.
- C. Install outlets that spill onto grade, anchored with concrete, where indicated.
- D. Install outlets that spill onto grade, with flared end sections that match pipe, where indicated.
- E. Construct energy dissipaters at outlets, as indicated.

3.8 CONCRETE PLACEMENT

- A. Place cast-in-place concrete according to ACI 318.

3.9 CONNECTIONS

- A. Connect nonpressure, gravity-flow drainage piping in building's storm building drains specified in Section 221413 "Facility Storm Drainage Piping."
- B. Make connections to existing piping and underground manholes.
 - 1. Use commercially manufactured wye fittings for piping branch connections. Remove section of existing pipe; install wye fitting into existing piping; and encase entire wye fitting, plus 6-inch overlap, with not less than 6 inches of concrete with 28-day compressive strength of 4000 psi.
 - 2. Make branch connections from side into existing piping, NPS 4 to NPS 2. Remove section of existing pipe, install wye fitting into existing piping, and encase entire wye with not less than 6 inches of concrete with 28-day compressive strength of 4000 psi.
 - 3. Make branch connections from side into existing piping, NPS 21 or larger, or to underground manholes and structures by cutting into existing unit and creating an opening large enough to allow 3 inches of concrete to be packed around entering connection. Cut end of connection pipe passing through pipe or structure wall to conform to shape of and be flush with inside wall unless otherwise indicated. On outside of pipe, manhole, or structure wall, encase entering connection in 6 inches of concrete for minimum length of 12 inches to provide additional support of collar from connection to undisturbed ground.
 - a. Use concrete that will attain a minimum 28-day compressive strength of 4000 psi unless otherwise indicated.

- b. Use epoxy-bonding compound as interface between new and existing concrete and piping materials.
 4. Protect existing piping, manholes, and structures to prevent concrete or debris from entering while making tap connections. Remove debris or other extraneous material that may accumulate.
- C. Pipe couplings and expansion joints with pressure ratings at least equal to piping rating may be used in applications below unless otherwise indicated.
 1. Use nonpressure-type flexible couplings where required to join gravity-flow, nonpressure sewer piping unless otherwise indicated.
 - a. Shielded flexible couplings for same or minor difference OD pipes.
 - b. Unshielded, increaser/reducer-pattern, flexible couplings for pipes with different OD.
 - c. Ring-type flexible couplings for piping of different sizes where annular space between smaller piping's OD and larger piping's ID permits installation.

3.10 IDENTIFICATION

- A. Materials and their installation are specified in Section 312000 "Earth Moving." Arrange for installation of green warning tape directly over piping and at outside edge of underground structures.
 1. Use warning tape or detectable warning tape over ferrous piping.
 2. Use detectable warning tape over nonferrous piping and over edges of underground structures.

3.11 FIELD QUALITY CONTROL

- A. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches of backfill is in place, and again at completion of Project.
 1. Submit separate reports for each system inspection.
 2. Defects requiring correction include the following:
 - a. Alignment: Less than full diameter of inside of pipe is visible between structures.
 - b. Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 92.5 percent of piping diameter.
 - c. Damage: Crushed, broken, cracked, or otherwise damaged piping.
 - d. Infiltration: Water leakage into piping.
 - e. Exfiltration: Water leakage from or around piping.

3. Replace defective piping using new materials, and repeat inspections until defects are within allowances specified.
 4. Reinspect and repeat procedure until results are satisfactory.
- B. Test new piping systems, and parts of existing systems that have been altered, extended, or repaired, for leaks and defects.
1. Do not enclose, cover, or put into service before inspection and approval.
 2. Test completed piping systems according to requirements of authorities having jurisdiction.
 3. Schedule tests and inspections by authorities having jurisdiction with at least 24 hours' advance notice.
 4. Submit separate report for each test.
 5. Gravity-Flow Storm Drainage Piping: Test according to requirements of authorities having jurisdiction, UNI-B-6, and the following:
 - a. Exception: Piping with soiltight joints unless required by authorities having jurisdiction.
 - b. Option: Test plastic piping according to ASTM F 1417.
 - c. Option: Test concrete piping according to ASTM C 924.
- C. Leaks and loss in test pressure constitute defects that must be repaired.
- D. Replace leaking piping using new materials, and repeat testing until leakage is within allowances specified.

END OF SECTION 33 41 00