Pinellas County Sheriff's Office

New Outdoor Firing Range Facility
Project Manual

April 5, 2010

Project Address:
3410 118th Avenue North
Pinellas Park, Florida 337625

Owner:
Pinellas County Sheriff's Office

Architect:
ARC3 Architecture, Inc.

Civil Engineer:
Northside Engineering Services, Inc.

Structural Engineer:
Fullone Structural Group

Mechanical/Plumbing Engineer:
Mechanical Engineering Solutions, Inc.

Electrical Engineer:
Hall Engineering Group

ARC3 architecture

6671 13th Avenue North, Suite 1C
St. Petersburg, Florida 33710
P: 727.381.5220
F: 727.381.0052

TABLE OF CONTENTS

TABLE OF CONTENTS

END OF TABLE OF CONTENTS

PINELLAS COUNTY SHERIFF'S OFFICE REQUESTS PROPOSALS FOR THE NEW OUTDOOR RANGE FACILITY RFQ NO.: 10-05

Sealed Cost and Schedule Proposals will be received by the Pinellas County Sheriff's Office, at the Purchasing and Materials Division, located at 13770 Automobile Blvd., Clearwater, FL 33762 until May 12th, 2010, 11:00 a.m. Cost and Schedule Proposals received after the specified time will not be considered and will be returned unopened. The time and date will be scrupulously observed.

Presentations will be conducted for all submitting firms on May 14, 2010. The order and times for the presenting firms will be released by the Pinellas County Sheriff's Office on or before May 13, 2010. A copy of the evaluation sheet is attached.

Note: All prospective respondents are hereby cautioned not to contact any member of the Pinellas County Sheriff's Office other than the specified contact person concerning this project.

Contact:
Karen Main, CPPB
Purchasing Agent
kmain@pcsonet.com

Any questions on the RFP should be emailed to Karen Main no later than 11:00 am May 7th, 2010.

A. PROJECT DESCRIPTION

The Pinellas County Sheriff's Office, in Pinellas County, Florida, has qualified firms to provide General Construction Services for a new Outdoor Firing Range Facility. The facility will be located at 3410 118th Avenue North, Clearwater, Florida 33762. The selected General Contractor will be responsible for project permitting and construction of the following which constitutes the first phase of the project:

- 25-yard open air firing range with 40 covered lanes
- Air conditioned classroom building with restrooms and storage of approximately 4,500 SF.
- Covered break area
- Workshop
- Parking for the facility
- Open training area

The Design Professional for this project is:

ARC3 Architecture, Inc.
6671 13th Avenue North, Suite 1C
St. Petersburg, Florida 33710

B. SELECTION PROCESS

Selection of a General Contractor will be as follows:

1. **Short listed general contractors will be required to attend a mandatory Pre-Bid meeting on April 21, 2010 at 9:00 AM at the Purchasing Office.**

2. Short listed firms will be provided with the Construction Documents and will be asked to provide an overall master schedule and a detailed cost proposal. The bid form from the project manual shall be required format for the May 12th submittal. The schedule format will be critical path method (CPM) in booklet form up to 11 x 17 sheet size.

3. The Selection Committee will meet each of the short listed firms to hear a presentation as to why their proposal is the best choice for the Pinellas County Sheriff's Office and to allow the Selection Committee to ask questions to obtain a better understanding of the proposal. Each firm will have 45-minutes to present with question/answer to follow.

4. The selection committee will evaluate the proposed schedule and cost proposals and rank the firms in accordance with the Consultant's Competitive Negotiation Act (CCNA), Florida Statute 287.055.

5. Sheriff's Office staff will negotiate with the number one ranked firm.

6. Final selection will be based upon best value for the Pinellas County Sheriff's Office as recommended by the Selection Committee and approved by the Sheriff.

C. TIMELINE

The estimated timeline for this process is as follows:

Proposal for New Outdoor Firing Range Facility

Proposal Announcement:	April 16, 2010
Pre-Bid Meeting:	April 21, 2010
Bid Proposal Due:	May 12, 2010
Presentations:	May 14, 2010
Contract Award:	May 21, 2010

Short listed General Contractors will receive two sets of drawings and specifications for the project at the Pre-Bid meeting. Additional sets of the Contract Documents can be obtained from Rapid Blueprinting in St. Petersburg, (727) 321-2740, by paying for the cost of reproduction and handling directly.

The Owner reserves the right to waive any irregularities and/or informalities and to reject any or all bids.

STAGE 2 – BID AND PRESENTATION

CONSTRUCTION FOR A NEW OUTDOOR FIRING RANGE FACILITY

A. Project Approach **0 – 30** _____

Your presentation should include a description of the overall project methodology including site issues, existing building issues and construction sequencing.

B. Time of Performance **0 – 10** _____

Shortest Duration	10
Second	5
Longest Duration	0

_____

_____

What is the overall schedule for completing the project? What are the critical milestones? How do permitting activities affect the schedule? What are the key decisions/submittals to keep the project moving forward?

Note: The submitted Time of Performance will be part of the contract for construction if the proposer is successful in being awarded the project

C. Experience **0 – 10** _____

Give a brief company history and discuss your companies experience with projects of similar scale and complexity. Introduce the people who will be working on the project; project manager, project superintendant and project executive.

D. Cost Proposal **0 – 50** _____

Low Bid and Bids up to Low Plus 1%	50
Within 3% of Bid Proposal	45
Within 6% of Bid Proposal	35
Within 10% of Bid Proposal	30
Within 12% of Bid Proposal	20

TOTAL SCORE: **0 – 100** _____

INSTRUCTIONS TO BIDDERS

Document 00200 - Page 1 of 2

1.1 BID FORM

A. In order to receive consideration, make all bids in strict accordance with the following:
   1. Make bids upon the forms provided therefore, properly executed and with all items filled out.
   2. Unauthorized conditions, limitations, or provisions attached to the proposal shall be cause for rejection of the proposal.
   3. Bids received after the time fixed for receiving them will not be considered.
   4. It is the sole responsibility of the bidder to see that the bid is received on time.

1.2 BONDS

A. Performance Bond
   1. Prior to signing the contract, the Owner will require the selected Contractor to secure and post a Performance Bond in the amount of 100 percent of the Contract Sum.
   2. All such bonds shall be issued by Surety acceptable to the Owner. Include the costs of all such bonds in the proposed Contract Sum.

1.3 PRIOR TO BID

A. EXAMINATION OF DRAWINGS, PROJECT MANUAL AND SCOPE OF WORK
   1. Before submitting a Bid, each Bidder shall carefully examine the Drawings, read the Project Manual and all other proposed Contract Documents, and visit the site of the Work.
   2. Each Bidder shall be fully informed prior to bidding as to all existing conditions and limitations under which the Work is to be performed, and shall include in the Bid a sum to cover all costs of all items necessary to perform the Work as set forth in the proposed Contract Documents.
   3. Allowance will not be made to any Bidder because of lack of such examination or knowledge.
   4. The submission of a Bid will be construed as conclusive evidence that the Bidder has made such examination.

B. INTERPRETATION OF CONTRACT DOCUMENTS PRIOR TO BIDDING
   1. If any person contemplating submitting a Bid for construction of the Work is in doubt as to the true meaning of any part of the proposed Contract Documents, or finds discrepancies in or omissions from any part of the proposed Contract Documents, he may submit to the Architect a written request for interpretation thereof not later than 3 days before Bids are due.
      a. The Architect shall receive any request for interpretation not later than 3 days before bids are due.
      b. Interpretation or correction of proposed Contract Documents will be made only by Addendum, and will be mailed or delivered to each Bidder of record.
      c. The Owner will not be responsible for any other explanations or interpretations of the proposed Contract Documents.

C. PRE-BID CONFERENCE
   1. There will be a pre-bid conference at 9:00 AM on Friday, April 16, 2010 at the Purchasing Office

1.4 BIDS

A. WITHDRAWAL OF BIDS
   1. Any Bidder may withdraw his Bid, either personally or by written request, received by the Architect at any time prior to scheduled time for receiving Bids.
   2. Bidder cannot withdraw his Bid for a period of 30 days after the date set for receiving thereof.
   3. Each Bid shall be subject to acceptance by the Owner during this period.

B. AWARD OR REJECTION OF BIDS
   1. The Contract, if awarded, will be awarded to the responsible Bidder who has scored the highest point total based on the criteria listed in STAGE 2 – BID AND PRESENTATION, subject to the Owner's right to reject any or all Bids and to waive informality and irregularity in the Bids and in the bidding.

1.5 EXECUTION OF AGREEMENT

A. The form of Agreement, which the successful Bidder, as Contractor, will be required to execute, is referenced in the Project Manual.

B. The Bidder to whom the Contract is awarded by the Owner shall, within 30 days after notice of award and receipt of Agreement forms from the Owner, sign and deliver to the Owner all required copies.

C. At or prior to delivery of the signed Agreement, the Contractor shall deliver to the Owner the policies of insurance or insurance certificates as required by the Contract Documents.

1.6 CONSTRUCTION TIME

A. The Agreement will include a stipulation that the Work be substantially completed in a period of calendar days as indicated on the bid form following receipt of Notice to Proceed. There will be $200 per calendar day liquidated damages for the project in the final contract for construction.

END OF INSTRUCTIONS TO BIDDERS

GEOTECHNICAL REPORT

Document 00320 - Page 1 of 1

A. INTRODUCTION

1. The following is a Geotechnical Report prepared by Gulf Coast Testing Laboratory, Inc., dated March, 2010.

2. This information is furnished by the Owner for the Contractor's use. The Architect does not warrant or take responsibility for the information to be correct, complete, or otherwise guaranteed.

END OF INTRODUCTION

Subsurface Investigation Report

Proposed PCSO Firing Range

Located At

3410 118th Avenue North
Pinellas Park, Florida

March 2010

Prepared for

ARC 3 Architecture
6671 13th Avenue North, Suite 1-C
St. Petersburg, FL 33710

GULF COAST TESTING LABORATORY INC.
5745 Park Boulevard North
PINELLAS PARK, FL 33781
CONSTRUCTION MATERIALS ENGINEERING COUNCIL CERTIFIED
PHONE: (727) 544:4080 *FAX*: (727) 544:7532

GULF COAST TESTING LABORATORY INC.

5745 PARK BOULEVARD
PINELLAS PARK, FL 33781
CONSTRUCTION MATERIALS ENGINEERING COUNCIL CERTIFIED
CERTIFICATE of AUTHORIZATION # 00002370
PHONE: (727) 544-4080 *FAX*: (727) 544-7532

March 31, 2010
Lab #16635

ARC 3 Architecture
6671 13th Avenue North, Suite 1-C
St. Petersburg, Florida 33710

RE: **Subsurface Investigation Report**
PCSO Firing Range
3410 118th Avenue North
Pinellas Park, Florida 33762

Gentlemen:

Gulf Coast Testing Laboratory, Inc. has completed the subsurface investigation in the above referenced site as authorized by ARC 3 Architecture on behalf of the owner of the project.

A copy of the site plan showing the proposed building layout was furnished to us. The Standard Penetration Test (SPT) borings B-1 through B-5 were located in the proposed outdoor firing range area and the SPT borings B-6 and B-7 were located in the proposed classroom/support building area.

All the seven Standard Penetration Test borings were taken to a depth of 30 feet below the existing ground surface in accordance with our proposal letter dated March 9, 2010. In addition to these borings, three hand auger borings were done in the proposed parking expansion area. The approximate locations of these borings are shown on the enclosed sketch.

This report present the soil test data along with our evaluation for the foundation support and recommendation for the site preparation for the proposed open air covered firing range and the proposed one story classroom and support building area.

SOIL EXPLORATION METHOD

The seven test borings performed on this project were made in accordance with ASTM D-1586 "Penetration Test and Split Barrel Sampling of Soils". A rotary drilling process was used to advance the test borings. No casings were required in these borings.

The Standard Penetration Resistance (N) is the number of blows of a 140 pound hammer falling 30 inches to drive a 2 inch outer diameter/1.4 inch inner diameter, split spoon sampler, one foot.

The sampler was initially seated 6 inches to penetrate any loose cuttings, whereupon the number of blows required to produce the next foot of penetration was recorded. A representative of this firm classified the samples in the field as they were obtained and representative portion of each sample type were then sealed and transferred to our facility for further verification.

The soil samples will be retained by the engineering facility for a period of 90 days from the date of this report, and then disposed of, unless otherwise notified.

SITE CONDITIONS & SUBSOIL OBSERVATIONS

The property is located at the southwest corner of 118th Avenue North and 34th Street North in Pinellas County, Florida 33762. The proposed classroom and the firing range structure are located west of the existing building in the fenced in property. There is an existing bullet containment berm along the west side and north side of the proposed firing range structure as well as a berm on the east side.

The existing berm is covered with thick vegetation and bushes. The borings B-1 through B-3 were located along the existing west berm as near as possible to the edge of the proposed building area.

The site surface in the proposed building areas is covered with scattered weeds and grass and the surface was undulating. Also noted is an existing sanitary lift station in the area of the firing range. Pictures showing the existing site conditions are enclosed with this report for reference.

The test borings B-1 through B-5 (located in the proposed firing range building area) encountered mostly sands to slightly silty sands with variable amounts of shell fragments in the upper stratum of 12± feet below the existing ground surface. There are some intermittent layers of clayey sand in this stratum in some locations. The relative density of this upper stratum was mostly medium dense with some loose layers at random locations in this building area. It appears that the upper layers of soil may contain some old fill material which might have been spread in this area due to the past construction activities involving lake excavation, berm construction, etc.

All the five borings in the proposed firing range area encountered loose to very loose stratum of slightly silty clayey sand to soft stratum of sandy clay below 12± feet to the terminated depth of 30 feet. It appears that the weak stratum of silty and/or clayey sand is underlain by sandy clay and calcareous clay with some limestone fragments.

The test borings B-6 and B-7 located in the proposed classroom and support building area encountered upper stratum of loose slightly sand layers to medium layers of silty sand clayey sand with variable amounts of shell fragments to approximately 12± feet below the existing ground surface.

It should be noted that there was existing surface elevation difference of approximately 2± feet between the locations of boring B-6 and B-7. Below 12± feet the test boring B-6 indicated dense sand to stiff silty sandy clay to the terminated depth of 30 feet, but the test boring B-7 encountered very loose stratum of silty sand to sandy silt in the depth range of 12± feet to 30 feet below the existing ground surface.

Three hand auger borings were performed in the proposed parking and drive areas (see attached site plan for their locations). The soils encountered were mostly slightly clayey sand to silty sand with variable amounts of shell fragments to the terminated depth varying from 5 ft. 8 inches to 6 ft. 2 inches below the existing ground surface. The water table was found at 3 ft. 2 inches in HA #1 location and the water table was found at 1 ft. 4 inches in HA #3 location. There was standing water in the existing swale near the HA #3 boring location. The hand auger

HA #2 could not be taken deeper than 5 ft. 8 inches due to some obstructive layer which could not be penetrated with the hand auger equipment. The surface elevation was also higher in this location and no water level was found in this location to the terminated depth.

It should be noted that due to the difference in surface elevations at these locations, the depth to ground water level was varying between these locations. The local rainfall in the area will influence the ground water depth in this site due to the sandy, loamy shelly soils present in the upper stratum.

EVALUATION FOR THE FOUNDATION SUPPORT

We understand that the proposed firing range building will be high wall structure consisting of columns (both interior and edge) and concrete wall panels. It was indicated that the maximum column load (including DL and LL) is anticipated to be 180 kips and the wall loads are anticipated to range between 3 to 6 kips/foot.

We understand that the proposed classroom and support building will be one story block masonry structure and that the ground floor slab will be soil supported. It appears that there are some existing swales in the east side of the proposed classroom building and it appears that the east edge of the proposed building area may be at a higher elevation.

In general, it appears that in the proposed firing range and the classroom building areas, some old fill material might have been placed several years ago above the old native soil layer. Below the existing old fill layer the borings indicate that the property, in general, represent typically poorly drained sandy soils (with some pockets of silt and clay) that formed in stratified sandy, loamy and shelly marine sediments.

The absence of organic soil, peat or muck stratum in the proposed building areas makes it feasible that the upper stratum of mostly sandy soils (with some silty or clayey sand layers) can be improved to a degree where it will not be a restriction to the use of shallow foundations for supporting the high wall firing range building and one story classroom building.

We understand that the ground floor slab of the proposed structure will be soil supported. We also anticipate that the elevation of the ground floor slab will meet the local regulatory requirement for minimum ground floor elevation. It is, therefore, anticipated that some structural fill at the proposed building area may be installed as a part of the site grading scheme to meet the minimum ground floor elevation.

On the assumption that the proper site preparatory work – as explained in the later part of this report – are undertaken prior to the commencement of the foundation work, we recommend the following:

Firing Range Building

We understand that the interior columns of this proposed high wall structure will be designed for the maximum load of 180 kips. The soil conditions in the proposed building area are such that the resulting footings for the columns may occupy a large area due to the limited safe soil pressure available for the existing soil conditions. It is therefore suggested that combined footing for the columns may be considered in the design of the foundation in order that the anticipated differential settlements can be reduced. Due to the presence of non-uniform clayey sand or silty sand pockets at the random locations in the shallow depth range, the possibility of

differential settlement occurring between the column footings cannot be ruled out. It has been proven that such differential settlements can be rectified by using combined footings for the heavily loaded columns. It may be economical to use a strap footing instead of using a footing of constant width or depth to span the distance between two columns.

Classroom/Support Building

We consider that the proposed one story lightly loaded structure can be supported on conventional shallow spread foundation. **The site preparatory work as explained in the later part of this report should be undertaken prior to the commencement of foundation work for this building.**

A safe soil pressure of 2000 PSF is recommended for design purposes for both structures, provided the depth to the foundation bearing level is at least 24 inches. We also recommend that the minimum width of the foundation be 24 inches for the continuous wall footing and 36 inches for column footings. These minimum widths of foundations are recommended in order to achieve a certain degree of confinement required in cohesionless soils to develop their shear strength. Under lightly loaded walls or columns, these minimum dimensions rather than maximum allowable pressure may govern the footing size.

The allowable soils pressure of 2000 PSF is based on the anticipated maximum settlement of 1 inch and a differential settlement of not more than ¾ inch. We consider that the anticipated differential settlement of ¾ inch is generally tolerable. If is therefore recommended that the footing may be designed accordingly.

SITE PREPARATION

In the vicinity of the proposed building areas in both locations, the surface elevation appears to vary due to the existing berm and also due to the existing swale. The site preparation recommendation should therefore be considered as guidelines and the actual field conditions may require adjustments accordingly in improving the upper soil conditions.

Initial site preparatory work in this site prior to the fill placement should include stripping of the vegetation, trees and roots from the proposed building area. It is important that bushes and any other old stumps and unsuitable material should be removed completely. Due to the existing structures, some excavation and backfilling will be involved in the site preparation.

The stripped native surface should be compacted (in the form of proof rolling) with a heavy vibratory roller to at least 98% of the Modified Proctor Density prior to the placement of additional fill. If a wet surface condition is encountered at the stripped native surface (as may be encountered in some low lying areas during wet periods) a thin layer of clean cohesionless dry fill may be spread as a blanket and the compaction may then be accomplished.

The structural fill which is required to construct the "mound" at the proposed building area, should be clean cohesionless sands so as to facilitate compaction with the vibratory equipment. All fill material should consist of clean granular material such as sand (SP or SW), sands with trace of silt or clay (with less than 5% passing US sieve #200) and the fill should be free of organic matter, roots, etc. The fill should be installed in compacted lifts of not more than 12 inches and each lift should be compacted to at least 98% of the Modified Proctor Density as determined by ASTM D-1557 Method 'A'.

The fill surface should extend horizontally a suitable distance beyond the perimeter of the building and then may incline away at a slope no steeper than three horizontal to one vertical.

As an additional precautionary measure, the excavated trenches for the footing may be verified for the in place density of 98% or greater of the Modified Proctor Density.

If unusual soils, other than those described in this report are encountered during construction, please notify this engineer immediately, as the recommendations given herein may need to be re-evaluated.

Included with this report are the three Hand Auger borings with water table measurements. These Hand Auger borings were performed in the proposed parking areas at the north side of the project.

CLOSURE

The analysis and recommendations of this report are based on the data obtained from the seven borings and three hand auger borings conducted at the approximate locations as indicated on the enclosed sketch. Variations in stratification of soils and fluctuations in the ground water table should be anticipated. If, during construction, conditions other than those noted here are encountered, we must be notified immediately to re-evaluate the recommendations of this report, if necessary.

We appreciate the opportunity of providing this service to you. Should you have any questions regarding this report, or if we may be of further assistance to you on this project or any other, please, contact our office.

Respectfully submitted,

GULF COAST TESTING LABORATORY, INC.

4/2/10

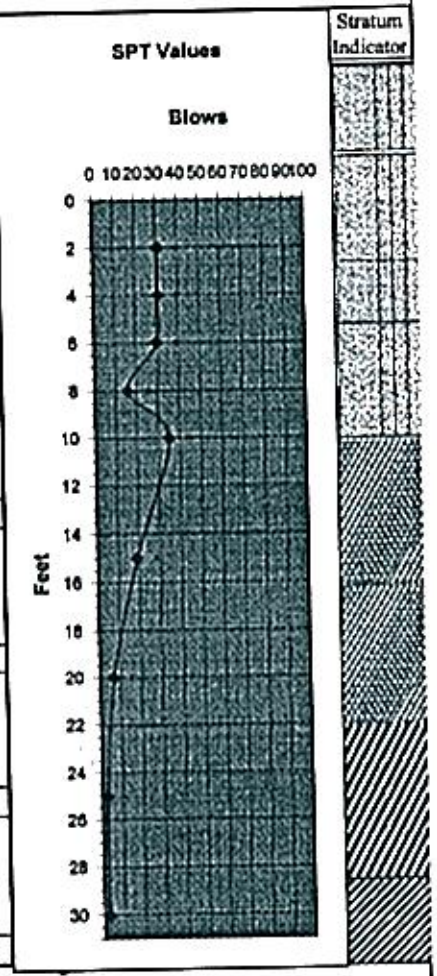
R. Gunasekaran, P.E.
Fla. License No. 20402

Gulf Coast Testing Laboratory, Inc.

5745 Park Boulevard
Pinellas Park, FL 33781
PHONE: (727) 544-4080 FAX: (727) 544-7532

Project:	Proposed PCSO Firing Range (34th Street & 118th Avenue N.)
Client:	ARC 3 Architecture
Date:	3/23/2010
Location:	Proposed Outdoor Firing Range (see attached site Plan)
Boring ID:	B-1

DEPTH FT.	Sample	SOIL DESCRIPTON	BLOWS PER 6			"N"
0						
1	1	Very Dark Brown Silty Sand w/ Organics. (Dense)				
2			30	16	15	31
3	2	Brown Slightly Silty Sand w/ Shell Frags. (Dense)				
4			14	16	15	31
5	3	Gray Slightly Silty Sand w/ Shell Frags. (Dense)				
6			12	15	15	30
7	4	Spoon Broke in Hole. No Sample Recovery.				
8			1	12	4	16
9	5	Gyay Slightly Silty Sand w/ Shell Frags. (Dense)				
10			17	20	15	35
11						
12						
13						
14	6	Dark Gray Slightly Clayey Sand w/ Trace of Roots. (Med)				
15			8	8	11	19
16						
17						
18						
19	7	Mottled Light to Dark Gray Slightly Clayey Sand.(Loose)				
20			2	3	4	7
21						
22						
23						
24	8	Light Gray Sandy Clay w/ Trace of Roots. (Soft)				
25			1	1	2	3
26						
27						
28						
29	9	Light Gray Sandy Clay w/ Trace of Limerock Frags. (Soft)				
30			1	1	2	3



Stratum Indicator

Boring Terminated @ 30'

Remarks	Material descriptions are based on visual observations and not laboratory test procedures. The materials between the sampling elevations may vary. Any recommendations, solutions, or other representations are based on the available information and subject

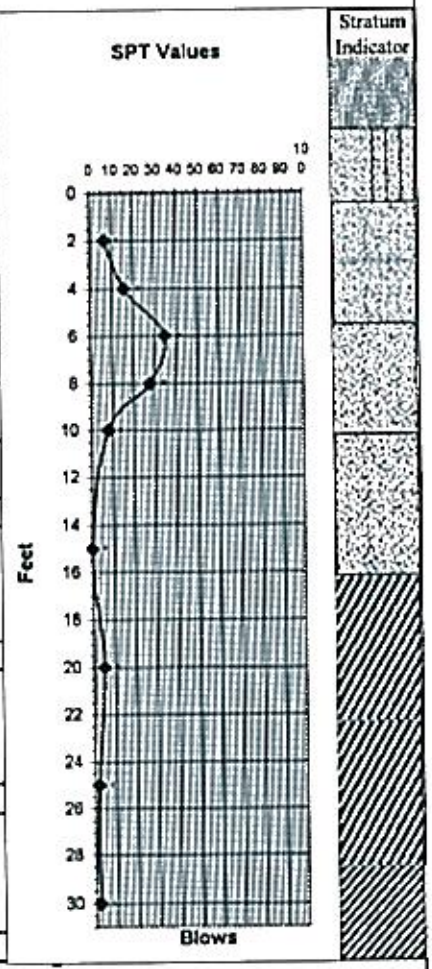
Lab #	16635		Method of Sampling:	*ASTM D-1586*	
Ground Water Depth:		Not Determined	Hammer Weight:	*140 pounds*	Fall: *30 - inches*
Length Of Casing:		N/A	Sampler:	*1.4" I.D. Split Spoon Sampler*	

Gulf Coast Testing Laboratory, Inc.

5745 Park Boulevard
Pinellas Park, FL 33781
PHONE: (727) 544-4080 FAX: (727) 544-7532

Project:	**Proposed PCSO Firing Range (34th Street & 118th Avenue N.)**
Client:	**ARC 3 Architecture**
Date:	**3/23/2010**
Location:	**Proposed Outdoor Firing Range (see attached site Plan)**
Boring ID:	**B-2**

DEPTH FT.	Sample	SOIL DESCRIPTON	BLOWS PER 6			"N"
0		Brown Slightly Clayey Sand w/ Roots & Shell Frags. (Loose)				
1	1					
2			2	3	4	7
3	2	Gray Slightly Silty Sand w/ Cemented Nodules and Shell Frags. (Med)				
4			8	8	8	16
5	3	Brown Sand w/ Shell Frags. (Dense)				
6		Gray Sand w/ Shell Frags.(Dense)	23	17	18	35
7	4	Very Pale Brown Sand w/ Limerock Frags and Shell. (Med)				
8			7	17	11	28
9	5	Light Brown Sand w/ Trace of Shell Frags. (Loose)				
10			3	2	6	8
11						
12						
13			W.O.R			Weight of Rod
14	6	Brown Sand. (Very Loose)				
15			0	0	0	0
16						
17						
18						
19	7	Dark Gray Sandy Clay. (Med)				
20			2	2	3	5
21						
22						
23						
24	8	Light Gray to Gray Sandy Clay. (Soft)				
25			1	1	1	2
26						
27						
28		Very Light Gray Sandy Clay w/ Limerock Frags. (Soft)				
29	9					
30			1	1	1	2



Stratum Indicator

Boring Terminated @ 30'

Remarks	Material descriptions are based on visual observations and not laboratory test procedures. The materials between the sampling elevations may vary. Any recommendations, solutions, or other representations are based on the available information and subject

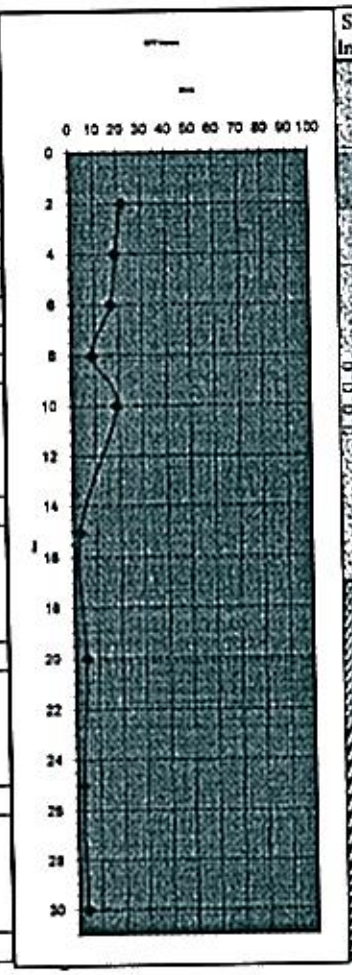
Lab #	**16635**		**Method of Sampling:**	*ASTM D-1586*	
Ground Water Depth:		**Not Determined**	**Hammer Weight:**	*140 pounds*	**Fall:** *30 - inches*
Length Of Casing:		N/A	**Sampler:**	*1.4" I.D. Split Spoon Sampler*	

Gulf Coast Testing Laboratory, Inc.

5745 Park Boulevard
Pinellas Park, FL 33781
PHONE: (727) 544-4080 FAX: (727) 544-7532

Project:	**Proposed PCSO Firing Range (34th Street & 118th Avenue N.)**
Client:	**ARC 3 Architecture**
Date:	**3/23/2010**
Location:	**Proposed Outdoor Firing Range (see attached site Plan)**
Boring ID:	**B-3**

DEPTH FT.	Sample	SOIL DESCRIPTON	BLOWS PER 6			"N"
0						
1	1	Brown Slightly Silty Sand w/ Shell Frags. (Med)				
2			6	10	12	22
3	2	Gray Slightly Clayey Sand w/ Limerock Frags. (Med)				
4			9	8	11	19
5	3	Gray to Dark Gray Slightly Silty Sand w/ Shell Frags. (Med)				
6			10	9	8	17
7	4	Dark Gray Slightly Silty Sand w/ Shell Frags. (Loose)				
8			6	6	3	9
9	5	Gray Sand w/ Trace of Dark Gray Silt				
10			13	10	9	19
11		Crushed Shell w/ Trace of Sand. (Med)				
12						
13						
14	6	Brown Slightly Silty Sand w/ Trace of Shell Frags. (Very Loose)				
15			2	1	2	3
16						
17						
18						
19	7	Gray Slightly Clayey Sand. (Loose)				
20			2	2	3	5
21						
22						
23		Grayish Green Clay. (Soft)				
24	8					
25		Light Gray Sandy Clay. (Very Loose)	2	2	1	3
26						
27						
28		Very Pale Brown Calcareous Clay. (Soft)				
29	9					
30			1	2	2	4



Stratum Indicator

Boring Terminated @ 30'

Remarks	Material descriptions are based on visual observations and not laboratory test procedures. The materials between the sampling elevations may vary. Any recommendations, solutions, or other representations are based on the available information and subject to change if other materials are encountered during the installation of any foundation systems developed from this information.

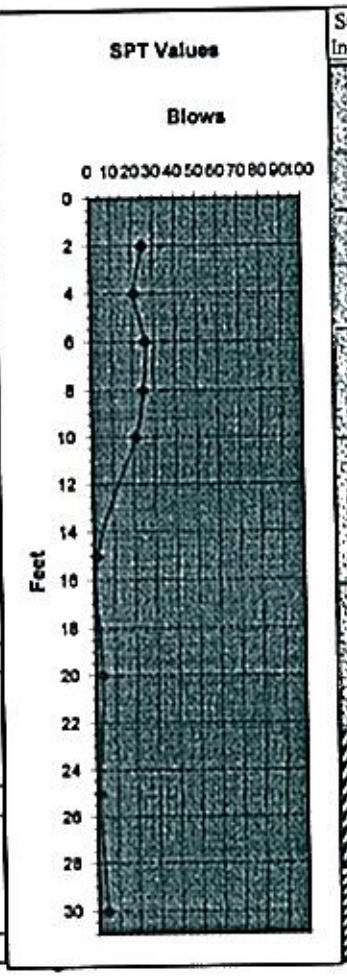
Lab #	**16635**		**Method of Sampling:**	*ASTM D-1586*	
Ground Water Depth:		**Not Determined**	**Hammer Weight:**	*140 pounds*	**Fall:** *30 - inches*
Length Of Casing:		**N/A**	**Sampler:**	*1.4" I.D. Split Spoon Sampler*	

Gulf Coast Testing Laboratory, Inc.

5745 Park Boulevard
Pinellas Park, FL 33781
PHONE: (727) 544-4080 FAX: (727) 544-7532

Project:	Proposed PCSO Firing Range (34th Street & 118th Avenue N.)
Client:	ARC 3 Architecture
Date:	3/23/2010
Location:	Proposed Outdoor Firing Range (see attached site plan)
Boring ID:	B-4

DEPTH FT.	Sample	SOIL DESCRIPTON	BLOWS PER 6			"N"
0		Gray Slightly Silty Sand w/ Shell Frags. (Med)				
1	1					
2			13	16	9	25
3	2	Mottled Gray to Brown Slightly Silty Sand. (Med)				
4			7	8	13	21
5	3	Gray to Dark Gray Slightly Silty Sand w/ Shell Frags. (Med)				
6			18	15	11	26
7	4	Gray Silty Sand. (Med)				
8		Gray Sand trace of Silt. (Med)	14	14	11	25
9	5	Gray Slightly Silty Sand. (Med)				
10			10	11	10	21
11						
12						
13		Gray Sand w/ Trace of Shell Frags. (Very Loose)				
14	6					
15			1	1	1	2
16						
17						
18		Grayish Brown Silty Sand w/ Tree Frags. (Loose)				
19	7					
20			1	1	3	4
21						
22						
23		Slightly Sandy Green Clay. (Soft)				
24	8					
25			2	1	1	2
26						
27						
28		Slightly Sandy Green Clay. (med)				
29	9					
30			1	2	3	5



Stratum Indicator

Boring Terminated @ 30'

Remarks	Material descriptions are based on visual observations and not laboratory test procedures. The materials between the sampling elevations may vary. Any recommendations, solutions, or other representations are based on the available information and subject

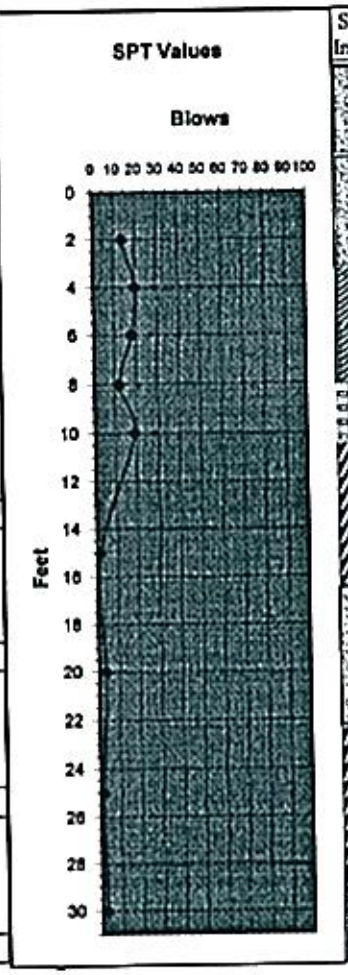
Lab #	16635		Method of Sampling:	*ASTM D-1586*	
Ground Water Depth:		Not Determined	Hammer Weight:	*140 pounds*	Fall: *30 - inches*
Length Of Casing:		N/A	Sampler:	*1.4" I.D. Split Spoon Sampler*	

Gulf Coast Testing Laboratory, Inc.

5745 Park Boulevard
Pinellas Park, FL 33781
PHONE: (727) 544-4080 FAX: (727) 544-7532

Project:	Proposed PCSO Firing Range (34th Street & 118th Avenue N.)
Client:	ARC 3 Architecture
Date:	3/23/2010
Location:	Proposed Outdoor Firing Range (see attached site Plan)
Boring ID:	B-5

DEPTH FT.	Sample	SOIL DESCRIPTON	BLOWS PER 6			"N"
0		Brown Slightly Silty Sand w/ Shell Frags. (Med)				
1	1					
2			3	6	8	14
3	2	Gray Slightly Silty Sand w/ Shell Frags. (Med)				
4			9	10	10	20
5	3	Gray Slightly Silty Sand w/ Shell Frags. (Med)				
6			10	10	8	18
7	4	Dark Gray Sandy Clay w/ Shell Frags. (Stiff)				
8			7	7	5	12
9	5	Dark Gray Sandy Clay w/ Shell Frags. (Stiff)				
10			10	10	9	19
11		Crushed Shell w/ Trace of Light Brown Sand. (Med)				
12						
13		Gray Sandy Clay. (Soft)				
14	6					
15			1	1	1	2
16						
17						
18		Grayish Green Silty Sand. (Loose)				
19	7					
20			2	2	2	4
21						
22						
23		Calcareous Clay w/ Limestone Frags. (Soft)				
24	8					
25			4	1	1	2
26						
27						
28		Calcareous Clay w/ Limestone Frags. (Soft)				
29	9					
30			1	1	2	3



Stratum Indicator

Boring Terminated @ 30'

Remarks	Material descriptions are based on visual observations and not laboratory test procedures. The materials between the sampling elevations may vary. Any recommendations, solutions, or other representations are based on the available information and subject

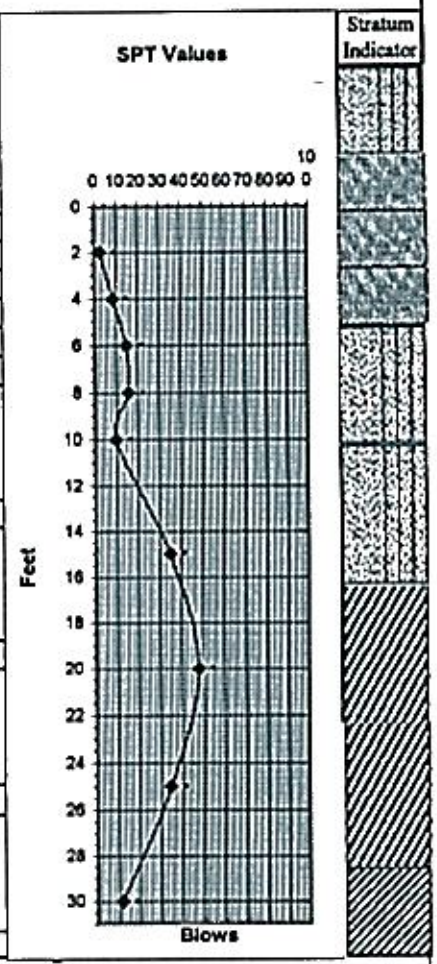
Lab #	16635		Method of Sampling:	*ASTM D-1586*	
Ground Water Depth:		Not Determined	Hammer Weight:	*140 pounds*	Fall: *30 - inches*
Length Of Casing:		N/A	Sampler:	*1.4" I.D. Split Spoon Sampler*	

Gulf Coast Testing Laboratory, Inc.

5745 Park Boulevard
Pinellas Park, FL 33781
PHONE: (727) 544-4080 FAX: (727) 544-7532

Project:	Proposed PCSO Firing Range (34th Street & 118th Avenue N.)
Client:	ARC 3 Architecture
Date:	3/23/2010
Location:	Proposed Classroom/Support Building (see attached site Plan)
Boring ID:	B-6

DEPTH FT.	Sample	SOIL DESCRIPTON	BLOWS PER 6			"N"
0						
1	1	Brown Slightly Silty Sand w/ Shell Frags. (Loose)				
2			1	1	2	3
3	2	Brown Clayey Sand w/ Shell Frags. (Loose)				
4			2	5	4	9
5	3	Brown Clayey Sand w/ Shell Marle Frags. (Med)				
6			1	5	10	15
7	4	Brown Clayey Sand w/ Shell Marle Frags. (Med)				
8			1	12	4	16
9	5	Gray Sand Trace of Silt. (Loose)				
10			3	4	6	10
11						
12						
13		Gray Slightly Silty Sand. (Dense)				
14	6					
15			7	10	25	35
16						
17						
18		Greenish Gray Slightly Sandy Clay. (Hard)				
19	7					
20			3	15	33	48
21						
22						
23		Greenish Gray Silty Sandy Clay. (Hard)				
24	8					
25			7	12	23	35
26						
27						
28		Light Gray Silty Sandy Clay w/ Shell Frags. (Stiff)				
29	9					
30			2	3	9	12



Stratum Indicator

Boring Terminated @ 30'

Remarks	Material descriptions are based on visual observations and not laboratory test procedures. The materials between the sampling elevations may vary. Any recommendations, solutions, or other representations are based on the available information and subject

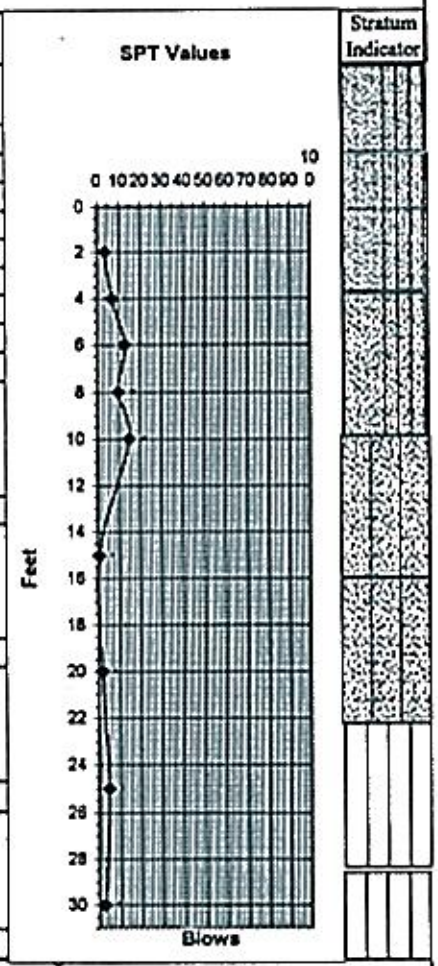
Lab #	16635		Method of Sampling:	*ASTM D-1586*
Ground Water Depth:		3' 8"	Hammer Weight:	*140 pounds* Fall: *30 - Inches*
Length Of Casing:		N/A	Sampler:	*1.4" I.D. Split Spoon Sampler*

Gulf Coast Testing Laboratory, Inc.

5745 Park Boulevard
Pinellas Park, FL 33781
PHONE: (727) 544-4080 FAX: (727) 544-7532

Project:	Proposed PCSO Firing Range (34th Street & 118th Avenue N.)
Client:	ARC 3 Architecture
Date:	3/23/2010
Location:	Proposed Classroom/Support Building (see attached site Plan)
Boring ID:	B-7

DEPTH IN FT.	Sample	SOIL DESCRIPTON	BLOWS PER 6			"N"
0		Dark Brown Slightly Silty Sand w/ Trace of Shell and Root Frags. (Loose)				
1	1					
2			2	2	2	4
3	2	Dark Brown Slightly Silty Sand w/ Trace of Shell and Root Frags. (Loose)				
4			6	4	3	7
5	3	Brownish Gray Slightly Silty Sand w/ Shell Frags. & Asphalt Pieces(Med)				
6			5	5	8	13
7	4					
8		Dark Gray Slightly Silty Sand w/ Trace of Shell Frags.(Med)	5	5	5	10
9	5					
10			5	7	8	15
11						
12						
13						
14	6	Dark Grayish Brown Silty Sand w/ Shell Frags. (Very Loose)				
15			2	0	1	1
16						
17						
18						
19	7	Dark Grayish Brown Silty Sand w/ Shell Frags. (Very Loose)				
20			2	1	1	2
21						
22						
23						
24	8	Very Pale Brown Sandy Silt w/ Shell and Cemented Sand Frags. (Loose)				
25			2	3	2	5
26						
27						
28		Very Pale Brown Sandy Silt w/ Shell and Cemented Sand Frags. (Very Loose)				
29	9					
30			1	1	2	3



Stratum Indicator

Boring Terminated @ 30'

Remarks	Material descriptions are based on visual observations and not laboratory test procedures. The materials between the sampling elevations may vary. Any recommendations, solutions, or other representations are based on the available information and subject

Lab #	16635		**Method of Sampling:**	*ASTM D-1586*	
Ground Water Depth:		Not Determined	**Hammer Weight:**	*140 pounds*	**Fall:** *30 - Inches*
Length Of Casing:		N/A	**Sampler:**	*1.4" I.D. Split Spoon Sampler*	

CLASSIFICATION OF SOILS FOR ENGINEERING PURPOSES
ASTM Designation: D 2487 - 83
(Based on Unified Soil Classification System)

SOIL CLASSIFICATION

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests[A]				Soil Classification	
				Group Symbol	Group Name[B]
Coarse-Grained Soils (More than 50% retained on No. 200 sieve)	Gravels More than 50% coarse fraction retained on No. 4 sieve	Clean Gravels Less than 5% fines[C]	Cu ≥ 4 and 1 ≤ Cc ≤ 3[D]	GW	Well-graded gravel[E]
			Cu < 4 and/or 1 > Cc > 3[D]	GP	Poorly graded gravel[E]
		Gravels with Fines More than 12% fines[C]	Fines classify as ML or MH	GM	Silty gravel[F,G,H]
			Fines classify as CL or CH	GC	Clayey gravel[F,G,H]
	Sands 50% or more of coarse fraction passes No. 4 sieve	Clean Sands Less than 5% fines[I]	Cu ≥ 6 and 1 ≤ Cc ≤ 3[D]	SW	Well-graded sand[E]
			Cu < 6 and/or 1 > Cc > 3[D]	SP	Poorly graded sand[E]
		Sands with Fines More than 12% fines[I]	Fines classify as ML or MH	SM	Silty sand[F,G,H]
			Fines classify as CL or CH	SC	Clayey sand[F,G,H]
Fine-Grained Soils (50% or more passes the No. 200 sieve)	Silts and Clays Liquid limit less than 50	Inorganic	PI > 7 and plots on or above "A" line[J]	CL	Lean clay[K,L,M]
			PI < 4 or plots below "A" line[J]	ML	Silt[K,L,M]
		Organic	Liquid limit – oven dried / Liquid limit – not dried < 0.75	OL	Organic clay[K,L,N,O] / Organic silt[K,L,N,P]
	Silts and Clays Liquid limit 50 or more	Inorganic	PI plots on or above "A" line	CH	Fat clay[K,L,M]
			PI plots below "A" line	MH	Elastic silt[K,L,M]
		Organic	Liquid limit – oven dried / Liquid limit – not dried < 0.75	OH	Organic clay[K,L,N,Q] / Organic silt[K,L,N,R]
Highly organic soils	Primarily organic matter, dark in color and organic odor			PT	Peat

[A] Based on the material passing the 3-in. (75-mm) sieve.

[B] If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

[C] Gravels with 5 to 12% fines require dual symbols:
GW-GM well-graded gravel with silt
GW-GC well-graded gravel with clay
GP-GM poorly graded gravel with silt
GP-GC poorly graded gravel with clay

[D] Sands with 5 to 12% fines require dual symbols:
SW-SM well-graded sand with silt
SW-SC well-graded sand with clay
SP-SM poorly graded sand with silt
SP-SC poorly graded sand with clay

[E] $Cu = D_{60}/D_{10}$ $Cc = \frac{(D_{30})^2}{D_{10} \times D_{60}}$

[F] If soil contains ≥ 15% sand, add "with sand" to group name.

[G] If fines classify as CL-ML, use dual symbol GC-GM or SC-SM.

[H] If fines are organic, add "with organic fines" to group name.

[I] If soil contains ≥ 15% gravel, add "with gravel" to group name.

[J] If Atterberg limits plot in hatched area, soil is a CL-ML, silty clay.

[K] If soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel," whichever is predominant.

[L] If soil contains ≥ 30% plus No. 200, predominantly sand, add "sandy" to group name.

[M] If soil contains ≥ 30% plus No. 200, predominantly gravel, add "gravelly" to group name.

[N] PI ≥ 4 and plots on or above "A" line.

[O] PI < 4 or plots below "A" line.

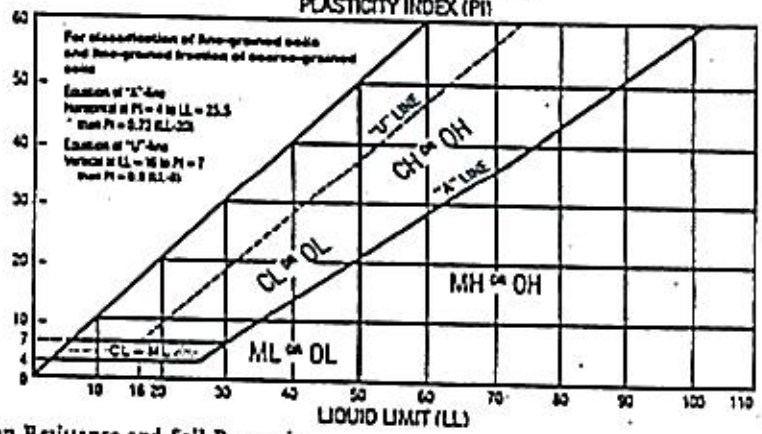
[P] PI plots on or above "A" line.

[Q] PI plots below "A" line.

DESCRIPTIVE ADJECTIVES for COARSE and FINE GRAINED SOILS*

Descriptive Adjective	Percentage Requirements
trace	Under 5%
few	5 - 15%
little	15 - 30%
some	30 - 50%
mostly	50 - 100%

*Modified from ASTM-D 2488-84



Penetration Resistance and Soil Properties on Basis of the Standard Penetration Test

Sands (Fairly Reliable) No. of Blows per ft, N	Relative Density
0– 4	Very loose
4–10	Loose
10–30	Medium
30–50	Dense
Over 50	Very dense

Clays (Rather Unreliable) No. of Blows per ft, N	Consistency
Below 2	Very soft
2– 4	Soft
4– 8	Medium
8–15	Stiff
15–30	Very stiff
Over 30	Hard

GULF COAST TESTING LABORATORY INC.

P.O. BOX 6

PINELLAS PARK, FL 33780

CONSTRUCTION MATERIALS ENGINEERING COUNCIL CERTIFIED

CERTIFICATE of AUTHORIZATION # 00002370

PHONE: (727)544-4080 *FAX*: (727) 544-7532

PROJECT: Pinellas County Sheriff's Office Firing Range

LOCATION: 3410 118th Ave. North, Pinellas Park, FL

See Test Location Site Plan

LAB NO.: 16635 **DATE REPORTED: 2/13/08**

DATE TESTED: 3/26/10 **TESTED BY: RD/CK**

Hand Auger #1 (See attached site plan)

DEPTH		CLASSIFICATION
FT.	IN.	
	3	Dark Grayish Brown Slightly Clayey SAND w/ Trace of Shell Fragments
	6	
	9	
1	12	
	15	
	18	
	21	Dark Brown Slightly Clayey SAND w/Pieces of Clayey Sand, and Trace of Rock
2	24	
	27	Dark Grayish Brown Clayey SAND w/Rock
	30	
	32	
3	36	
	38	
	42	Brown SAND w/ Trace of Shell Fragments
	45	
4	48	
	52	Dark Grayish Brown Clayey SAND w/ Rock, and Shell Fragments
	54	
	58	
5	60	Light Grayish Brown SAND w/ Trace of Rock
	61	
	66	
	69	
6	72	Dark Gray SAND
	75	
	78	Hole Terminated @ 6' 3" Water Table @ 3' 2"
	81	
7	84	
	87	
	90	
	94	
8	96	
	99	
	102	
	105	
9	108	

PROJECT: Pinellas County Sheriff's Office Firing Range

LOCATION: 3410 118th Ave. North, Pinellas Park, FL

See Test Location Site Plan

LAB NO.: 16635 **DATE REPORTED: 4/1/10**

DATE TESTED: 3/26/10 **TESTED BY: RD/CK**

Hand Auger #2

DEPTH		CLASSIFICATION
FT.	IN.	
	2	Dark Grayish Brown Slightly Clayey SAND w/Trace of Shell Fragments
	5	
	9	
1	12	Dark Gray SAND w/ Silt Pieces
	15	
	17	Mottled Very Pale Brown and Very Dark Gray SAND w/ Shell Fragments
	19	
2	24	Grayish Brown SAND w/ Silt Pieces and Trace of Shell Fragments
	27	
	30	
	33	
3	36	
	38	
	42	
	46	
4	48	Very Dark Grayish Brown Slightly Clayey SAND w/Trace of Shell Fragments
	50	
	54	
	57	
5	60	
	63	Very Dark Grayish Brown SAND w/Clayey Pieces and Trace of Shell Fragments
	65	
	66	Black SAND w/ Clay Pieces and Trace of Shell Fragments
6	68	
	75	Hole Terminated @ 5' 8" Due to Blockage @ 5' 8" could not penetrate w/ HA equipment Water Table = Not Encountered
	78	
	81	
7	84	
	87	
	90	
	93	
8	96	
	99	
	102	
	105	
9	108	

GULF COAST TESTING LABORATORY INC.

P.O. BOX 6

PINELLAS PARK, FL 33780

CONSTRUCTION MATERIALS ENGINEERING COUNCIL CERTIFIED FOR 2004

PHONE: (727) 544-4080 *FAX*: (727) 544-7532

PROJECT: Pinellas County Sheriff's Office Firing Range

LOCATION: 3410 118th Ave. North, Pinellas Park, FL

See Test Location Site Plan

LAB NO.: 16635 **DATE REPORTED: 4/1/10**

DATE TESTED: 3/26/10 **TESTED BY: RD/CK**

Hand Auger # 3

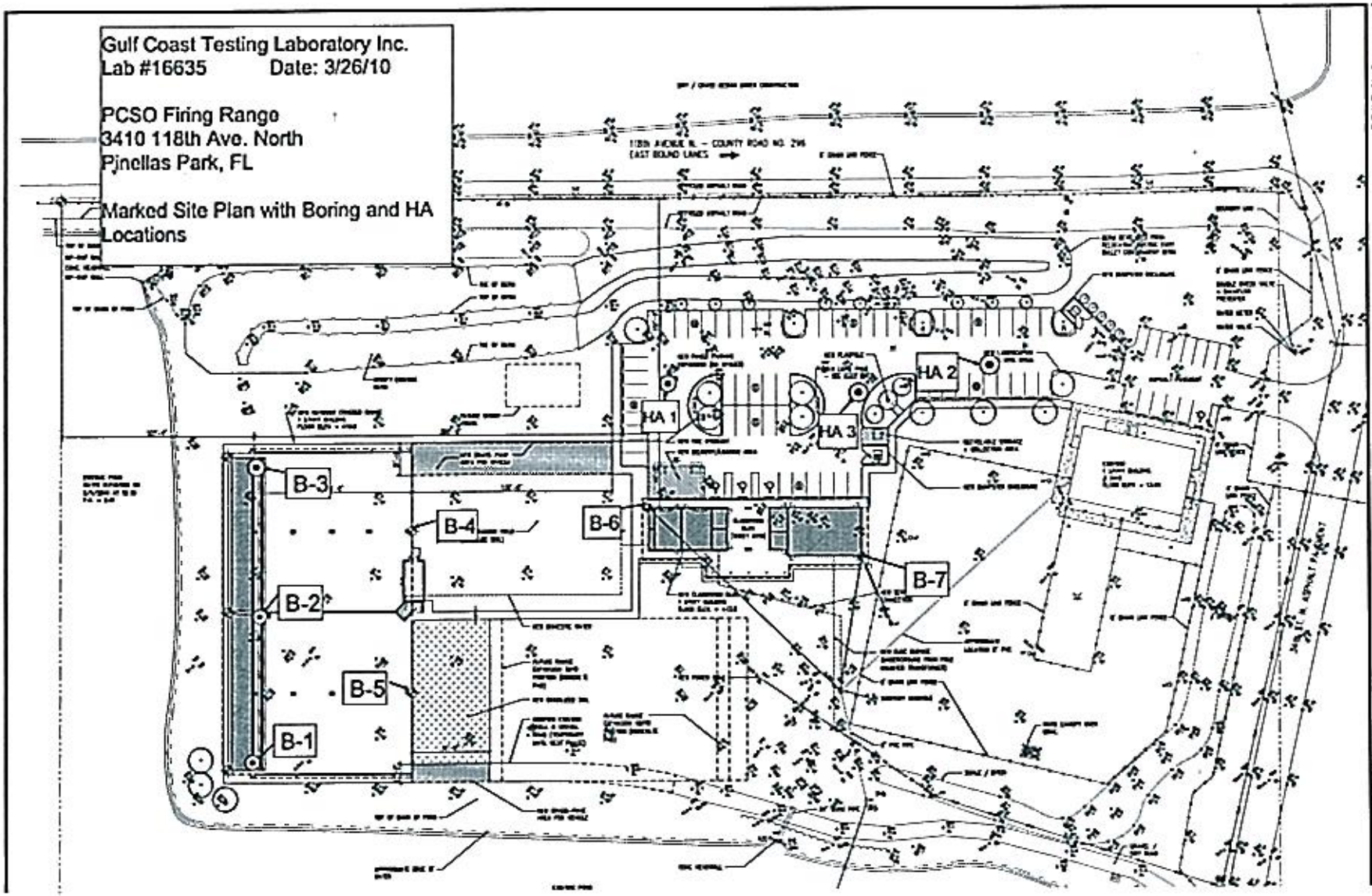
DEPTH		CLASSIFICATION
FT.	IN.	
	3	Very Dark Brown SAND w/ Pieces of Asphalt
	6	
	9	
1	12	Light Brownish Gray SAND w/ Rock and Shell Fragments
	15	
	16	
	21	
2	24	
	25	Dark Grayish Brown Silty SAND w/ Trace of Shell Fragments and Silt Clusters
	30	
	33	
3	36	Dark Gray Slightly Clayey SAND w/ Shell Fragments
	40	
	42	
	47	
4	48	
	51	
	54	
	57	
5	60	
	63	
	67	
	69	Very Dark Gray Sandy Silt w/ Trace of Shell Fragments
6	72	
	75	
	78	Hole Terminated @ 6' 2" Water Table @ 1' 4"
	81	
7	84	
	87	
	90	
	93	
8	96	
	99	
	102	
	105	
9	108	
	111	
	114	
	117	
	120	

Note – Hand Auger #2 was performed at a Higher elevation than Hand Auger #1 and Hand Auger #3.

Gulf Coast Testing Laboratory Inc.
Lab #16635 Date: 3/26/10

PCSO Firing Range
3410 118th Ave. North
Pinellas Park, FL

Marked Site Plan with Boring and HA Locations

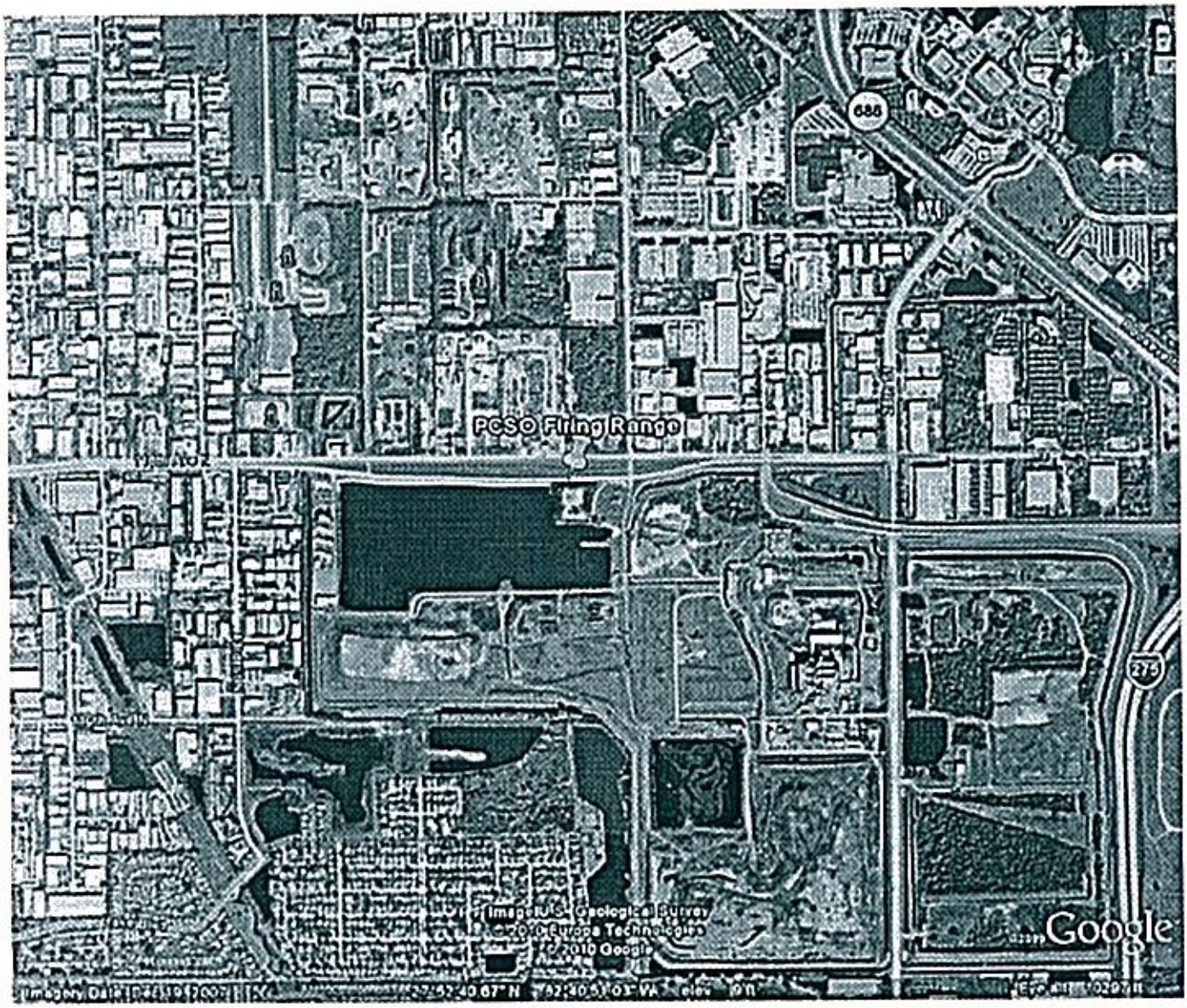


ARC3
architecture

Construction Documents

PCSO FIRING RANGE
Outdoor Firing Range

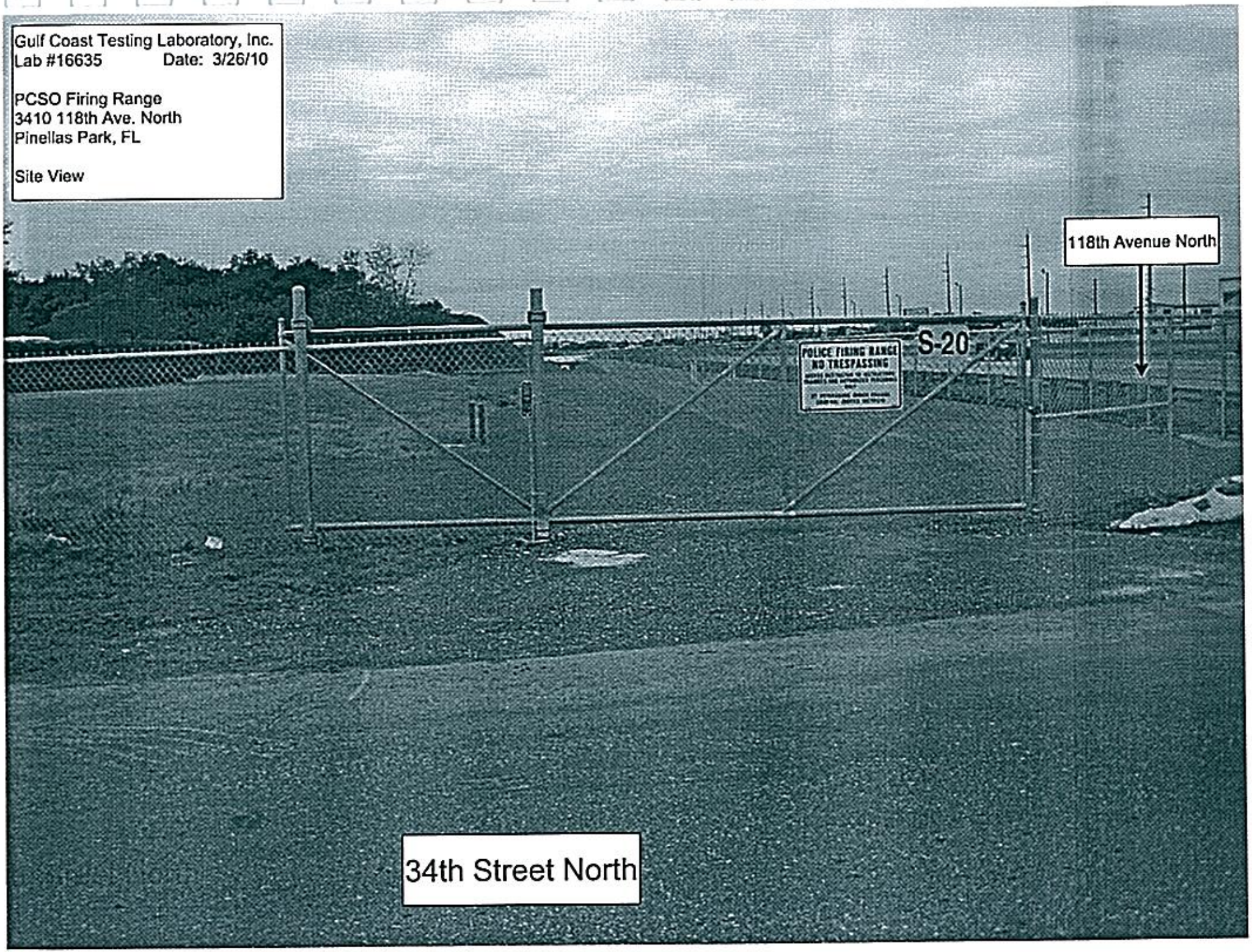
REVISIONS

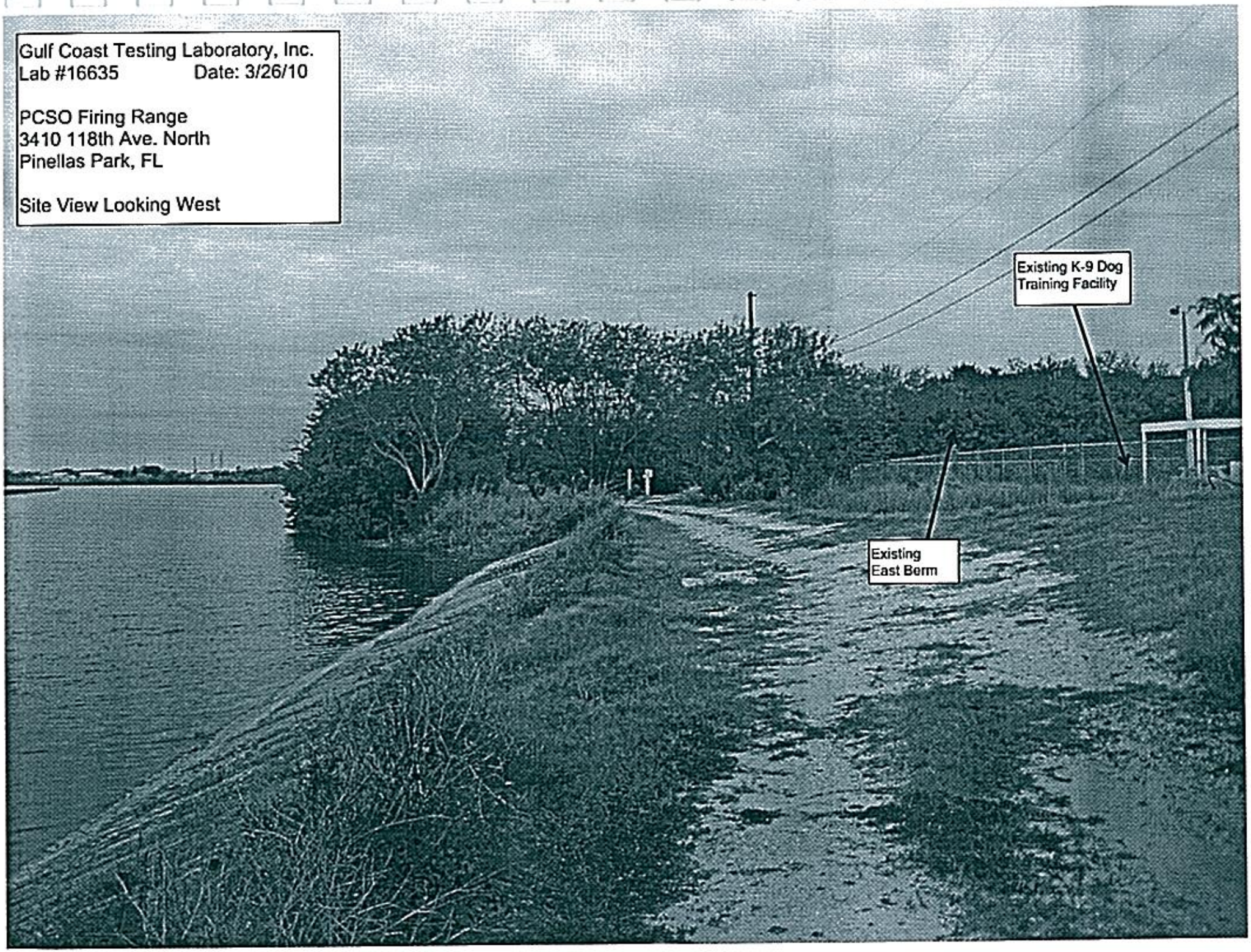


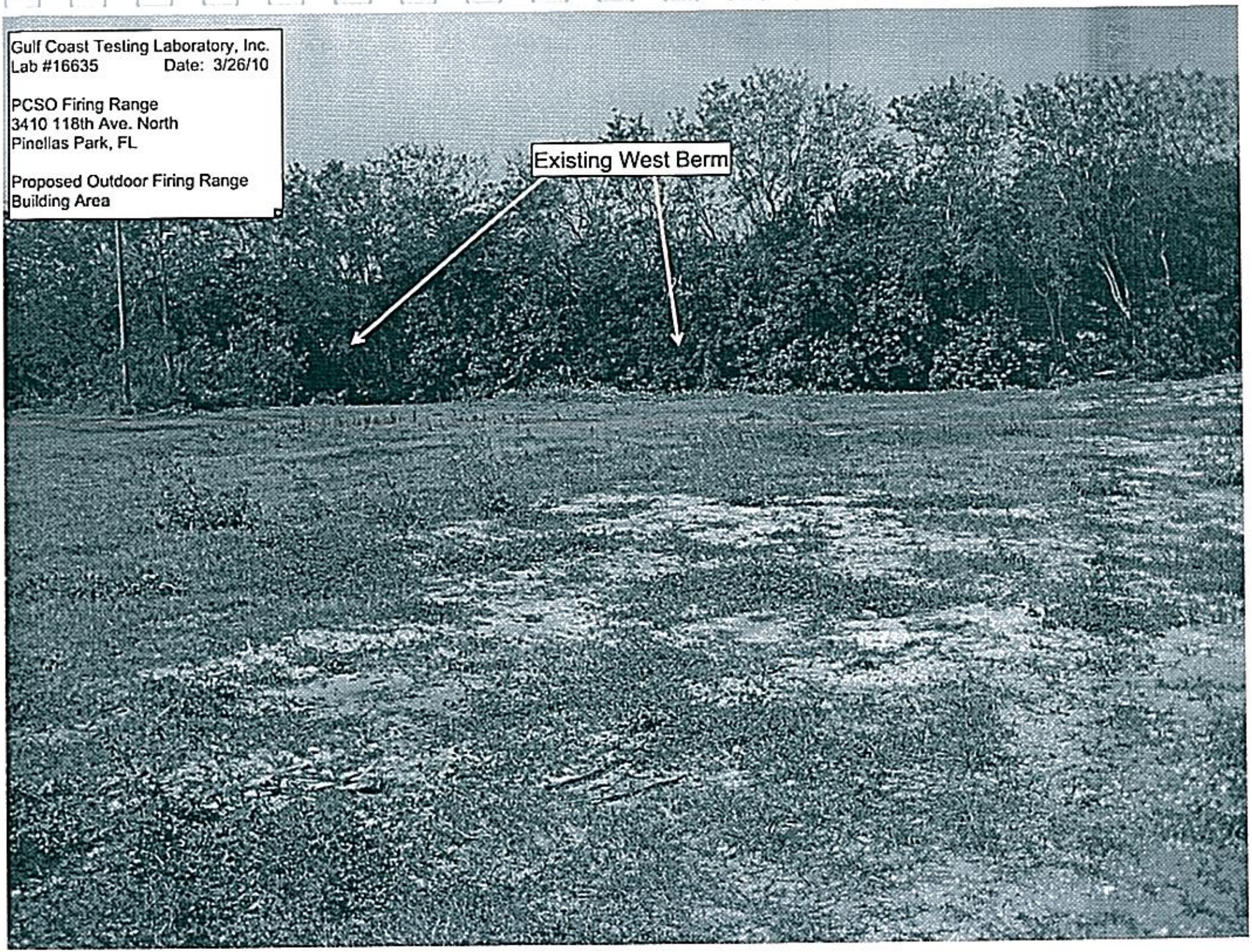
Gulf Coast Testing Laboratory, Inc.
Lab #16635 Date:3/26/10

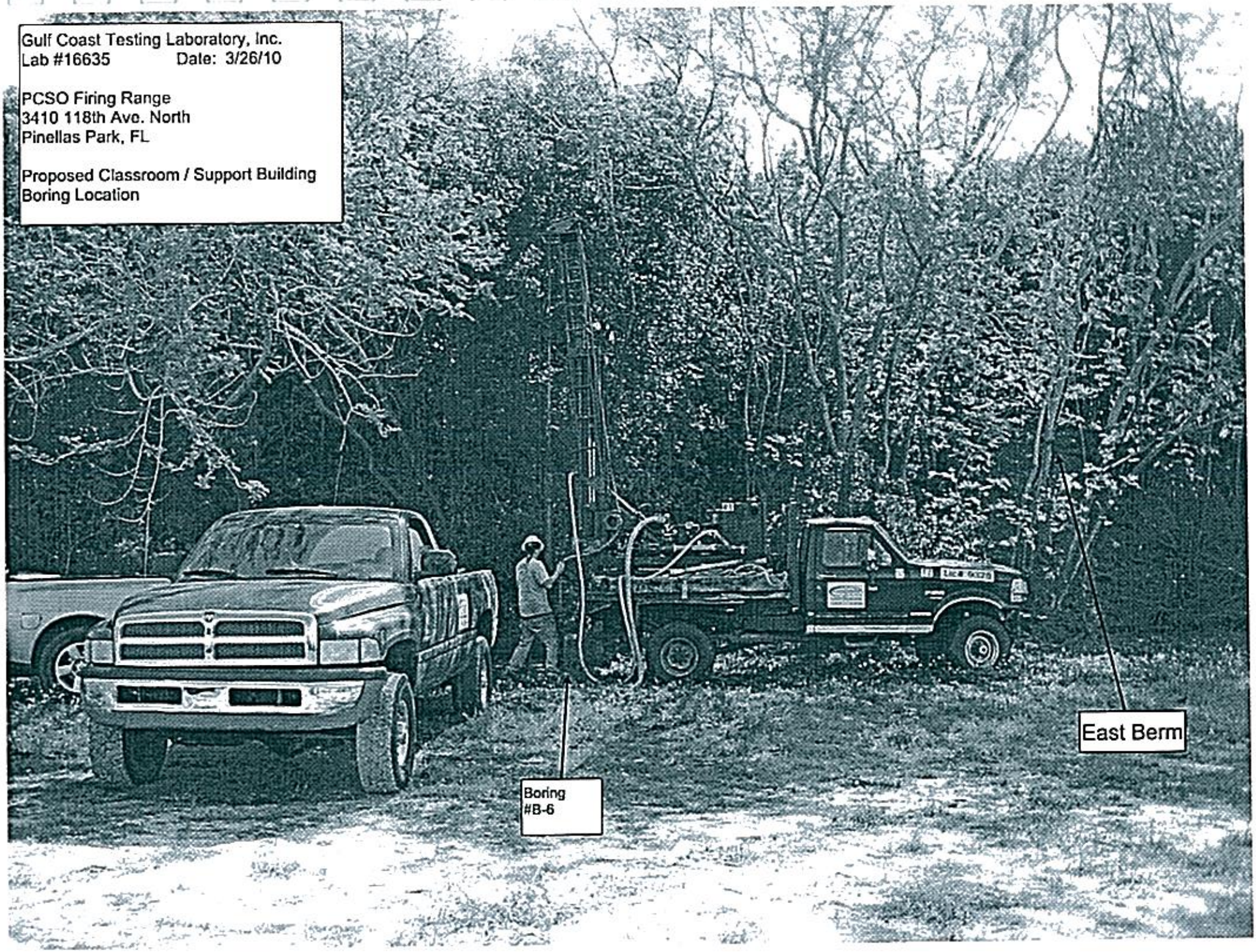
PCSO Firing Range
3410 118th Ave. North
Pinellas Park, FL

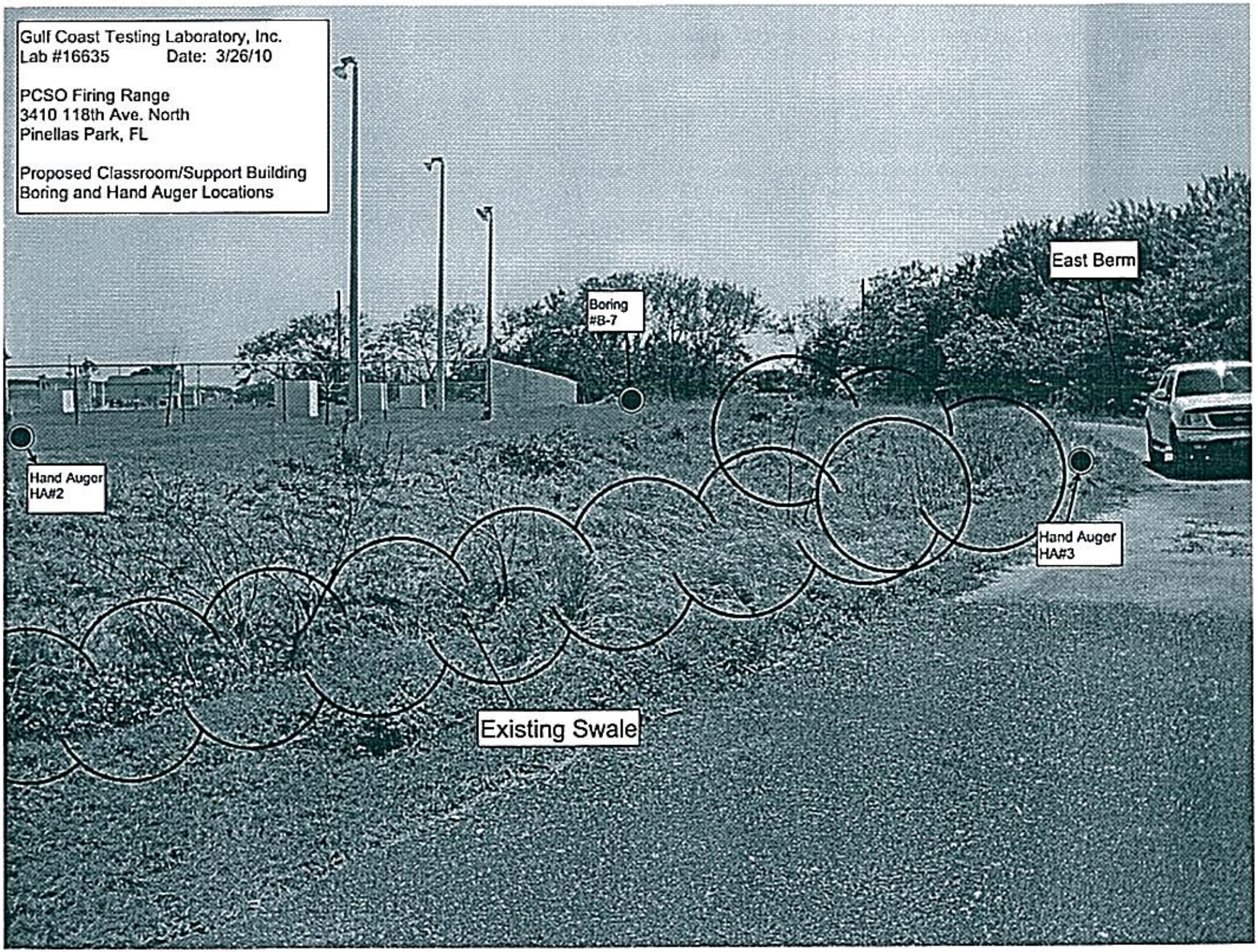
Aerial View of Site


Gulf Coast Testing Laboratory, Inc.
Lab #16635 Date: 3/26/10
PCSO Firing Range
3410 118th Ave. North
Pinellas Park, FL
Site View
118th Avenue North
POLICE FIRING RANGE
NO TRESPASSING
S-20
34th Street North


Gulf Coast Testing Laboratory, Inc.
Lab #16635 Date: 3/26/10
PCSO Firing Range
3410 118th Ave. North
Pinellas Park, FL
Site View Looking West
Existing K-9 Dog Training Facility
Existing East Berm


Gulf Coast Testing Laboratory, Inc.
Lab #16635 Date: 3/26/10
PCSO Firing Range
3410 118th Ave. North
Pinellas Park, FL
Proposed Outdoor Firing Range
Building Area
Existing West Berm


Gulf Coast Testing Laboratory, Inc.
Lab #16635 Date: 3/26/10
PCSO Firing Range
3410 118th Ave. North
Pinellas Park, FL
Proposed Classroom / Support Building
Boring Location
Boring #B-6
East Berm


Gulf Coast Testing Laboratory, Inc.
Lab #16635 Date: 3/26/10
PCSO Firing Range
3410 118th Ave. North
Pinellas Park, FL
Proposed Classroom/Support Building
Boring and Hand Auger Locations
East Berm
Boring #B-7
Hand Auger HA#2
Hand Auger HA#3
Existing Swale

BID FORM

Document 00410 - Page 1 of 3

Pursuant to and in compliance with the Invitation to Bid and the proposed Contract Documents relating to construction of the Pinellas County Sheriff's Office Firing Range Facility**.**

Including Addenda: (none to date)

The undersigned, having become thoroughly familiar with the terms and conditions of the proposed Contract Documents and with local conditions affecting the performance and costs of the Work at the place where the Work is to be completed, and having fully inspected the site in all particulars, hereby proposes and agrees to fully perform the Work within the time stated and in strict accordance with the proposed Contract Documents, including furnishing any and all labor and materials, and to do all of the work required to construct and complete said Work in accordance with the Contract Documents, for the following sum of money:

Base Bid: All labor, materials, services, and equipment necessary for completion of the Work shown on the Drawings and in the Project Manual, except for the items described as "Alternates":

_____Dollars ($[_____])

Alternate No. 1: If the Owner elects to proceed with Alternate No. 1 (Mosquito Misting), add the sum of:

_____Dollars ($[_____])

Alternate No. 2: If the Owner elects to proceed with Alternate No. 2 (Ground Face) add the sum of:

_____Dollars ($[_____])

Alternate No. 3: If the Owner elects to proceed with Alternate No. 3 (Storefront), deduct the sum of:

_____Dollars ($[_____])

Alternate No. 4: If the Owner elects to proceed with Alternate No. 4 (Kalwall), deduct the sum of:
_____Dollars ($[_____])

Alternate No. 5: If the Owner elects to proceed with Alternate No. 5 (SIP), deduct the sum of:

_____Dollars ($[_____])

I understand that the Owner reserves the right to reject this Bid, but that this Bid shall remain open and not be withdrawn for a period of sixty days from the date prescribed for its receiving.

The Bidder, if awarded a contract, hereby agrees to commence work under this contract on or before a date to be specified in a written notice to proceed from the Owner and to fully complete the project within _____ calendar days thereafter.

If written notice of the acceptance of this bid is mailed or delivered to the undersigned within thirty days after the date set for the receiving of this bid, or at any other time thereafter before it is withdrawn, the undersigned shall execute and deliver the Contract Documents to the Owner in accordance with this Bid as accepted, and will also furnish and deliver to the Owner the Performance Bond, Labor and Material Payment Bond, and proof of insurance coverage, all within fifteen days after personal delivery or after deposit in the mails of the notification of acceptance of this Bid.

Notice of acceptance, or request for additional information, may be addressed to the undersigned at the address set forth below.

The names of all persons interested in the foregoing Bid as principals are:

Name (Print)	Signature
_____	_____
_____	_____
_____	_____

Licensed in accordance with an act for the registration of contractors, and with license number _____ in the State of _____.

NOTE: If Bidder is a corporation, set forth the legal name of the corporation together with the signature of the officer or officers authorized to sign contracts on behalf of the corporation. If bidder is a partnership, set forth the name of the firm together with the signature of the partner or partners authorized to sign contracts on behalf of the partnership.

Business Address: _____

_____

_____

_____

Telephone: _____

_____

Date of Proposal: _____

BID FORM

Required Division Worksheet

Division 1	General Requirements	$
Division 2	Site Construction	$
Division 3	Concrete	$
Division 4	Masonry	$
Division 5	Metals	$
Division 6	Wood, Plastics, and Composites	$
Division 7	Thermal and Moisture Protection	$
Division 8	Openings	$
Division 9	Finishes	$
Division 10	Specialties	$
Division 11	Equipment	$
Division 15	Plumbing	$
Division 15	Heating Ventilating and Air Conditioning	$
Division 16	Electrical	$
Division 16	Communications	$
Division 16	Electronic Safety and Security	$
Other		$
Other		$
Other		$
Other		$

Project Total (Must match Base Bid on Cover Sheet): $

END OF BID FORM

CONTRACT FORMS AND ATTACHMENTS

Document 00500 - Page 1 of 1

A. The following documents prepared by the American Institute of Architects shall be used for the work of this Project:

AIA	A101	Owner-Contractor Agreement Form, Stipulated Sum (2007).
AIA	A201	General Conditions of the Contract for Construction (2007).
AIA	G701	Change Order (2001).
AIA	G702	Application and Certificate for Payment (1992).
AIA	G703	Continuation Sheet for G702 (1992).
AIA	G704	Certification of Substantial Completion (2000).
AIA	G706	Contractor's Affidavit of Payment of Debts and Claims (1994).
AIA	G706A	Contractor's Affidavit of Release of Liens (1994).
AIA	G707	Consent of Surety to Final Payment (1994).
AIA	G709	Proposal Request (2001).
AIA	G710	Architect's Supplemental Instructions (1992).

END OF CONTRACT FORMS AND ATTACHMENTS

SUPPLEMENTARY CONDITIONS

The following supplements modify the "General Conditions of the Contract for Construction", AIA Document A201, 2007. 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.

ARTICLE 3 - CONTRACTOR

3.2 REVIEW OF CONTRACT DOCUMENTS AND FIELD CONDITIONS BY CONTRACTOR

Add the following Paragraph 3.2.5:

3.2.5 Contractor shall be responsible for ascertaining correct dimensions, and Contractor is not to ascertain dimensions simply by scaling drawings. In case of any discrepancy between Drawings and Specifications, Contractor shall consult Architect promptly for an interpretation before proceeding with the Work.

3.7 PERMITS, FEES AND NOTICES

Add the following to Paragraph 3.7.1:

3.7.1 Add the following sentence to this Subparagraph:

The Contractor shall complete all required applications and obtain related permits in the Owner’s behalf. The cost shall not be included in the base bid. The Owner will reimburse the Contractor for this cost with no mark-up.

ARTICLE 4 - ADMINISTRATION OF THE CONTRACT

4.2 ARCHITECT'S ADMINISTRATION OF THE CONTRACT

Add the following clause to 4.2.12:

4.2.12.1 Should conflict occur between the Contract Documents, the Contractor is deemed to have based his estimate upon the more expensive method of performing the Work unless he has requested and received a written decision from the Architect before submission of his proposal.

ARTICLE 7 - CHANGES IN THE WORK

7.3 CONSTRUCTION CHANGE DIRECTIVES

In the first sentence of Paragraph 7.3.7, delete the words "a reasonable allowance for overhead and profit" and substitute "an allowance for overhead and profit in accordance with Subparagraphs 7.3.7.6 through 7.3.7.11.

Add the following Paragraphs 7.3.7:

7.3.7 Such allowance for the combined overhead and profit shall be based on the following:

.6 For the Contractor, for Work performed by the Contractor's own forces, 10 percent of the cost.

.7 For the Contractor, for Work performed by the Contractor's Subcontractor, 5 percent of the amount due the Subcontractor.

.8 For each Subcontractor or Sub-subcontractor involved, for Work performed by that Subcontractor's or Sub-subcontractor's own forces, 10 percent of the cost.

.9 For each Subcontractor, for Work performed by the Subcontractor's Sub-subcontractors, 5 percent of the amount due the Sub-subcontractor.

.10 Cost to which overhead and profit is to be applied shall be determined in accordance with Subparagraph 7.3.6.

.11 In order to facilitate checking of quotations for extras or credits, all proposals, except those so minor that their propriety can be seen by inspection, shall be accompanied by a complete itemization of costs including labor, materials and Subcontracts. Labor and materials shall be itemized in the manner prescribed above. Where major items are Subcontracts, they shall be itemized also. In no case will a change involving over $5,000.00 be approved without such itemization.

ARTICLE 11 - INSURANCE AND BONDS

11.1 CONTRACTOR'S LIABILITY INSURANCE

Add the following Subparagraph 11.1.2.1 to 11.1.2:

11.1.2.1 General Liability: The Contractor shall procure and maintain until the work has been completed and accepted by the Owner, Commercial General Liability with combined single limits of not less than what is stated below. Such certificates must show broad form property damage coverage including, but not limited to, damage arising from collapse of structure, with any XCU exclusion removed. The Policy must include Contractor's Protective Liability Insurance and completed operations coverage. Owner must be given 30 days prior written notice of cancellation of coverage.

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) Employer's Liability:
  $1,000,000 per Accident.

2. Commercial General Liability (including Premises-Operations; Independent Contractors' Protective; Products and Completed Operations):
- a) Bodily Injury and Property Damage:
  $5,000,000 Each Occurrence.
  $5,000,000 Aggregate.
- b) Fire Damage Limit shall be not less than $500,000 on any one Fire.

3. Business Auto Liability (including owned, non-owned and hired vehicles):
- a) Bodily Injury:
  $1,000,000 Each Occurrence.

END OF SUPPLEMENTARY CONDITIONS

SUMMARY

Section 01100 - Page 1 of 2

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
1. Work covered by the Contract Documents.
2. Owner-furnished products.
3. Use of premises.
4. Specification formats and conventions.

1.2 WORK COVERED BY CONTRACT DOCUMENTS

A. Project Identification: New Outdoor Firing Range Facility
1. Project Location: 3410 118th Avenue North, Clearwater, FL 33762

B. Owner: Pinellas County Sheriff's Office
1. Owner's Representative: Jim LaBonte, Director

C. The Work consists of the following:
1. The project will consist of an open air firing range with 40-covered lanes and an air conditioned classroom building with workshop, covered break area and storage.

1.3 OWNER-FURNISHED PRODUCTS/EQUIPMENT

A. Owner will furnish products indicated. The Work includes providing support systems to receive Owner's equipment and making plumbing, mechanical, and electrical connections.

B. Owner-Furnished Products:
1. The Pinellas County Sheriff's Office will provide the targeting system and bullet trap for the project.

1.4 USE OF PREMISES

A. Use of Site: Limit use of premises to work in areas indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated without written approval of Owner.
1. Obtain written approval from Owner at least 7 working days in advance when scheduling Work outside limits of construction. Provide Owner with an estimate of time needed to perform Work outside limits of construction.
2. Limits: Confine constructions operations to provide ongoing operations for the existing K9 Facility. This includes parking and site egress at all times.
3. Cutting, capping, and reconnecting utility systems outside limits of construction shall be performed by Contractor, unless otherwise noted.
4. Conform to all laws, ordinances, permits and regulations affecting the Work on site.
5. Driveways 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 storage of materials.
a. Schedule deliveries to minimize use of driveways and entrances.
6. Parking for construction personnel including the use of Owner's parking lot(s) shall be reviewed with Owner prior to construction start.

1.5 SPECIFICATION FORMATS AND CONVENTIONS

A. Specification Format: The Specifications are organized into Divisions and Sections using the 16-division format and CSI/CSC's "MasterFormat" numbering system.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01100

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for alternates.

1.2 DEFINITIONS

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

1. Alternates described in this Section are part of the Work only if enumerated in the Agreement.
2. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternate into the Work. No other adjustments are made to the Contract Sum.

1.3 PROCEDURES

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

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

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

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

D. Schedule: A schedule of alternates is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF ALTERNATES

A. Alternate No. 1: Mosquito Misting System

1. Base Bid: As currently designed, a Mosquito Misting System is not part of the contract documents.
2. Alternate: The contractor will design, furnish and install a Mosquito Misting System for the covered range (see sheet A101). The system installed at the adjacent K9 facility will be used as the design basis. MosquitoMisterSystem.com 877-723-8108.

B. Alternate No. 2: Ground Face Architectural Block

1. Base Bid: As currently shown, the selected General Contractor will furnish and install standard concrete masonry units with a Portland cement plaster painted finish.
2. Alternate: Provide a cost for architectural ground face masonry units and water repellent in place of standard concrete masonry units with Portland cement plaster paint finish (see sheet A210).

C. Alternate No. 3: Impact Resistant Storefront Glazing System

1. Base Bid: As currently designed, the selected General Contractor will furnish and install translucent wall panels for the Classroom Clerestory.
2. Alternate: Provide a cost to replace the translucent wall panels with impact resistant storefront glazing system (see sheet A210)

D. Alternate No. 4: Metal Wall Panels at Classroom Clerestory

1. Base Bid: As currently designed, the selected General Contractor will furnish and install translucent wall panels for the Classroom Clerestory.
2. Alternate: Provide a cost to replace the translucent wall panels with insulated metal wall panels (see sheet A210)

E. Alternate No. 5: Structural Insulated Panel (SIP)

1. Base Bid: As currently designed, the selected General Contractor will furnish and install structurally insulated panels on the engineered truss system.
2. Alternate: Provide a cost to remove the structural insulated panels and furnish and install (2) layers of sheathing (per note 1/S111) and spray insulation to underside of sheathing (R-30).

END OF SECTION 01230

PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements necessary to prepare and process Applications for Payment.

1.2 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 other required administrative forms and schedules, including the following:

a. Application for Payment forms with continuation sheets.
b. Submittal schedule.
c. Items required to be indicated as separate activities in Contractor's construction schedule.

2. Submit the schedule of values to Architect at earliest possible date but no later than three 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.

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. Arrange schedule of values consistent with format of AIA Document G703.
2. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with Project Manual table of contents.

3. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
4. 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.
5. Provide separate line items in the schedule of values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
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. Each item in the schedule of values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.

a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the schedule of values or distributed as general overhead expense, at Contractor's option.

8. Schedule Updating: Update and resubmit the schedule of values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.3 APPLICATIONS FOR PAYMENT

A. Each Application for Payment shall be consistent with previous applications and payments as certified by Architect and paid for by Owner.

1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.

B. Payment Application Times: Submit Application for Payment to Architect by the 25th day of the month. The period covered by each Application for Payment is one month, ending on the last day of the month.

C. Application for Payment Forms: Use AIA Document G702 and AIA Document G703 as form for Applications for Payment.

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.

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 of Change Orders and Construction Change Directives issued before last day of construction period covered by application.

E. 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.

F. 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. Waiver Forms: Submit executed waivers of lien on forms acceptable to Owner.

G. 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. Submittal schedule (preliminary if not final).
5. List of Contractor's staff assignments.
6. List of Contractor's principal consultants.
7. Copies of building permits.
8. Initial progress report.
9. Report of preconstruction conference.
10. Certificates of insurance and insurance policies.

H. 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.
2. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.

I. 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. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
3. Updated final statement, accounting for final changes to the Contract Sum.
4. AIA Document G706-1994, "Contractor's Affidavit of Payment of Debts and Claims."
5. AIA Document G706A-1994, "Contractor's Affidavit of Release of Liens."
6. AIA Document G707-1994, "Consent of Surety to Final Payment."
7. Evidence that claims have been settled.
8. 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.
9. Final liquidated damages settlement statement.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01290

SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.

1.2 DEFINITIONS

A. Action Submittals: Written and graphic information that requires responsive action.

B. Informational Submittals: Written information that does not require approval. Submittals may be rejected for not complying with requirements.

1.3 SUBMITTAL PROCEDURES

A. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
   1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
   2. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
      a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

B. Processing Time: Allow enough time for submittal review, including time for resubmittals, as follows. Time for review shall commence on **Architect's** receipt of submittal. Submittals received after 2 pm local time shall be deemed to have been received on the following working day. 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 10 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required.
   2. Resubmittal Review: Allow 5 days for review of each resubmittal.

C. Identification: Place a permanent label or title block on each submittal for identification.
   1. Indicate name of firm or entity that prepared each submittal on label or title block.
   2. Include the following information on label for processing and recording action taken:
      a. Project name.
      b. Date.
      c. Name and address of Architect
      d. Name and address of Contractor.
      e. Name and address of subcontractor.
      f. Name and address of supplier.
      g. Name of manufacturer.
      h. Submittal number or other unique identifier, including revision identifier.
      i. Number and title of appropriate Specification Section.
      j. Drawing number and detail references, as appropriate.
      k. Location(s) where product is to be installed, as appropriate.

D. Deviations: Highlight, encircle, or otherwise specifically identify deviations from the Contract Documents on submittals.

E. Transmittal: Package each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Architect will return submittals, without review, received from sources other than Contractor.
   1. Transmittal Form: Provide locations on form for the following information:
      a. Project name.
      b. Date.
      c. Destination (To:).
      d. Source (From:).
      e. Names of subcontractor, manufacturer, and supplier.
      f. Category and type of submittal.
      g. Submittal purpose and description.
      h. Specification Section number and title.
      i. Drawing number and detail references, as appropriate.
      j. Transmittal number**,** numbered consecutively.
      k. Submittal and transmittal distribution record.
      l. Remarks.
      m. Signature of transmitter.
   2. On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Architect on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same label information as related submittal.

F. 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.

G. 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.

1.4 CONTRACTOR'S USE OF ARCHITECT'S CAD FILES

A. General: At Contractor's written request, copies of Architect's CAD files will be provided to Contractor for Contractor's use in connection with Project, subject to the following conditions:
   1. Copies of base plan CAD files will be in AutoCAD .dwg format. It shall be the Contractor’s responsibility to perform any required translation of the Instruments of Service provided into a format for use in the execution of the Work.

PART 2 - PRODUCTS

2.1 ACTION SUBMITTALS

A. General: Prepare and submit Action Submittals required by individual Specification Sections.

B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
   1. If information must be specially prepared for submittal because standard printed data are not suitable for use, submit as Shop Drawings, not as Product Data.
   2. Mark each copy of each submittal to show which products and options are applicable.

3. Include the following information, as applicable:
   a. Manufacturer's written recommendations.
   b. Manufacturer's product specifications.
   c. Manufacturer's installation instructions.
   d. Standard color charts.
   e. Manufacturer's catalog cuts.
   f. Wiring diagrams showing factory-installed wiring.
   g. Printed performance curves.
   h. Operational range diagrams.
   i. Mill reports.
   j. Standard product operation and maintenance manuals.
   k. Compliance with specified reference standards.
   l. Testing by recognized testing agency.
   m. Application of testing agency labels and seals.
   n. Notation of coordination requirements.
4. Submit Product Data before or concurrent with Samples.
5. Number of Copies: Submit two copies of Product Data, unless otherwise indicated. Architect will return one copy.

C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.
   1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
      a. Dimensions.
      b. Identification of products.
      c. Fabrication and installation drawings.
      d. Roughing-in and setting diagrams.
      e. Wiring diagrams showing field-installed wiring, including power, signal, and control wiring.
      f. Shopwork manufacturing instructions.
      g. Templates and patterns.
      h. Design calculations.
      i. Compliance with specified standards.
      j. Notation of coordination requirements.
      k. Notation of dimensions established by field measurement.
      l. Relationship to adjoining construction clearly indicated.
      m. Seal and signature of professional engineer if specified.

D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.
   1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
   2. Disposition: Maintain approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Samples may be used to determine final acceptance of construction associated with each sample.
   3. 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.

E. Product Schedule or List: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:
   1. Type of product. Include unique identifier for each product.

2. Number and name of room or space.
3. Location within room or space.

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

2.2 INFORMATIONAL SUBMITTALS

A. General: Prepare and submit Informational Submittals required by other Specification Sections.
1. Number of Copies: Submit two copies of each submittal, unless otherwise indicated. Architect will not return copies.
2. Certificates and Certifications: Provide a notarized statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.

B. Product Test Reports: Prepare written reports indicating current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.

C. Maintenance Data: Prepare written and graphic instructions and procedures for operation and normal maintenance of products and equipment. Comply with requirements specified in Division 1 Section "Operation and Maintenance Data."

D. Insurance Certificates and Bonds: Prepare written information indicating current status of insurance or bonding coverage. Include name of entity covered by insurance or bond, limits of coverage, amounts of deductibles, if any, and term of the coverage.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

A. Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.

B. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.2 ARCHITECT'S / ACTION

A. General: Architect will not review submittals that do not bear Contractor's approval stamp and will return them without action.

1. Review of submittals by Architect is only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents.
2. Review of submittals by Architect is not for purpose of determining the accuracy and completeness of dimensions and quantities, or substantiating installation instructions.

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 are not acceptable, will be considered nonresponsive, and will be returned without review.

END OF SECTION 01330

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes general procedural requirements governing execution of the Work including, but not limited to, the following:
   1. Construction layout.
   2. Field engineering and surveying.
   3. General installation of products.
   4. Coordination of Owner-installed products.
   5. Progress cleaning.
   6. Starting and adjusting.
   7. Protection of installed construction.
   8. Correction of the Work.

1.2 SUBMITTALS

A. Certificates: Submit certificate signed by land surveyor certifying that location and elevation of improvements comply with requirements.

B. Final Property Survey: Submit 8 copies showing the Work performed and record survey data.

1.3 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.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Existing Conditions: The existence and location of site improvements, utilities, and other construction indicated as existing are not guaranteed. Before beginning work, investigate and verify the existence and location of mechanical and electrical systems and other construction affecting the Work.

B. Existing Utilities: 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 and other construction affecting the Work.
   1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; and underground electrical services.
   2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.

3.2 PREPARATION

A. Existing Utility Information: Furnish information to local utility 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. Include a detailed description of problem encountered, together with recommendations for changing the Contract Documents.

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. If discrepancies are discovered, notify Architect promptly.

B. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and invert elevations.

C. 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.

D. 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.

3.4 INSTALLATION

A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
   1. Make vertical work plumb and make horizontal work level.
   2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
   3. Conceal pipes, ducts, and wiring in finished areas, unless otherwise indicated.

B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.

C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.

D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.

E. Anchors and Fasteners: Provide anchors and fasteners as required to anchor each component securely in place, accurately located and aligned with other portions of the Work.
   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.

F. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.

G. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.5 OWNER-INSTALLED PRODUCTS

A. Site Access: Provide access to Project site for Owner's construction forces.

B. Coordination: Coordinate construction and operations of the Work with work performed by Owner's construction forces.

3.6 PROGRESS CLEANING

A. General: Clean Project site and work areas daily, including common areas. Coordinate progress cleaning for joint-use areas where more than one installer has worked. Enforce requirements strictly. Dispose of materials lawfully.

B. Site: Maintain Project site free of waste materials and debris.

C. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.

D. Waste Disposal: Burying or burning waste materials on-site will not be permitted. Washing waste materials down sewers or into waterways will not be permitted.

E. 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.

F. 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.

3.7 STARTING AND ADJUSTING

A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.

B. Adjust operating components for proper operation without binding. Adjust equipment for proper operation.

C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

3.8 PROTECTION OF INSTALLED CONSTRUCTION

A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.

B. Comply with manufacturer's written instructions for temperature and relative humidity.

3.9 CORRECTION OF THE WORK

A. Repair or remove and replace defective construction. Restore damaged substrates and finishes. Comply with requirements in Division 1 Section "Cutting and Patching."

B. Restore permanent facilities used during construction to their specified condition.

C. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.

D. Remove and replace chipped, scratched, and broken glass or reflective surfaces.

END OF SECTION 01700

CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
   1. Inspection procedures.
   2. Warranties.
   3. Final cleaning.

1.2 SUBSTANTIAL COMPLETION

A. Preliminary Procedures: Before requesting inspection for determining date of Substantial Completion, complete the following. List items below that are incomplete in request.
   1. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.
   2. Advise Owner of pending insurance changeover requirements.
   3. Submit specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
   4. Obtain and submit releases permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
   5. Prepare and submit Project Record Documents, operation and maintenance manuals, Final Completion construction photographs, damage or settlement surveys, property surveys, and similar final record information.
   6. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
   7. Complete startup testing of systems.
   8. Submit test/adjust/balance records.
   9. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
   10. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
   11. Complete final cleaning requirements, including touchup painting.
   12. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

B. Inspection: Submit a written request for inspection for Substantial Completion. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Contractor will prepare the Certificate of Substantial Completion after Architects approval of inspection.

1.3 FINAL COMPLETION

A. Preliminary Procedures: Before requesting final inspection for determining date of Final Completion, complete the following:
   1. Submit certified copy of Architects Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
   2. Submit evidence of final, continuing insurance coverage complying with insurance requirements.

3. Submit pest-control final inspection report and warranty.

1.4 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

A. Preparation: Submit 2 copies 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.
   2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.

1.5 WARRANTIES

A. Submittal Time: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated.

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.

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

PART 2 - PRODUCTS

2.1 MATERIALS

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

PART 3 - EXECUTION

3.1 FINAL CLEANING

A. General: Provide final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
   1. Complete the following cleaning operations before requesting inspection for certification Two paragraphs below represent end of the Work specified in Division 1 Section "Temporary Facilities and Controls." Most projects require these actions at completion of construction. Insert a paragraph on termite inspection where required by local code or desired for Project.

C. Pest Control: Engage an experienced, licensed exterminator to make a final inspection and rid Project of rodents, insects, and other pests.

D. Comply with safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on Owner's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from Project site and dispose of lawfully.

END OF SECTION 01770

PROJECT RECORD DOCUMENTS

Section 01781 - Page 1 of 2

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative and procedural requirements for Project Record Documents, including the following:
   1. Record Drawings.
   2. Record Specifications.
   3. Record Product Data.

1.2 SUBMITTALS

A. Record Drawings: Comply with the following:
   1. Number of Copies: Submit 2-sets of marked-up Record Prints.

B. Record Specifications: Submit 2-copies of Project's Specifications, including addenda and contract modifications.

C. Record Product Data: Submit 2-copies of each Product Data submittal.
   1. Where Record Product Data is required as part of operation and maintenance manuals, submit marked-up Product Data as an insert in manual instead of submittal as Record Product Data.

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

A. Record Prints: Maintain one set of blue- or black-line white prints of the Contract Drawings and Shop Drawings.
   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 prepare the marked-up Record Prints.
   2. Content: Types of items requiring marking include, but are not limited to, the following:
      a. Dimensional changes to Drawings.
      b. Revisions to details shown on Drawings.
      c. Depths of foundations below first floor.
      d. Locations and depths of underground utilities.
      e. Revisions to routing of piping and conduits.
      f. Revisions to electrical circuitry.
      g. Actual equipment locations.
      h. Duct size and routing.
      i. Locations of concealed internal utilities.
      j. Details not on the original Contract Drawings.
      k. Field records for variable and concealed conditions.
      l. Record information on the Work that is shown only schematically.

2.2 RECORD SPECIFICATIONS

A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.

2.3 RECORD PRODUCT DATA

A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

A. Recording: Maintain one copy of each submittal during the construction period for Project Record Document purposes. Post changes and modifications to Project Record Documents as they occur; do not wait until the end of Project.

END OF SECTION 01781

OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
   1. Operation and maintenance documentation directory.
   2. Emergency manuals.
   3. Operation manuals for systems, subsystems, and equipment.

1.2 SUBMITTALS

A. Final Submittal: Submit 2-copies of each manual in final form at least 15 days before final inspection. Architect will return copy with comments within 15 days after final inspection.
   1. Correct or modify each manual to comply with Architect comments. Submit 3-copies of each corrected manual within 15 days of receipt of Architects comments.

1.3 COORDINATION

A. Where operation and maintenance documentation includes information on installations by more than one factory-authorized service representative, assemble and coordinate information furnished by representatives and prepare manuals.

PART 2 - PRODUCTS

2.1 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY

A. Organization: Include a section in the directory for each of the following:
   1. List of documents.
   2. List of systems.
   3. List of equipment.
   4. Table of contents.

B. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.

C. 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.

D. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.

2.2 MANUALS, GENERAL

A. Organization: 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.

B. Title Page: Enclose title page in transparent plastic sleeve.

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.

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.

2.3 OPERATION MANUALS

A. 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.
2. Performance and design criteria if Contractor is delegated design responsibility.
3. Operating standards.
4. Operating procedures.
5. Operating logs.
6. Wiring diagrams.
7. Control diagrams.
8. Piped system diagrams.
9. Precautions against improper use.
10. License requirements including inspection and renewal dates.

B. 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.

C. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.

D. Piped Systems: Diagram piping as installed, and identify color-coding where required for identification.

2.4 PRODUCT MAINTENANCE MANUAL

A. 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.

B. 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.

C. 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.

D. 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.

E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.

F. 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.

2.5 SYSTEMS AND EQUIPMENT MAINTENANCE MANUAL

A. 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 warranty and bond information, as described below.

B. 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.

C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:
1. Standard printed maintenance instructions and bulletins.
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.

D. 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 videotape, if available.

E. 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.

F. 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.

G. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.

H. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

PART 3 - EXECUTION

3.1 MANUAL PREPARATION

A. Operation and Maintenance Documentation Directory: Prepare a separate manual that provides an organized reference to operation and maintenance manuals.

B. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.

C. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.

D. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, 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.

E. 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 operation and maintenance manuals.
2. Comply with requirements of newly prepared Record Drawings in Division 1 Section "Project Record Documents."

F. Comply with Division 1 Section "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

END OF SECTION 01782

DEMONSTRATION AND TRAINING

Section 01820 - Page 1 of 3

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:
   1. Demonstration of operation of systems, subsystems, and equipment.
   2. Training in operation and maintenance of systems, subsystems, and equipment.

B. Related Sections include the following:
   1. Divisions 2 through 16 Sections for specific requirements for demonstration and training for products in those Sections.

1.2 SUBMITTALS

A. Instruction Program: Submit 2-copies of outline of instructional program for demonstration and training, including a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module.
   1. At completion of training, submit 2 complete training manuals for Owner's use.

B. Attendance Record: For each training module, submit list of participants and length of instruction time.

C. Evaluations: For each participant and for each training module, submit results and documentation of performance-based test.

1.3 QUALITY ASSURANCE

A. Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that indicated for this Project, and whose work has resulted in training or education with a record of successful learning performance.

1.4 COORDINATION

A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations.

B. Coordinate content of training modules with content of approved operation and maintenance manuals. Do not submit instruction program until operation and maintenance data has been reviewed and approved by Architect.

PART 2 - PRODUCTS

2.1 INSTRUCTION PROGRAM

A. Program Structure: Develop an instruction program that includes individual training modules for each system and equipment not part of a system, as required by individual Specification Sections, and as follows:

1. HVAC systems
2. HVAC instrumentation and controls.
3. Electrical service and distribution
4. Lighting equipment and controls.
5. Communication systems

B. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following:
   1. Basis of System Design, Operational Requirements, and Criteria: Include the following:
      a. System, subsystem, and equipment descriptions.
      b. Operating standards.
      c. Regulatory requirements.
      d. Equipment function.
      e. Operating characteristics.
      f. Limiting conditions.
      g. Performance curves.
   2. Documentation: Review the following items in detail:
      a. Operations manuals.
      b. Maintenance manuals.
      c. Project Record Documents.
      d. Identification systems.
      e. Warranties and bonds.
      f. Maintenance service agreements and similar continuing commitments.
   3. Operations: Include the following, as applicable:
      a. Startup procedures.
      b. Equipment or system break-in procedures.
      c. Routine and normal operating instructions.
      d. Regulation and control procedures.
      e. Control sequences.
      f. Safety procedures.
      g. Instructions on stopping.
      h. Normal shutdown instructions.
      i. Operating procedures for emergencies.
      j. Operating procedures for system, subsystem, or equipment failure.
      k. Seasonal and weekend operating instructions.
      l. Required sequences for electric or electronic systems.
      m. Special operating instructions and procedures.
   4. Maintenance: Include the following:
      a. Inspection procedures.
      b. Types of cleaning agents to be used and methods of cleaning.
      c. List of cleaning agents and methods of cleaning detrimental to product.
      d. Procedures for routine cleaning
      e. Procedures for preventive maintenance.
      f. Procedures for routine maintenance.
      g. Instruction on use of special tools.
   5. Repairs: Include the following:
      a. Diagnosis instructions.
      b. Repair instructions.
      c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
      d. Instructions for identifying parts and components.
      e. Review of spare parts needed for operation and maintenance.

PART 3 - EXECUTION

3.1 PREPARATION

A. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a combined training manual.

3.2 INSTRUCTION

A. Facilitator: Engage a qualified facilitator to prepare instruction program and training modules, to coordinate instructors, and to coordinate between Contractor and Owner for number of participants, instruction times, and location.

END OF SECTION 01820

TERMITE CONTROL

Section 02361 - Page 1 of 3

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following for termite control:
1. Soil treatment.

1.2 DEFINITIONS

A. EPA: Environmental Protection Agency.

B. PCO: Pest control operator.

1.3 SUBMITTALS

A. Product Data: Treatments and application instructions, including EPA-Registered Label.

B. Product Certificates: Termite control products certifying that treatments furnished comply with requirements.

C. Qualification Data: For firms and persons specified in "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.

D. Soil Treatment Application Report : After application of termiticide is completed, submit report for Owner's record information, including the following as applicable:
1. Date and time of application.
2. Moisture content of soil before application.
3. Brand name and manufacturer of termiticide.
4. Quantity of undiluted termiticide used.
5. Dilutions, methods, volumes, and rates of application used.
6. Areas of application.
7. Water source for application.

1.4 QUALITY ASSURANCE

A. Applicator Qualifications: A PCO who is licensed according to regulations of authorities having jurisdiction to apply termite control treatment in jurisdiction where Project is located and who is experienced and has completed termite control treatment similar to that indicated for this Project and whose work has a record of successful in-service performance.

1.5 PROJECT CONDITIONS

A. Environmental Limitations: To ensure penetration, do not treat soil that is water saturated or frozen. Do not treat soil while precipitation is occurring. Comply with EPA-Registered Label requirements and requirements of authorities having jurisdiction.

1.6 COORDINATION

A. Coordinate soil treatment application with excavating, filling, and grading and concreting operations. Treat soil under footings, grade beams, and ground-supported slabs, before construction.

1.7 WARRANTY

A. Warranty Period: Three years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SOIL TREATMENT

A. Termiticide: Provide an EPA-registered termiticide complying with requirements of authorities having jurisdiction, in a soluble or emulsible, concentrated formulation that dilutes with water or foaming agent, and formulated to prevent termite infestation. Use only soil treatment solutions that are not harmful to plants. Provide quantity required for application at the label volume and rate for the maximum termiticide concentration allowed for each specific use, according to the product's EPA-Registered Label.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements for moisture content of the soil, interfaces with earthwork, slab and foundation work, landscaping, and other conditions affecting performance of termite control. Proceed with application only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. General: Comply with the most stringent requirements of authorities having jurisdiction and with manufacturer's written instructions for preparing substrate. Remove all extraneous sources of wood cellulose and other edible materials such as wood debris, tree stumps and roots, stakes, formwork, and construction waste wood from soil and around foundations.

B. Soil Treatment Preparation: Remove foreign matter and impermeable soil materials that could decrease treatment effectiveness on areas to be treated. Loosen, rake, and level soil to be treated, except previously compacted areas under slabs and footings. Termiticides may be applied before placing compacted fill under slabs if recommended by termiticide manufacturer.

C. Fit filling hose connected to water source at the site with a backflow preventer, complying with requirements of authorities having jurisdiction.

3.3 APPLICATION, GENERAL

A. General: Comply with the most stringent requirements of authorities having jurisdiction and with manufacturer's EPA-Registered Label for products.

3.4 APPLYING SOIL TREATMENT

A. Application: Mix soil treatment termiticide solution to a uniform consistency. Provide quantity required for application at the label volume and rate for the maximum specified concentration of termiticide, according to manufacturer's EPA-Registered Label, to the following so that a continuous horizontal and vertical termiticidal barrier or treated zone is established around and under building construction. Distribute the treatment evenly.
   1. Slabs-on-Grade and Basement Slabs: Under ground-supported slab construction, including footings, building slabs, and attached slabs as an overall treatment. Treat soil materials before concrete footings and slabs are placed.
   2. Foundations: Adjacent soil including soil along entire inside perimeter of foundation walls, along both sides of interior partition walls, around plumbing pipes and electric conduit penetrating slab, and around interior column footings, piers, and along entire outside perimeter, from grade to bottom of footing. Avoid soil washout around footings.
   3. Penetrations: At expansion joints, control joints, and areas where slabs will be penetrated.

B. Avoid disturbance of treated soil after application. Keep off treated areas until completely dry.

C. Protect termiticide solution, dispersed in treated soils and fills, from being diluted until ground-supported slabs are installed. Use waterproof barrier according to EPA-Registered Label instructions, but not less than 6 mil vapor retarder.
   1. Retreat areas if rain occurs prior to vapor retarder placement.

D. Post warning signs in areas of application.

E. Reapply soil treatment solution to areas disturbed by subsequent excavation, reinforcing steel placement, grading, landscaping, or other construction activities following application.

END OF SECTION 02361

ROUGH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Wood blocking and nailers.
2. Plywood backing panels.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product.

1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements
2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements.

B. Sustainable Submittals:
1. Product Data: For composite wood products, documentation indicating that product contains no urea formaldehyde.

1.3 INFORMATIONAL SUBMITTALS

A. Evaluation Reports: For the following, from ICC-ES:

1. Wood-preservative-treated wood.
2. Fire-retardant-treated wood.

PART 2 - PRODUCTS

2.1 WOOD-PRESERVATIVE-TREATED LUMBER

A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in contact with the ground and use Category UC3b for exterior construction not in contact with the ground.

1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.

B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or that does not comply with requirements for untreated material.

C. Application: Treat all rough carpentry unless otherwise indicated, and the following:

1. Wood cants, nailers, curbs, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.

2. Wood sills, sleepers, blocking and similar concealed members in contact with masonry or concrete.

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. For items of dimension lumber size, provide Standard, Stud, or No. 3 grade lumber of any species.

2.3 PLYWOOD BACKING PANELS

A. Equipment Backing Panels: DOC PS 1, Exposure 1, C-D Plugged, fire-retardant treated, in thickness indicated or, if not indicated, not less than 1/2-inch nominal thickness.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry to other construction; scribe and cope as needed for accurate fit. Locate nailers, blocking,and similar supports to comply with requirements for attaching other construction.

B. Install fire-retardant treated plywood backing panels with classification marking of testing agency exposed to view.

3.2 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 rough carpentry from weather. If, despite protection, rough carpentry becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION 06100

INTERIOR ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
1. Plastic-laminate countertops.
2. Closet and utility shelving.

1.2 DEFINITIONS

A. Interior architectural woodwork includes wood furring, blocking, shims, and hanging strips for installing woodwork items, unless concealed within other construction before woodwork installation.

1.3 SUBMITTALS

A. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.

B. Samples for Initial Selection:
1. Plastic laminates.
2. PVC edge material.
3. Thermoset decorative panels.

C. Samples for Verification:
1. Plastic laminates, 8 by 10 inches, for each type, color, pattern, and surface finish

1.4 QUALITY ASSURANCE

A. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.

B. Source Limitations: Engage a qualified woodworking firm to assume undivided responsibility for production of interior architectural woodwork with sequence-matched wood veneers.

C. Quality Standard: Unless otherwise indicated, comply with AWI's "Architectural Woodwork Quality Standards" for grades of interior architectural woodwork indicated for construction, finishes, installation, and other requirements.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver woodwork until painting and similar operations that could damage woodwork have been completed in installation areas. If woodwork must be stored in other than installation areas, store only in areas where environmental conditions comply with requirements specified in "Project Conditions" Article.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install woodwork until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.

B. Field Measurements: Where woodwork is indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
   1. Locate concealed framing, blocking, and reinforcements that support woodwork by field measurements before being enclosed, and indicate measurements on Shop Drawings.

1.7 COORDINATION

A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that interior architectural woodwork can be supported and installed as indicated.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Provide materials that comply with requirements of AWI's quality standard for each type of woodwork and quality grade specified, unless otherwise indicated.

B. Wood Products: Comply with the following:
   1. Medium-Density Fiberboard: ANSI A208.2, Grade MD, made with binder containing no urea formaldehyde.
   2. Particleboard: ANSI A208.1, Grade M-2-Exterior Glue.
   3. Particleboard: Straw-based particleboard complying with requirements in ANSI A208.1, Grade M-2, except for density.

C. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or, if not indicated, as required by woodwork quality standard.
   1. Manufacturer: Subject to compliance with requirements, provide high-pressure decorative laminates by one of the following:
      a. Formica Corporation.
      b. Lamin-Art, Inc.
      c. Nevamar Company, LLC; Decorative Products Div.
      d. Wilsonart International; Div. of Premark International, Inc.

2.2 MISCELLANEOUS MATERIALS

A. Furring, Blocking, Shims, and Hanging Strips: Fire-retardant-treated softwood lumber, kiln dried to less than 15 percent moisture content.

B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide nonferrous-metal or hot-dip galvanized anchors and inserts on inside face of exterior walls and elsewhere as required for corrosion resistance. Provide toothed-steel or lead expansion sleeves for drilled-in-place anchors.

C. Adhesives, General: Do not use adhesives that contain urea formaldehyde.

D. VOC Limits for Installation Adhesives and Glues: Use installation adhesives that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):

1. Wood Glues: 30 g/L.
2. Contact Adhesive: 250 g/L.

2.3 FABRICATION, GENERAL

A. Interior Woodwork Grade: Unless otherwise indicated, provide Custom-grade interior woodwork complying with referenced quality standard.

B. Wood Moisture Content: Comply with requirements of referenced quality standard for wood moisture content in relation to ambient relative humidity during fabrication and in installation areas.

C. Fabricate woodwork to dimensions, profiles, and details indicated. Ease edges to radius indicated for the following:

D. Shop-cut openings to maximum extent possible, to receive hardware, appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.
1. Seal edges of openings in countertops with a coat of varnish.

2.4 PLASTIC-LAMINATE COUNTERTOPS

A. Grade: Custom

B. High-Pressure Decorative Laminate Grade: HGS

C. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:
1. As selected by Architect from manufacturer's full range in the following categories:

2.5 CLOSET AND UTILITY SHELVING

A. Grade: Custom

B. Shelf Material: 3/4-inch solid lumber

PART 3 - EXECUTION

3.1 PREPARATION

A. Before installation, condition woodwork to average prevailing humidity conditions in installation areas.

3.2 INSTALLATION

A. Install woodwork level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb (including tops) to a tolerance of 1/8 inch in 96 inches.

B. Scribe and cut woodwork to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.

C. Anchor woodwork to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing as required for complete installation.

D. Countertops: Anchor securely by screwing through supports into underside of countertop.

3.3 ADJUSTING AND CLEANING

A. Repair damaged and defective woodwork, where possible, to eliminate functional and visual defects; where not possible to repair, replace woodwork. Adjust joinery for uniform appearance.

B. Clean, lubricate, and adjust hardware.

C. Clean woodwork on exposed and semiexposed surfaces. Touch up shop-applied finishes to restore damaged or soiled areas.

END OF SECTION 06402

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes asphalt dampproofing applied to the following surfaces:
   1. Exterior, below-grade surfaces of concrete foundation walls.
   2. Interior face of exterior cmu walls with furring, insulation and drywall finish, above grade.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated. Include recommendations for method of application, primer, number of coats, coverage or thickness, and protection course.

B. Material Certificates: For each product, signed by manufacturers.

1.3 QUALITY ASSURANCE

A. Source Limitations: Obtain primary dampproofing materials and primers through one source from a single manufacturer. Provide secondary materials recommended by manufacturer of primary materials.

1.4 PROJECT CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit asphalt dampproofing to be performed according to manufacturers' written instructions.

B. Ventilation: Provide adequate ventilation during application of dampproofing in enclosed spaces. Maintain ventilation until dampproofing has thoroughly cured.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Cold-Applied, Cut-Back (Solvent-Based) Asphalt Dampproofing:
      a. Meadows, W. R., Inc.
      b. Sonneborn, Div. of ChemRex, Inc.
      c. Karnak, Inc.
   2. Cold-Applied, Emulsified-Asphalt Dampproofing:
      a. Euclid Chemical Company (The).
      b. Meadows, W. R., Inc.
      c. Sonneborn, Div. of ChemRex, Inc.
   3. Protection Course, Asphalt-Board Type:
      a. Grace, W. R. & Co.; Construction Products Div.
      b. Meadows, W. R., Inc.
      c. Sonneborn, Div. of ChemRex, Inc.

2.2 BITUMINOUS DAMPPROOFING

A. Odor Elimination: For interior and concealed-in-wall uses provide dampproofing material warranted by manufacturer to be substantially odor free after drying for 24 hours under normal conditions.

B. Use: On interior of concrete masonry in conditioned spaces.

C. Cold-Applied, Cut-Back (Solvent-Based) Asphalt Dampproofing:
1. Trowel Coats: ASTM D 4586, Type I.
2. Brush and Spray Coats: ASTM D 4479, Type I.

D. Cold-Applied, Emulsified-Asphalt Dampproofing:
1. Trowel Coats: ASTM D 1227, Type II, Class 1.
2. Fibered Brush and Spray Coats: ASTM D 1227, Type II, Class 1.
3. Brush and Spray Coats: ASTM D 1227, Type III, Class 1.

2.3 MISCELLANEOUS MATERIALS

A. Cut-Back Asphalt Primer: ASTM D 41.

B. Emulsified-Asphalt Primer: ASTM D 1227, Type III, Class 1, except diluted with water as recommended by manufacturer.

C. Asphalt-Coated Glass Fabric: ASTM D 1668, Type I.

D. Protection Course, Asphalt-Board Type: Premolded, 1/8-inch thick, multi-ply, semirigid board consisting of a mineral-stabilized asphalt core sandwiched between layers of asphalt-saturated felt, and faced on 1 side with polyethylene film.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Applicator present, for compliance with requirements for surface smoothness and other conditions affecting performance of work.
1. Begin dampproofing application only after substrate construction and penetrating work have been completed and unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Protection of Other Work: Mask or otherwise protect adjoining exposed surfaces from being stained, spotted, or coated with dampproofing. Prevent dampproofing materials from entering and clogging weep holes and drains.

B. Clean substrates of projections and substances detrimental to work; fill voids, seal joints, and apply bond breakers if any, as recommended by prime material manufacturer.

3.3 APPLICATION, GENERAL

A. Comply with manufacturer's written recommendations unless more stringent requirements are indicated or required by Project conditions to ensure satisfactory performance of dampproofing.
   1. Apply additional coats if recommended by manufacturer or required to achieve coverages indicated.
   2. Allow each coat of dampproofing to cure 24 hours before applying subsequent coats.

B. Apply dampproofing to footings and foundation walls where opposite side of wall faces building interior whether indicated or not.

C. Apply dampproofing to provide continuous plane of protection on interior face of above grade, exterior concrete walls unless walls are indicated to receive direct application of paint.
   1. Continue dampproofing through intersecting walls by keeping vertical mortar joints at intersection temporarily open or by delaying construction of intersecting walls until dampproofing is applied.

D. Contractor's Options: Provide hot-applied cold-applied, cut-back or cold-applied, emulsified asphalt dampproofing, as specified in subsequent articles for substrates indicated, within the following limitations:
   1. Use cold-applied, cut-back asphalt dampproofing only on exterior surfaces of building.
   2. Use cold-applied, emulsified-asphalt dampproofing on surfaces other than below-grade exterior surfaces.

3.4 COLD-APPLIED, CUT-BACK ASPHALT DAMPPROOFING

A. On Concrete Foundations: Apply two brush or spray coats at not less than 1.25 gal./100 sq. ft.(0.5 L/sq. m) for first coat and 1 gal./100 sq. ft.(0.4 L/sq. m) for second coat, or one trowel coat at not less than 4 gal./100 sq. ft.(1.6 L/sq. m). or as required by manufacturer's recommendations if in excess of that stated.

B. On Backs of Concrete Retaining Walls: Apply one brush or spray coat at not less than 1.25 gal./100 sq. ft.(0.5 L/sq. m), or as required by manufacturer's recommendations if in excess of that stated.

3.5 COLD-APPLIED, EMULSIFIED-ASPHALT DAMPPROOFING

A. On Concrete Foundations: Apply two brush or spray coats at not less than 1.5 gal./100 sq. ft. for first coat and 1 gal./100 sq. ft. for second coat, one fibered brush or spray coat at not less than 3 gal./100 sq. ft., or one trowel coat at not less than 4 gal./100 sq. ft. or as required by manufacturer's recommendations if in excess of that stated.

B. On Interior Face of Exterior Concrete Walls: Where above grade and indicated to be furred and finished, apply one brush or spray coat at not less than 1 gal./100 sq. ft. or as required by manufacturer's recommendations if in excess of that stated.

3.6 CLEANING

A. Remove dampproofing materials from surfaces not intended to receive dampproofing.

END OF SECTION 07115

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes traffic coatings for the following applications:

1. Waterproofing on top of covered range concrete baffles

1.2 ACTION SUBMITTALS

A. Product Data: For each product indicated.

B. Warranty.

1.3 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of traffic coatings required for this Project.

B. Source Limitations:

1. Obtain traffic coatings from a single manufacturer.
2. Obtain primary traffic coating materials, including primers, from traffic coating manufacturer. Obtain secondary materials including aggregates, sheet flashings, joint sealants, and substrate repair materials of type and from source recommended in writing by primary material manufacturer.

C. Mockups: Apply mockups to set quality standards for materials and execution.

1. Architect will select one representative surface for each traffic coating and each substrate to receive traffic coatings. Apply each coating to at least 100 sq. ft. of each substrate to demonstrate surface preparation, joint and crack treatment, thickness, texture, color, and standard of workmanship.
2. Remove and reapply mockups until they are approved by Architect.
3. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.5 WARRANTY

A. Special Warranty: Manufacturer's standard form in which traffic coating manufacturer agrees to repair or replace traffic coatings that deteriorate during the specified warranty period. Warranty

does not include deterioration or failure of traffic coating due to unusual weather phenomena, failure of prepared and treated substrate, formation of new substrate cracks exceeding 1/16 inch in width, fire, vandalism, or abuse by snowplow, maintenance equipment, and truck traffic.

1. Deterioration of traffic coatings includes the following:

    a. Adhesive or cohesive failures.
    b. Abrasion or tearing failures.
    c. Surface crazing or spalling.

2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Material Compatibility: Provide primers; base, intermediate, and topcoats; and miscellaneous materials that are compatible with one another and with substrate under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.

2.2 TRAFFIC COATING

A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
    1. Carlisle Coatings & Waterproofing, Inc.; ccw-5013 Pedestrian Traffic Deck System.

B. Primer: Manufacturer's standard factory-formulated primer recommended for substrate and conditions indicated.

C. Preparatory and Base Coats: Single, one-part polyurethane Base Coat.

D. Topcoat: Single one-part aliphatic polyurethane Top Coat.

    1. Color: As selected by Architect from manufacturer's full range.

E. Component Coat Thicknesses: As recommended by manufacturer for substrate and service conditions.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements and for other conditions affecting performance of traffic coatings.

    1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance.

2. Verify compatibility with and suitability of substrates.
3. Begin coating application only after minimum concrete curing and drying period recommended by traffic coating manufacturer has passed, after unsatisfactory conditions have been corrected, and after surfaces are dry.
4. Verify that substrates are visibly dry and free of moisture.

5. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Clean and prepare substrates according to ASTM C 1127 and manufacturer's written recommendations to produce clean, dust-free, dry substrate for traffic coating application.

B. Mask adjoining surfaces not receiving traffic coatings, deck drains, and other deck substrate penetrations to prevent spillage, leaking, and migration of coatings.

C. Concrete Substrates: Mechanically abrade concrete surfaces to a uniform profile according to ASTM D 4259. Do not acid etch.

1. Remove grease, oil, paints, and other penetrating contaminants from concrete.
2. Remove concrete fins, ridges, and other projections.
3. Remove laitance, glaze, efflorescence, curing compounds, concrete hardeners, form-release agents, and other incompatible materials that might affect coating adhesion.
4. Remove remaining loose material to provide a sound surface, and clean surfaces according to ASTM D 4258.

3.3 TERMINATIONS AND PENETRATIONS

A. Prepare vertical and horizontal surfaces at terminations and penetrations through traffic coatings and at expansion joints, drains, and sleeves according to ASTM C 1127 and manufacturer's written recommendations.

B. Provide sealant cants at penetrations and at reinforced and nonreinforced, deck-to-wall butt joints.

C. Terminate edges of deck-to-deck expansion joints with preparatory base-coat strip.

D. Install sheet flashings at deck-to-wall expansion and dynamic joints, and bond to deck and wall substrates according to manufacturer's written recommendations.

3.4 JOINT AND CRACK TREATMENT

A. Prepare, treat, rout, and fill joints and cracks in substrates according to ASTM C 1127 and manufacturer's written recommendations. Before coating surfaces, remove dust and dirt from joints and cracks according to ASTM D 4258.

1. Comply with recommendations in ASTM C 1193 for joint-sealant installation.

3.5 TRAFFIC COATING APPLICATION

A. Apply traffic coating material according to ASTM C 1127 and manufacturer's written recommendations.

B. Apply traffic coatings to prepared wall terminations and vertical surfaces to height indicated, and omit aggregate on vertical surfaces.

C. Cure traffic coatings according to manufacturer's written recommendations. Prevent contamination and damage during application and curing stages.

3.6 PROTECTING AND CLEANING

A. Protect traffic coatings from damage and wear during remainder of construction period.

B. Clean spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION 07180

BUILDING INSULATION

Section 07210 - Page 1 of 4

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
1. Concealed building insulation.
2. Exposed building insulation.
3. Vapor retarders.

1.2 DEFINITIONS

A. Mineral-Fiber Insulation: Insulation composed of rock-wool fibers, slag-wool fibers, or glass fibers; produced in boards and blanket with latter formed into batts (flat-cut lengths) or rolls.

1.3 SUBMITTALS

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

B. Sustainable Submittals:
1. Product Data indicating percentages by weight of postconsumer and preconsumer recycled content for products having recycled content.
a. Include statement indicating costs for each product having recycled content.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain each type of building insulation through one source from a single manufacturer.

B. Fire-Test-Response Characteristics: Provide insulation and related materials with the fire-test-response characteristics indicated, as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.
1. Surface-Burning Characteristics: ASTM E 84.
2. Fire-Resistance Ratings: ASTM E 119.
3. Combustion Characteristics: ASTM E 136.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Protect insulation materials from physical damage and from deterioration by moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 FOAM-PLASTIC BOARD INSULATION

A. Foil-Faced, Polyisocyanurate Board Insulation: ASTM C 1289, Type I, Class 1 or 2, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, based on tests performed on unfaced core on thicknesses up to 2 inches.

1. Manufacturers:

a. Atlas Roofing Corporation.
b. Dow Chemical Company.- TUFF-R Commercial
c. Rmax, Inc.

2.3 GLASS-FIBER BATT/BLANKET INSULATION

A. Manufacturers:
1. CertainTeed Corporation.
2. Guardian Fiberglass, Inc.
3. Johns Manville.
4. Owens Corning.

B. Unfaced, Glass-Fiber Blanket Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; passing ASTM E 136 for combustion characteristics.

2.4 SLAG-WOOL-FIBER/ROCK-WOOL-FIBER BATT/BLANKET INSULATION

A. Manufacturers:
1. Fibrex Insulations Inc.
2. Owens Corning.
3. Thermafiber.

B. Unfaced, Slag-Wool-Fiber/Rock-Wool-Fiber Blanket Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; passing ASTM E 136 for combustion characteristics.

2.5 VAPOR RETARDERS

A. Polyethylene Vapor Retarders: ASTM D 4397, 6 mils thick, with maximum permeance rating of 0.13 perm.

B. Reinforced-Polyethylene Vapor Retarders: 2 outer layers of polyethylene film laminated to an inner reinforcing layer consisting of either nylon cord or polyester scrim and weighing not less than 25 lb/1000 sq. ft. (12 kg/100 sq. m), with maximum permeance rating of 0.0507 perm (2.9 ng/Pa x s x sq. m).

C. Vapor-Retarder Tape: Pressure-sensitive tape of type recommended by vapor-retarder manufacturer for sealing joints and penetrations in vapor retarder.

D. Adhesive for Vapor Retarders: Product recommended by vapor-retarder manufacturer and with demonstrated capability to bond vapor retarders securely to substrates indicated.

2.6 INSULATION FASTENERS

A. Adhesively Attached, Spindle-Type Anchors: Plate welded to projecting spindle; capable of holding insulation of thickness indicated securely in position indicated with self-locking washer in place.

B. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch (0.41-mm-) thick galvanized steel sheet, with beveled edge for increased stiffness, sized as required to hold insulation securely in place, but not less than 1-1/2 inches (38 mm) square or in diameter.

C. Anchor Adhesive: Product with demonstrated capability to bond insulation anchors securely to substrates indicated without damaging insulation, fasteners, and substrates.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements of Sections in which substrates and related work are specified and for other conditions affecting performance.

3.2 PREPARATION

A. Clean substrates of substances harmful to insulation or vapor retarders, including removing projections capable of puncturing vapor retarders or of interfering with insulation attachment.

3.3 INSTALLATION, GENERAL

A. Comply with insulation manufacturer's written instructions applicable to products and application indicated.

B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed at any time to ice, rain, and snow.

C. Extend insulation in thickness indicated to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.

D. Water-Piping Coordination: If water piping is located within insulated exterior walls, coordinate location of piping to ensure that it is placed on warm side of insulation and insulation encapsulates piping.

E. For preformed insulating units, provide sizes to fit applications indicated and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units to produce thickness indicated, unless multiple layers are otherwise shown or required to make up total thickness.

3.4 INSTALLATION OF PERIMETER INSULATION

A. On vertical surfaces, set insulation units in adhesive applied according to manufacturer's written instructions. Use adhesive recommended by insulation manufacturer.

3.5 INSTALLATION OF GENERAL BUILDING INSULATION

A. Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.

B. Seal joints between foam-plastic insulation units by applying adhesive, mastic, or sealant to edges of each unit to form a tight seal as units are shoved into place. Fill voids in completed installation with adhesive, mastic, or sealant as recommended by insulation manufacturer.

C. Set vapor-retarder-faced units with vapor retarder to warm side of construction, unless otherwise indicated.
   1. Tape joints and ruptures in vapor retarder, and seal each continuous area of insulation to surrounding construction to ensure airtight installation.

D. Install mineral-fiber insulation in cavities formed by framing members according to the following requirements:
   1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill cavity, provide lengths that will produce a snug fit between ends.
   2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
   3. Maintain 3-inch clearance of insulation around recessed lighting fixtures.
   4. For metal-framed wall cavities where cavity heights exceed 96 inches, support unfaced blankets mechanically and support faced blankets by taping stapling flanges to flanges of metal studs.

3.6 INSTALLATION OF VAPOR RETARDERS

A. General: Extend vapor retarder to extremities of areas to be protected from vapor transmission. Secure in place with adhesives or other anchorage system as indicated. Extend vapor retarder to cover miscellaneous voids in insulated substrates, including those filled with loose-fiber insulation.

B. Seal vertical joints in vapor retarders over framing by lapping not less than two wall studs. Fasten vapor retarders to wood framing at top, end, and bottom edges; at perimeter of wall openings; and at lap joints. Space fasteners 16 inches o.c.

C. Before installing vapor retarder, apply urethane sealant to flanges of metal framing including runner tracks, metal studs, and framing around door and window openings. Seal overlapping joints in vapor retarders with vapor-retarder tape according to vapor-retarder manufacturer's written instructions. Seal butt joints with vapor-retarder tape. Locate all joints over framing members or other solid substrates.

D. Firmly attach vapor retarders to framing and solid substrates with vapor-retarder fasteners as recommended by vapor-retarder manufacturer.

E. Repair tears or punctures in vapor retarders immediately before concealment by other work. Cover with vapor-retarder tape or another layer of vapor retarder.

END OF SECTION 07210

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Exposed-fastener, lap-seam metal roof panels.

1.2 PERFORMANCE REQUIREMENTS

A. Hydrostatic-Head Resistance: No water penetration when tested according to ASTM E 2140.

B. Structural Performance: Provide metal roof panel assemblies capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated, based on testing according to ASTM E 1592:

1. Wind Loads: As shown on structural drawings

2. Wind Uplift Resistance: UL 580 wind uplift rating UL90

C. Solar Reflectance Index: Not less than 78 when calculated according to ASTM E 1980 based on testing identical products by a qualified testing agency.

1.3 ACTION SUBMITTALS

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

B. Shop Drawings: Show fabrication and installation layouts of metal roof panels; details of edge conditions, side-seam and endlap joints, panel profiles, corners, anchorages, trim, flashings, closures, and accessories; and special details. Distinguish between factory- and field-assembled work.

C. Samples: For each type of exposed finish required.

1.4 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Roof plans, drawn to scale, based on input from installers of the items involved.

B. Product test reports.

C. Warranties: Samples of special warranties.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An employer of workers trained and approved by manufacturer.

1.7 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace metal roof panel assemblies that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 UNDERLAYMENT MATERIALS

A. Self-Adhering, High-Temperature Sheet: 30 to 40 mils (0.76 to 1.0 mm) thick minimum, consisting of slip-resisting, polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.

1. Thermal Stability: Stable after testing at 240 deg F (116 deg C); ASTM D 1970.
2. Low-Temperature Flexibility: Passes after testing at minus 20 deg F (29 deg C); ASTM D 1970.
3. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Carlisle Coatings & Waterproofing Inc., Div. of Carlisle Companies Inc.; CCW WIP 300HT.
b. Grace Construction Products; a unit of Grace, W. R. & Co.; Ultra.
c. Henry Company; Blueskin PE200 HT.
d. Metal-Fab Manufacturing, LLC; MetShield.
e. Owens Corning; WeatherLock Metal High Temperature Underlayment.

B. Slip Sheet: Manufacturer's recommended slip sheet, of type required for application.

2.2 MISCELLANEOUS MATERIALS

A. Panel Fasteners: Self-tapping screws, bolts, nuts, self-locking rivets and bolts, end-welded studs, and other suitable fasteners designed to withstand design loads. Provide exposed

fasteners with heads matching color of metal roof panels by means of plastic caps or factory-applied coating. Provide EPDM, PVC, or neoprene sealing washers.

B. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil (0.4-mm) dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.3 STANDING-SEAM METAL ROOF PANELS

A. General: Provide factory-formed metal roof panels designed to be installed by lapping and interconnecting raised side edges of adjacent panels with joint type indicated and mechanically attaching panels to supports using concealed clips in side laps. Include clips, cleats, pressure plates, and accessories required for weathertight installation.

1. Basis-of-Design Product: Subject to compliance with requirements, provide CENTRIA, SRS3 Standing Seam Metal Roof Panel System or comparable product by one of the following:

    a. Alcoa Inc.
    b. Architectural Metal Systems.
    c. CENTRIA Architectural Systems.
    d. Fabral.
    e. Flexospan Steel Buildings, Inc.
    f. Galvamet; Galvacer Building Systems.
    g. MBCI; a division of NCI Building Systems, L. P.
    h. McElroy Metal, Inc.
    i. Metal Sales Manufacturing Corporation.
    j. Metecno-Morin Corporation; Division of Metecno Inc.
    k. Petersen Aluminum Corporation.
    l. Steelox Systems, L.L.C.
    m. United Steel Deck Inc.; Subsidiary of Bouras Industries Inc.

2.4 ACCESSORIES

A. Roof Panel Accessories: Provide components approved by roof panel manufacturer and as required for a complete metal roof panel assembly including trim, copings, fasciae, corner units, ridge closures, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal roof panels unless otherwise indicated.

1. Closures: Provide closures at eaves and ridges, fabricated of same metal as metal roof panels.
2. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch- (25-mm-) thick, flexible closure strips; cut or premolded to match metal roof panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.
3. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.

B. Flashing and Trim: Formed from same material as roof panels, prepainted with coil coating, minimum 0.018 inch (0.45 mm) thick. Provide flashing and trim as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, eaves, rakes, corners, bases, framed openings, ridges, fasciae, and fillers. Finish flashing and trim with same finish system as adjacent metal roof panels.

2.5 FABRICATION

A. Fabricate and finish metal roof panels and accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes and as necessary to fulfill indicated performance requirements. Comply with indicated profiles and with dimensional and structural requirements.

B. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.

C. Fabricate metal roof panel side laps with factory-installed captive gaskets or separator strips that provide a tight seal and prevent metal-to-metal contact, in a manner that will seal weathertight and minimize noise from movements within panel assembly.

D. Sheet Metal Accessories: Fabricate flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to the design, dimensions, metal, and other characteristics of item indicated.

PART 3 - EXECUTION

3.1 METAL ROOF PANEL INSTALLATION

A. Standing-Seam Metal Roof Panels: Fasten metal roof panels to supports with concealed clips at each standing-seam joint at location, spacing, and with fasteners recommended by manufacturer.

1. Install clips to supports with self-tapping fasteners.
2. Install pressure plates at locations indicated in manufacturer's written installation instructions.
3. Snap Joint: Nest standing seams and fasten together by interlocking and completely engaging factory-applied sealant.
4. Seamed Joint: Crimp standing seams with manufacturer-approved, motorized seamer tool so clip, metal roof panel, and factory-applied sealant are completely engaged.

3.2 ACCESSORY INSTALLATION

A. General: Install accessories with positive anchorage to building and weathertight mounting and provide for thermal expansion. Coordinate installation with flashings and other components.

1. Install components required for a complete metal roof panel assembly including trim, copings, ridge closures, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.
2. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.

3.3 CLEANING

A. Remove temporary protective coverings and strippable films, if any, as metal roof panels are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of metal roof panel installation, clean finished surfaces as recommended by metal roof panel manufacturer. Maintain in a clean condition during construction.

END OF SECTION 07411

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Exposed-fastener, lap-seam metal wall panels.

1.2 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide metal wall panel assemblies capable of withstanding the effects the following loads and stresses within limits and under conditions indicated, based on testing according to ASTM E 1592:

1.3 ACTION SUBMITTALS

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

B. Shop Drawings: Show fabrication and installation layouts of metal wall panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details. First paragraph below assumes manufacturer's standard-size Samples are acceptable. Revise to suit Project.

1.4 INFORMATIONAL SUBMITTALS

A. Product test reports.

B. Warranties: Samples of special warranties.

C. Maintenance data.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An employer of workers trained and approved by manufacturer.

1.6 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal wall panel assemblies that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PANEL MATERIALS

A. Metallic-Coated Steel Sheet: Restricted flatness steel sheet metallic coated by the hot-dip process and prepainted by the coil-coating process to comply with ASTM A 755/A 755M.

1. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, G90 coating designation; structural quality.

2.2 MISCELLANEOUS METAL FRAMING

A. Miscellaneous Metal Framing, General: ASTM C 645, cold-formed metallic-coated steel sheet, hot-dip galvanized or coating with equivalent corrosion resistance unless otherwise indicated.

B. Hat-Shaped, Rigid Furring Channels:

1. Nominal Thickness: As indicated.

2.3 MISCELLANEOUS MATERIALS

A. Panel Fasteners: Self-tapping screws, bolts, nuts, self-locking rivets and bolts, end-welded studs, and other suitable fasteners designed to withstand design loads. Provide exposed fasteners with heads matching color of metal wall panels by means of plastic caps or factory-applied coating. Provide EPDM, PVC, or neoprene sealing washers.

2.4 EXPOSED-FASTENER, LAP-SEAM METAL WALL PANELS

A. Provide factory-formed metal wall panels designed to be field assembled by lapping side edges of adjacent panels and mechanically attaching panels to supports using exposed fasteners in side laps. Include accessories required for weathertight installation.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Kingspan R-Span 900 Series Insulated Metal Wall Panel or comparable product by one of the following:

a. AEP-Span.
b. Alcoa Architectural Products (USA).
c. Architectural Metal Systems.
d. ATAS International, Inc.
e. Berridge Manufacturing Company.
f. Butler Manufacturing Company
g. CENTRIA Architectural Systems.
h. Englert, Inc.
i. Fabral.
j. Flexospan Steel Buildings, Inc.
k. Industrial Building Panels.

l. MBCI; Div. of NCI Building Systems.
m. McElroy Metal, Inc.
n. Steelox Systems, L.L.C.
o. United Steel Deck, Inc.; Subsidiary of Bouras Industries Inc.

2.5 ACCESSORIES

A. Wall Panel Accessories: Provide components required for a complete metal wall panel assembly including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal wall panels, unless otherwise indicated.

1. Closures: Provide closures at eaves and rakes, fabricated of same metal as metal wall panels.
2. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.

B. Flashing and Trim: Provide flashing and trim as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, bases, drips, sills, jambs, corners, endwalls, framed openings, rakes, fasciae, parapet caps, soffits, reveals, and fillers. Finish flashing and trim with same finish system as adjacent metal wall panels.

2.6 FABRICATION

A. General: Fabricate and finish metal wall panels and accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.

B. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.

C. Fabricate metal wall panel joints with factory-installed captive gaskets or separator strips that provide a tight seal and prevent metal-to-metal contact, and that will minimize noise from movements within panel assembly.

D. Sheet Metal Accessories: Fabricate flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to the design, dimensions, metal, and other characteristics of item indicated.

PART 3 - EXECUTION

3.1 PREPARATION

A. Miscellaneous Framing: Install subgirts, base angles, sills, furring, and other miscellaneous wall panel support members and anchorages according to ASTM C 754 and metal wall panel manufacturer's written recommendations.

3.2 METAL WALL PANEL INSTALLATION

A. Lap-Seam Metal Wall Panels: Fasten metal wall panels to supports with fasteners at each lapped joint at location and spacing recommended by manufacturer.

1. Lap ribbed or fluted sheets one full rib corrugation. Apply panels and associated items for neat and weathertight enclosure. Avoid "panel creep" or application not true to line.
2. Provide metal-backed washers under heads of exposed fasteners bearing on weather side of metal wall panels.
3. Locate and space exposed fasteners in uniform vertical and horizontal alignment. Use proper tools to obtain controlled uniform compression for positive seal without rupture of washer.
4. Install screw fasteners with power tools having controlled torque adjusted to compress washer tightly without damage to washer, screw threads, or panels. Install screws in predrilled holes.
5. Provide sealant tape at lapped joints of metal wall panels and between panels and protruding equipment, vents, and accessories.
6. Apply a continuous ribbon of sealant tape to weather-side surface of fastenings on end laps; on side laps of nesting-type panels; on side laps of corrugated nesting-type, ribbed, or fluted panels; and elsewhere as needed to make panels weathertight.

3.3 ACCESSORY INSTALLATION

A. General: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.

1. Install components required for a complete metal wall panel assembly including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.

B. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.

3.4 CLEANING AND PROTECTION

A. Remove temporary protective coverings and strippable films, if any, as metal wall panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal wall panel installation, clean finished surfaces as recommended by metal wall panel manufacturer. Maintain in a clean condition during construction.

B. After metal wall panel installation, clear weep holes and drainage channels of obstructions, dirt, and sealant.

END OF SECTION 07421

SBS MODIFIED BITUMINOUS ROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes SBS-modified bituminous protected membrane roofing.

1.2 DEFINITIONS

A. Hot Roofing Asphalt: Roofing asphalt heated to its equiviscous temperature, the temperature at which its viscosity is 125 centipoise for mop-applied roofing asphalt and 75 centipoise for mechanical spreader-applied roofing asphalt, within a range of plus or minus 25 deg F, measured at the mop cart or mechanical spreader immediately before application.

1.3 PERFORMANCE REQUIREMENTS

A. Roofing System Design: Provide membrane roofing system that is identical to systems that have been successfully tested by a qualified testing and inspecting agency to resist uplift pressure calculated according to ASCE/SEI 7.

1. Corner Uplift Pressure: See Structural Drawings.
2. Perimeter Uplift Pressure: See Structural Drawings.
3. Field-of-Roof Uplift Pressure: See Structural Drawings.

1.4 ACTION SUBMITTALS

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

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by membrane roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's special warranty.

B. Source Limitations: Obtain components for membrane roofing system from same manufacturer as membrane roofing or approved by membrane roofing manufacturer.

C. Preinstallation Roofing Conference: Conduct conference at Project site.

1.7 WARRANTY

A. Special Warranty: Manufacturer's standard or customized form, without monetary limitation, in which manufacturer agrees to repair or replace components of membrane roofing system that fail in materials or workmanship within specified warranty period.

1. Warranty Period: 15 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SBS-MODIFIED ASPHALT-SHEET MATERIALS

A. SBS-Modified Bituminous Membrane Roofing:

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

a. Flex Membranes International.
b. GAF Materials Corporation.
c. Hickman, W. P. Systems, Inc.
d. Honeywell International Inc.
e. IKO.
f. Johns Manville.
g. Malarkey Roofing Products.
h. Siplast, Inc.
i. Soprema.
j. U.S. Intec; a division of BMCA.

B. Roofing Membrane Sheet: ASTM D 6164, Grade S, Type I or II, SBS-modified asphalt sheet (reinforced with polyester fabric; smooth surfaced; suitable for application method specified.

C. Granule-Surface Roofing Membrane Cap Sheet: ASTM D 6164, Grade G, Type II, SBS-modified asphalt sheet (reinforced with polyester fabric; granular surfaced; suitable for application method specified.

2.2 BASE-SHEET MATERIALS

A. Base Sheet: ASTM D 4601, Type II, nonperforated, asphalt-impregnated and -coated, glass-fiber sheet, dusted with fine mineral surfacing on both sides.

2.3 BASE-PLY SHEET MATERIALS

A. Glass-Fiber Base-Ply Sheet: ASTM D 2178, Type IV, asphalt-impregnated, glass-fiber felt.

2.4 BASE FLASHING SHEET MATERIALS

A. Backer Sheet: ASTM D 6164, Grade S, Type I or II, SBS-modified asphalt sheet (reinforced with polyester fabric; smooth surfaced; suitable for application method specified.

B. Granule-Surfaced Flashing Sheet: ASTM D 6164, Grade G, Type II, SBS-modified asphalt sheet (reinforced with polyester fabric; granular surfaced; suitable for application method specified, and as follows:

1. Granule Color: White.

2.5 AUXILIARY ROOFING MEMBRANE MATERIALS

A. General: Auxiliary materials recommended by roofing manufacturer for intended use and compatible with roofing membrane.

1. Liquid-type auxiliary materials shall comply with VOC limits of authorities having jurisdiction.

B. Asphalt Primer: ASTM D 41.

C. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required by roofing manufacturer for application.

D. Insulation Cant Strips: ASTM C 728, perlite insulation board.

PART 3 - EXECUTION

3.1 ROOFING MEMBRANE INSTALLATION, GENERAL

A. Install roofing membrane system according to roofing system manufacturer's written instructions and applicable recommendations in ARMA/NRCA's "Quality Control Guidelines for the Application of Polymer Modified Bitumen Roofing" and as follows:

1. Membrane: S (SBS).
2. Deck Type: C (concrete or nonnailable).
3. Adhering Method: M (mopped).
4. Base Sheet: One.
5. Number of Glass-Fiber Base-Ply Sheets: One.
6. Number of Modified Asphalt Sheets: Two.
7. Surfacing Type: P (protected).

B. Coordinate installing roofing system so components of the roofing membrane system not permanently exposed are not subjected to precipitation or left uncovered at the end of the workday or when rain is forecast.

C. Substrate-Joint Penetrations: Prevent roofing asphalt from penetrating substrate joints, entering building, or damaging roofing system components or adjacent building construction.

3.2 BASE-SHEET INSTALLATION

A. Install lapped base sheet course, extending sheet over and terminating beyond cants. Attach base sheet as follows:
   1. Adhere to substrate in a solid mopping of hot roofing asphalt.

3.3 BASE-PLY SHEET INSTALLATION

A. Install glass-fiber base-ply sheets according to roofing system manufacturer's written instructions starting at low point of roofing system. Align glass-fiber base-ply sheets without stretching. Extend glass-fiber base-ply sheets over and terminate beyond cants. Embed glass-fiber base-ply sheet in a continuous void-free mopping of hot roofing asphalt, to form a uniform membrane without glass-fiber base-ply sheets touching.

3.4 MODIFIED BITUMINOUS MEMBRANE INSTALLATION

A. Install modified bituminous roofing membrane sheet and cap sheet according to roofing manufacturer's written instructions, starting at low point of roofing system. Extend roofing membrane sheets over and terminate beyond cants.

B. Laps: Accurately align roofing membrane sheets, without stretching, and maintain uniform side and end laps. Stagger end laps. Completely bond and seal laps, leaving no voids.

   1. Repair tears and voids in laps and lapped seams not completely sealed.
   2. Apply roofing granules to cover exuded bead at laps while bead is hot.

C. Install roofing membrane sheets so side and end laps shed water.

3.5 FLASHING AND STRIPPING INSTALLATION

A. Install base flashing over cant strips and other sloping and vertical surfaces, at roof edges, and at penetrations through roof, and secure to substrates according to roofing system manufacturer's written instructions.

B. Extend base flashing up walls or parapets a minimum of 8 inches above roofing membrane and 4 inches onto field of roofing membrane.

C. Mechanically fasten top of base flashing securely at terminations and perimeter of roofing.

D. Install roofing membrane cap-sheet stripping where metal flanges and edgings are set on membrane roofing according to roofing system manufacturer's written instructions.

END OF SECTION 07552

SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Manufactured reglet
2. Formed roof drainage sheet metal fabrications.
3. Formed low-slope roof sheet metal fabrications.
4. Formed wall sheet metal fabrications.

1.2 SUBMITTALS

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

B. Shop Drawings: Show installation layouts of sheet metal flashing and trim, including plans, elevations, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled work.

1. Include details for forming, joining, supporting, and securing sheet metal flashing and trim, including pattern of seams, termination points, fixed points, expansion joints, expansion-joint covers, edge conditions, special conditions, and connections to adjoining work.

1.3 QUALITY ASSURANCE

A. Sheet Metal Flashing and Trim Standard: Comply with SMACNA's "Architectural Sheet Metal Manual" unless more stringent requirements are specified or shown on Drawings.

PART 2 - PRODUCTS

2.1 SHEET METALS

A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying a strippable, temporary protective film before shipping.

B. Aluminum Sheet: ASTM B 209 (ASTM B 209M), alloy as standard with manufacturer for finish required, with temper as required to suit forming operations and performance required.
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 Manufacturers full range of product.

2.2 UNDERLAYMENT MATERIALS

A. Polyethylene Sheet: 6-mil thick polyethylene sheet complying with ASTM D 4397.

B. Felt: ASTM D 226, Type II (No. 30), asphalt-saturated organic felt, nonperforated.

C. Slip Sheet: Building paper, 3-lb/100 sq. ft. minimum, rosin sized.

2.3 MISCELLANEOUS MATERIALS

A. General: Provide materials and types of fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and recommended by manufacturer of primary sheet metal 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.

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.
    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 Aluminum Sheet: Aluminum or Series 300 stainless steel.

C. Sealant Tape: Pressure-sensitive, 100 percent solids, gray 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 C 920, elastomeric polymer sealant; low modulus; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

E. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.

F. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D 1187.

2.4 REGLETS

A. Reglets: Units of type, material, and profile indicated, formed to provide secure interlocking of separate reglet and counterflashing pieces, and compatible with flashing indicated.

1. Material:Aluminum, 0.024 inch thick
2. Finish: Mill

2.5 FABRICATION, GENERAL

A. General: Custom fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, geometry, metal thickness, and other characteristics of item indicated. Fabricate items at the shop to greatest extent possible.

1. Obtain field measurements for accurate fit before shop fabrication.
2. Form sheet metal flashing and trim without excessive oil canning, buckling, and tool marks and true to line and levels indicated, with exposed edges folded back to form hems.
3. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces exposed to view.

B. Sealed Joints: Form nonexpansion but movable joints in metal to accommodate elastomeric sealant.

C. Expansion Provisions: Where lapped expansion provisions cannot be used, form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with butyl sealant concealed within joints.

D. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.

E. Seams: Fabricate nonmoving seams with flat-lock seams. Tin edges to be seamed, form seams, and solder.

F. Seams: 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. Downspouts: Fabricate rectangular downspouts complete with mitered elbows. Furnish with metal hangers, from same material as downspouts, and anchors.

1. Hanger Style: See drawings
2. Fabricate from the following materials:
   a. Aluminum: 0.024 inch thick.

B. Parapet Scuppers: Fabricate scuppers of dimensions required with closure flange trim to exterior, 4-inch wide wall flanges to interior, and base extending 4 inches beyond cant or tapered strip into field of roof. Fabricate from the following materials:
1. Aluminum: 0.032 inch thick.

2.7 LOW-SLOPE ROOF SHEET METAL FABRICATIONS

A. Roof-Edge Flashing: Fabricate in minimum 96-inch long, but not exceeding 10-foot long, sections. Furnish with 6-inch wide, joint cover plates. Fabricate from the following materials:
1. Aluminum: 0.050 inch thick.

B. Copings: Fabricate in minimum 96-inch long, but not exceeding 10-foot long, sections. Fabricate joint plates of same thickness as copings. Furnish with continuous cleats to support edge of external leg and interior leg. Miter corners, seal, and solder or weld watertight. Fabricate from the following materials:
   1. Aluminum: 0.050 inch thick.

PART 3 - EXECUTION

3.1 UNDERLAYMENT INSTALLATION

A. Polyethylene Sheet: Install polyethylene sheet with adhesive for anchorage. Apply in shingle fashion to shed water, with lapped and taped joints of not less than 2 inches.

B. Felt Underlayment: Install felt underlayment with adhesive for temporary anchorage. Apply in shingle fashion to shed water, with lapped joints of not less than 2 inches.

C. Self-Adhering Sheet Underlayment: Install self-adhering sheet underlayment, wrinkle free. Comply with temperature restrictions of underlayment manufacturer for installation; use primer rather than nails for installing underlayment at low temperatures. Apply in shingle fashion to shed water, with end laps of not less than 6 inches staggered 24 inches between courses. Overlap side edges not less than 3-1/2 inches. Roll laps with roller.

3.2 INSTALLATION, GENERAL

A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement so that completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight. Use fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.

   1. Install sheet metal flashing and trim true to line and levels indicated. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.
   2. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
   3. Space cleats not more than 12 inches apart. Anchor each cleat with two fasteners. Bend tabs over fasteners.
   4. Install exposed sheet metal flashing and trim without excessive oil canning, buckling, and tool marks.
   5. Torch cutting of sheet metal flashing and trim is not permitted.

B. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by SMACNA.

C. Seal joints as shown and as required for watertight construction.

3.3 ROOF DRAINAGE SYSTEM INSTALLATION

A. General: Install sheet metal roof drainage items to produce complete roof drainage system according to SMACNA recommendations and as indicated. Coordinate installation of roof perimeter flashing with installation of roof drainage system.

B. Downspouts: Join sections with 1-1/2-inch telescoping joints. Provide hangers with fasteners designed to hold downspouts securely to walls. Locate hangers at top and bottom and at approximately 60 inches o.c. in between.

3.4 ROOF FLASHING INSTALLATION

A. General: Install sheet metal flashing and trim to comply with performance requirements, sheet metal manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, set units true to line, and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.

B. Counterflashing: Coordinate installation of counterflashing with installation of base flashing. Insert counterflashing in reglets or receivers and fit tightly to base flashing. Extend counterflashing 4 inches over base flashing. Lap counterflashing joints a minimum of 4 inches and bed with sealant.

3.5 WALL FLASHING INSTALLATION

A. General: Install sheet metal wall flashing to intercept and exclude penetrating moisture according to SMACNA recommendations and as indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.

3.6 CLEANING AND PROTECTION

A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.

B. Clean and neutralize flux materials. Clean off excess solder and sealants.

C. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions.

END OF SECTION 07620

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Penetrations in fire-resistance-rated walls.
2. Penetrations in horizontal assemblies.

1.2 QUALITY ASSURANCE

A. Installer Qualifications: A firm that has been approved by FM Global according to FM Global 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 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. A/D Fire Protection Systems Inc.
2. Grace Construction Products.
3. Hilti, Inc.
4. Johns Manville.
5. Nelson Firestop Products.
6. NUCO Inc.
7. Passive Fire Protection Partners.
8. RectorSeal Corporation.
9. Specified Technologies Inc.
10. 3M Fire Protection Products.
11. Tremco, Inc.; Tremco Fire Protection Systems Group.
12. USG Corporation.

2.2 PENETRATION FIRESTOPPING

A. Provide penetration firestopping that is produced and installed to resist spread of fire according to requirements indicated, resist 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.

B. Penetrations in Fire-Resistance-Rated Walls: Ratings determined per ASTM E 814 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.

C. Penetrations in Horizontal Assemblies: Ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.

1. F-Rating: At least 1 hour, but not less than the fire-resistance rating of constructions penetrated.
2. T-Rating: At least 1 hour, but not less than the fire-resistance rating of constructions penetrated except for floor penetrations within the cavity of a wall.

D. Exposed Penetration Firestopping: Provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.

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 manufacturer and approved by qualified testing and inspecting agency for firestopping 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. Install penetration firestopping to comply with manufacturer's written installation instructions and published drawings for products and applications indicated.

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 indicated.

1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of firestopping.

D. Install fill materials for firestopping by proven techniques to produce the following results:

1. Fill voids and cavities formed by openings, forming materials, accessories, and penetrating items as required to achieve fire-resistance ratings indicated.
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. Identify penetration firestopping with preprinted metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches of firestopping edge so labels will be visible to anyone seeking to remove penetrating items or firestopping. 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. Where deficiencies are found or penetration firestopping is damaged or removed because of testing, repair or replace penetration firestopping to comply with requirements.

B. Proceed with enclosing penetration firestopping with other construction only after inspection reports are issued and installations comply with requirements.

END OF SECTION 07841

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes sealants for the following:
   1. Exterior joints in vertical surfaces and nontraffic horizontal surfaces.
   2. Interior joints in vertical surfaces and horizontal nontraffic surfaces.

1.2 SUBMITTALS

A. Product Data: For each joint sealant product indicated.

1.3 QUALITY ASSURANCE

A. Sealant Compatibility and Adhesion Testing: Use sealant manufacturer's standard test methods to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.

1.4 WARRANTY

A. Special Installer's Warranty: Written warranty in which Installer agrees to repair or replace elastomeric joint sealants that do not meet requirements specified in this Section or fail in adhesion within specified warranty period two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:
   1. Products: Subject to compliance with requirements, provide one of the products specified.

2.2 MATERIALS, GENERAL

A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.

B. Colors of Exposed Joint Sealants: As selected.

2.3 ELASTOMERIC JOINT SEALANTS

A. Multicomponent Nonsag Polysulfide Sealant:
   1. Products:
      a. Meadows, W. R, Inc.; cm-60.
      b. Pecora Corporation; GC-5 Synthacalk.
      c. Sonneborn Building Products Div., ChemRex Inc.; Two-Part Sealant.
   2. Type and Grade: M (multicomponent) and NS (nonsag).

3. Class: 25.
4. Exposure: Use T (traffic) and NT (nontraffic).
5. Substrates: Uses M, G, A, and, as applicable to joint substrates indicated, O.

B. Single-Component Nonsag Polysulfide Sealant:
1. Products:
   a. Meadows, W. R., Inc.; Deck-O-Seal One Step.
   b. Morton International, Inc.; Thiokol 1P.
   c. Pecora Corporation; GC-9 Synthacalk.
   d. Polymeric Systems, Inc.; PSI-7000.
2. Type and Grade: S (single component) and NS (nonsag).
3. Class: 25.
4. Exposure: Use NT (nontraffic).
5. Substrates: Uses M, G, A, and, as applicable to joint substrates indicated, O.

C. Low-Modulus Nonacid-Curing Silicone Sealant:
1. Products:
   a. Dow Corning; 790.
   b. Ohio Sealants, Inc.; VP 275.
   c. Pecora Corporation; 890.
   d. Polymeric Systems, Inc.; PSI-641.
   e. Sonneborn Building Products Div., ChemRex Inc.; Omniseal.
   f. Tremco; Spectrem 1.
2. Type and Grade: S (single component) and NS (nonsag).
3. Class: 25.
4. Additional Movement Capability: Capable of 100 percent movement in extension and 50 percent movement in compression when tested for adhesion and cohesion under maximum cyclic movement per ASTM C 719.
5. Exposure: Use NT (nontraffic).
6. Substrates: Uses M, G, A, and, as applicable to joint substrates indicated, O.
7. Nonstaining to porous substrates when testing per ASTM C 1248 for substrates indicated.

D. Medium-Modulus Neutral-Curing Silicone Sealant:
1. Products:
   a. Dow Corning; 795.
   b. NUCO Industries, Inc.; HiFlex 393.
   c. Polymeric Systems, Inc.; PSI-631.
2. Type and Grade: S (single component) and NS (nonsag).
3. Class: 25.
4. Exposure: Use NT (nontraffic).
5. Substrates: Uses M, G, A, and, as applicable to joint substrates indicated, O.
6. Nonstaining to porous substrates when testing per ASTM C 1248 for substrates indicated.

E. Mildew-Resistant Silicone Sealant:
1. Products:
   a. Dow Corning; 786 Mildew Resistant.
   b. GE Silicones; Sanitary 1700.
   c. NUCO Industries, Inc.; NuFlex 302.
   d. Pecora Corporation; 898 Silicone Sanitary Sealant.
   e. Polymeric Systems, Inc.; PSI-611.

f. Tremco; Tremsil 600 White.
2. Type and Grade: S (single component) and NS (nonsag).
3. Class: 25.
4. Exposure: Use NT (nontraffic).
5. Substrates: Uses G, A, and, as applicable to joint substrates indicated, O.

F. Multicomponent Nonsag Urethane Sealant:
1. For joints not subject to traffic and requiring additional movement capability, provide the following:
a. Products:
1) Mameco International; Vulkem 922.
2) Pecora Corporation; Dynatrol II.
3) Polymeric Systems, Inc.; Flexiprene 2000.
4) Sika Corporation; Sikaflex - 2c NS.
5) Tremco; DYmeric 511.
b. Type and Grade: M (multicomponent) and NS (nonsag).
c. Class: 25.
d. Additional Movement Capability: 50 percent movement in extension and 50 percent in compression when tested for adhesion and cohesion under maximum cyclic movement per ASTM C 719.
e. Exposure: Use NT (nontraffic).
f. Substrates: M, A, and, as applicable to joint substrates indicated, O.

G. Single-Component Nonsag Urethane Sealant:
1. For joints subject to traffic, provide the following:
a. Products:
1) Sika Corporation; Sikaflex - 1a.
2) Sonneborn Building Products Div., ChemRex Inc.; NP 1.
b. Type and Grade: S (single component) and NS (nonsag).
c. Class: 25.
2. Exposure: Use T (traffic) and NT (nontraffic).
3. Substrates: Uses M, A and as applicable to joint substrates indicated, O.
4. For joints not subject to traffic, provide the following:
a. Products:
1) Mameco International; Vulkem 921.
2) Ohio Sealants, Inc.; PR-255.
3) Pecora Corporation; Dynatrol I.
4) Schnee-Morehead, Inc.; SM7100 Permathane.
5) Tremco; DyMonic.
b. Type and Grade: S (single component) and NS (nonsag).
c. Class: 12-1/2 or 25.
d. Exposure: Use NT (nontraffic).
e. Substrates: Uses M, A, and, as applicable to joint substrates indicated, O.

H. Single-Component Pourable Urethane Sealant:
1. Products:
a. Bostik Inc.; Chem-Calk 950.
b. Pecora Corporation; NR-201.
c. Polymeric Systems, Inc.; Flexiprene PSI-951.
d. Sonneborn Building Products Div., ChemRex Inc.; SL 1.
2. Type and Grade: S (single component) and P (pourable).
3. Class: 25.

4. Exposure: Use T (traffic) and NT (nontraffic).
5. Substrates: Uses M, A, and, as applicable to joint substrates indicated, O.

2.4 LATEX JOINT SEALANTS

A. Latex Sealant: ASTM C 834.
1. Products:
a. Bostik Inc.; Chem-Calk 600.
b. NUCO Industries, Inc.; NuFlex 330.
c. Ohio Sealants, Inc.; LC 160 All Purpose Acrylic Caulk.
d. Pecora Corporation; AC-20.
e. Polymeric Systems, Inc.; PSI-701.
f. Sonneborn Building Products Div., ChemRex, Inc.; Sonolac.
g. Tremco; Tremflex 834.

2.5 JOINT-SEALANT BACKING

A. General: Provide sealant backings of material and type that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

B. Cylindrical Sealant Backings: ASTM C 1330, of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance:
1. Type: C, O, or B.

C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

2.6 MISCELLANEOUS MATERIALS

A. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants with joint substrates.

B. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants.
1. Remove foreign material from joint substrates that could interfere with adhesion of joint sealant.
2. Clean porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles

remaining from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air.
3. Remove laitance and form-release agents from concrete.
4. Clean nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues could interfere with adhesion of joint sealants.

B. Joint Priming: Prime joint substrates where recommended in writing by joint sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

D. Sealant Installation: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

E. Install sealant backings to support sealants during application and at position required to produce optimum sealant movement capability.
1. Do not leave gaps between ends of sealant backings.
2. Do not stretch, twist, puncture, or tear sealant backings.
3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.

F. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and back of joints.

G. Place sealants so they directly contact and fully wet joint substrates.
1. Completely fill recesses provided for each joint configuration.
2. Produce uniform, cross-sectional shapes and depths that allow optimum sealant movement capability.

H. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants to form smooth, uniform beads, to eliminate air pockets, and to ensure contact and adhesion of sealant with sides of joint.
1. Remove excess sealants from surfaces adjacent to joint.
2. Use tooling agents that are approved by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
3. Joint Configuration: Concave joint configuration per Figure 5A in ASTM C 1193, unless otherwise indicated.

I. Clean excess sealants or sealant smears adjacent to joints as installation progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

END OF SECTION 07920

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. Standard hollow metal doors and frames.
2. Ballistic resistant hollow metal doors and frames.

B. Related Sections:

1. Division 04 Section "Unit Masonry" for embedding anchors for hollow metal work into masonry construction.
2. Division 08 Section Door Hardware for door hardware for hollow metal doors and frames.
3. Division 09 Sections "Exterior Painting" and "Interior Painting" for field painting hollow metal doors and frames.

C. References:

1. ANSI/SDI A250.8 (2003) - Recommended Specifications for Standard Steel Doors and Frames.
2. ANSI/SDI A250.4 (2001) -Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames, Frames Anchors and Hardware Reinforcing.
3. ANSI/SDI A250.6 (1997) - Recommended Practice for Hardware Reinforcing on Standard Steel Doors and Frames.
4. ANSI/SDI A250.10 (1998) - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames.
5. ANSI/SDI A250.11 (2001) - Recommended Erection Instructions for Steel Frames.
6. ANSI/SDI A250.13 (2003) –Testing and Rating of Severe Windstorm Resistant Components.
7. SDI 115 (1993) - Recommended Specifications for Steel Doors and Frames for Hardware Preparation.
8. SDI 122 (1998) - Installation and Troubleshooting Guide for Standard Steel Doors and Frames.
9. SDI 124 (1998) - Maintenance of Standard Steel Doors and Frames.
10. ASTM A1008 (2003) - Standard Specification for Steel Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
11. ASTM A568 (2003) - Standard Specification for General Requirements for Steel Sheet, Carbon, and High -Strength, Low-Alloy, Hot-Rolled and Cold-Rolled.
12. ASTM A653 (2002) - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

13. ASTM A924 (1999) - Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.
14. ASTM E 90 (1990) - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.
15. ASTM E 283 (1991) - Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
16. ASTM E 330 – 02 – Test method for Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
17. ASTM E 331 (1996) - Standard Test Method for Water Penetration of Exterior Windows, Curtain Walls and Doors by Uniform Static Air Pressure Differences.
18. ASTM E 1886 - 02 - Test method for Structural Performance of Exterior Windows, Curtain Walls, Doors, and Storm Shutters Impacted by Missile(s) and Exposed to Cyclic Pressure Differentials.
19. ASTM E 1996 – 02 - Test method for Structural Performance of Exterior Windows, Curtain Walls, Doors, and Storm Shutters Impacted by Windborne Debris in Hurricanes.
20. ASTM F 476 – 96 – Standard Test Methods for Security of Swinging Door Assemblies.
21. ANSI/NFPA 101 (2000) - Life Safety Code.
22. FBC-TPHVHZ – 04 - Florida Building Code, Test Portocals for High Velocity Hurricane Zone, TAS-201, TAS-202, TAS-203.
23. UL 752 Ballistic Satandards.
24. Door and Hardware Institute (DHI) (1992) - Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames.
25. International Building Code (2003).

1.3 DEFINITIONS

A. Minimum Thickness: Minimum thickness of base metal without coatings.

B. Standard Hollow Metal Work: Hollow metal work fabricated according to ANSI/SDI A250.8.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, core descriptions, hardware reinforcements, profiles, anchors, fire-resistance rating, temperature-rise ratings, and finishes.

B. Shop Drawings: Include the following:

1. Elevations of each door design.
2. Details of doors, including vertical and horizontal edge details and metal thicknesses.
3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
4. Locations of reinforcement and preparations for hardware.
5. Details of each different wall opening condition.
6. Details of anchorages, joints, field splices, and connections.
7. Details of accessories.
8. Details of moldings, removable stops, and glazing.
9. Details of electrical knockout boxes and preparations for power, signal, and control systems.

10. Product approval numbers for all exterior openings.

C. Samples for Verification:

1. Samples are only required by request of the architect and for manufactures that are not current members of Steel Door Institute.
2. For each type of exposed finish required, prepared on Samples of not less than 3 by 5 inches (75 by 125 mm).
3. For the following items, prepared on Samples about 12 by 12 inches (305 by 305 mm) to demonstrate compliance with requirements for quality of materials and construction:

   a. Doors: Show vertical-edge, top, and bottom construction; core construction; and hinge and other applied hardware reinforcement. Include separate section showing glazing if applicable.
   b. Frames: Show profile, corner joint, floor and wall anchors, and silencers. Include separate section showing fixed hollow metal panels and glazing if applicable.

D. Other Action Submittals:

1. Schedule: Provide a schedule of hollow metal work prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with door hardware schedule.

2. Ballistic Safety Compliance: The manufacturer of the ballistic resistant door and frame assembly shall submit the independent test report from an accredited licensed agency. The test report information must specify compliance with the protection level specified under section 2.4.A.2 below.

1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain hollow metal work from single source from single manufacturer.

B. Windstorm rated openings within affected costal states to show approval documentation and labels on both doors and frames showing compliance to the standards adopted by the state. The products that are being used must bear a label showing the standards tested, design pressure, the manufacturer name, and label number.

C. Ballistic Test Requirements: Door/frame assemblies shall be tested and must meet the level of protection specified in section 2.4.A.2 below by an independent laboratory to applicable ASTM F1233, NIJ and UL752 Standards where ballistic resistance is required.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver hollow metal work palletized, wrapped, or crated to provide protection during transit and Project-site storage. Do not use non-vented plastic.

B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.

C. Store hollow metal work under cover at Project site. Place in stacks of five units maximum in a vertical position with heads up, spaced by blocking, on minimum 4-inch- (102-mm-) high wood blocking. Do not store in a manner that traps excess humidity.

1. Provide minimum 1/4-inch (6-mm) space between each stacked door to permit air circulation. Doors and frames to be stacked in vertical upright position.

1.7 PROJECT CONDITIONS

A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

1.8 COORDINATION

A. Coordinate installation of anchorages for hollow metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Amweld Building Products, LLC.
2. Ceco Door Products; an Assa Abloy Group company.
3. Curries Company; an Assa Abloy Group company.
4. Fleming-Baron Door Products Ltd.; an Assa Abloy Group company.
5. Steelcraft; an Ingersoll-Rand company.
6. No Substitution: Material from custom hollow metal fabricators will not be accepted on jobsite unless prior approval is given in accordance with substitution request requirements.

2.2 MATERIALS

A. Cold-Rolled Steel Sheets: Carbon steel complying with ASTM A 366 (ASTM A 366M), commercial quality, or ASTM A 620 (ASTM A 620M), drawing quality, special killed.

B. Metallic-Coated Steel Sheet: Hot dipped zinc-coated (galvanized) or zinc-iron alloy coated (galvannealed) carbon steel complying with ASTM A 653 (ASTM A 653M), Commercial Steel (CS), Type B; with an A60 (ASTM A 525M, with Z-180 or ZF 180) coating designation, mill phosphphatized.

C. Frame Anchors: ASTM A 591/A 591M, Commercial Steel (CS), 40Z (12G) coating designation; mill phosphatized.

1. For anchors built into exterior walls, steel sheet complying with ASTM A 1008/A 1008M or ASTM A 1011/A 1011M, hot-dip galvanized according to ASTM A 153/A 153M, Class B.

D. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.

E. Glazing: Comply with requirements in Division 08 Section "Glazing."

2.3 STANDARD HOLLOW METAL DOORS

A. General: Provide 1 3/4" thick doors of design indicated, fabricated with smooth surfaces, without visible joints or seams on exposed faces unless otherwise indicated. Comply with ANSI/SDI A250.8.

1. Design: Flush panel
2. Core Construction: Manufacturer's standard polystyrene, polyurethane, polyisocyanurate, mineral-board, or vertical steel-stiffener core.
   a. Thermal-Rated (Insulated) Doors: Where indicated, provide doors fabricated with thermal-rated assemblies with R Factor 11 or better.

      1) Locations: Exterior doors.

3. Vertical Edges for Single-Acting Doors: Beveled edge

   a. Beveled Edge: 1/8 inch in 2 inches (3 mm in 50 mm).

4. Vertical Edges for Double-Acting Doors: Round vertical edges with 2-1/8-inch (54-mm) radius.
5. Top and Bottom Edges: Closed with flush or inverted 0.042-inch- (1.0-mm-) thick, end closures or channels of same material as face sheets.
6. Tolerances: Comply with SDI 117, "Manufacturing Tolerances for Standard Steel Doors and Frames."

B. Exterior Doors: Face sheets fabricated from metallic-coated steel sheets. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:

1. Level 3 and Physical Performance Level A (Extra Heavy Duty), (0.053-inch - 1.3-mm-) thick steel, Model 2 (Seamless face and edges).

C. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 with reinforcing plates from same material as door face sheets.

D. Fabricate concealed stiffeners and hardware reinforcement from either cold- or hot-rolled steel sheet.

2.4 BALLISTIC RESISTANT HOLLOW METAL DOORS

A. General
1. 1-3/4 inch (44.5mm) thick doors shall be 737 series as manufactured by CURRIES Company, Mason City, Iowa or approved equal as listed within this specification.
2. Doors shall be tested and meet UL752 HPSA level 2 (High Power Small Arms) rating.
3. Face sheets fabricated from metallic-coated steel sheets.

B. Doors designated as 1-3/4 inches (44.5 mm) thick minimum on door schedule shall have 14 gage (1.9 mm) steel face sheets.
1. Core Construction: Polystyrene or vertical steel stiffener.
2. Doors shall have 14 gage (1.9 mm) continuous lock channel and 12 gage (2.6 mm) continuous hinge channel reinforcings.
   a. Channels shall provide structural strength and rigidity for the door.
   b. Channels shall have integral extruded pad reinforcing for hinges and lock.
   c. Each channel shall be welded to inverted 16 gage (1.4 mm) top and bottom channels.
3. Tops of doors shall be closed flush with 16 gage (1.4 mm) channel welded into inverted 16 gage (1.4 mm) top channel

2.5 STANDARD HOLLOW METAL FRAMES

A. General: Comply with ANSI/SDI A250.8 and with details indicated for type and profile.

B. Exterior Frames: Fabricated from metallic-coated steel sheets.

1. Fabricate frames with mitered or coped corners.
2. Fabricate frames as face welded joints and back weld joints continuously, unless otherwise indicated.
3. Frames for Level 3 Steel Doors: 0.067-inch- (1.7-mm-) thick steel sheet.

C. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 Table 4 with reinforcement plates from same material as frames.

2.6 STANDARD FRAME ANCHORS

A. Jamb Anchors:

1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, not less than 0.042 inch (1.0 mm) thick, with corrugated or perforated straps not less than 2 inches (50 mm) wide by 10 inches (250 mm) long; or wire anchors not less than 0.177 inch (4.5 mm) thick.
2. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch (1.0 mm) thick.

B. Floor Anchors: Formed from same material as frames, not less than 0.042 inch (1.0 mm) thick, and as follows:

1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.
2. Separate Topping Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.

2.7 BALLISTIC RESISTANT HOLLOW METAL FRAMES

A. Frames to be as manufactured by CURRIES Company, Mason City, Iowa or approved equal as listed within this specification.

B. All frames to pass performance criteria established by test standards called for within this specification.

C. Frames shall be fabricated from 12 gage (2.6 mm) metallic coated steel.

D. Three (3) sided door frame corners coped or mitered and continuously welded, full profile of frame, finished smooth and re-primed.

E. Frames shall be mortised, reinforced, drilled and tapped for all finish hardware. Include grout covers at backs of all mortised preparations.

F. Prepare frames for push-in type silencers.

G. Glazed openings shall be complete with removable stops. Glazing bead shall be fully installed with drilled and tapped mounting holes.

H. Pre-treat frames prior to priming at factory by washing, phosphatizing and using chromic seal. Primer shall be baked on.

I. Provide temporary shipping bars to help protect frames from damage during transit and handling. Remove temporary shipping bars before setting frames.

J. All welds on frames, transoms and sidelites shall be flush with neatly mitered or butted material cuts. Where butt joints occur, face weld adjoining members, finish smooth and re-prime.

2.8 SECURITY FRAME ANCHORS

A. Wall anchors for frame attachment to masonry construction: Masonry anchors, adjustable, flat, corrugated or perforated “T” shaped anchors with leg not less than 2 inches (50.8 mm) wide by 10 inches (254 mm) long or masonry “wire” type anchors not less than 3/16 inch (5 mm) diameter.

B. Frame anchors shall be 14 gage (1.9 mm) minimum for both base and jamb anchors.

C. All frame jamb anchors shall be provided; one each jamb per 30 inches (762 mm) of frame height or fraction thereof.

D. Floor anchors: Angle clip type.
1. 14 gage (1.9 mm) minimum.

2. Fasten to floor with 2 fasteners per jamb.
3. Weld anchors to bottom of each jamb.

E. In place masonry or concrete:
1. 3/8 inch (9.5 mm) countersunk flat head stove bolt and expansion shield.
2. Weld pipe spacers or other type of spacers per manufacturer's standard design in back of frame soffit to protect frame profile during tightening of bolts and anchors.

2.9 STOPS AND MOLDINGS

A. Moldings for Glazed Lites in Doors: Minimum 0.032 inch (0.8 mm) thick, fabricated from same material as door face sheet in which they are installed.

B. Fixed Frame Moldings: Formed integral with hollow metal frames, a minimum of 5/8 inch (16 mm) high unless otherwise indicated.

C. Loose Stops for Glazed Lites in Frames: Minimum 0.032 inch (0.8 mm) thick, fabricated from same material as frames in which they are installed.

2.10 ACCESSORIES

A. Mullions and Transom Bars: Join to adjacent members by welding or rigid mechanical anchors.

B. Grout Guards: Formed from same material as frames, not less than 0.016 inches (0.4 mm) thick.

2.11 FABRICATION

A. Fabricate hollow metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.

B. Tolerances: Fabricate hollow metal work to tolerances indicated in ANSI/SDI A250.8

C. Hollow Metal Doors:

1. Exterior Doors:

a. Provide weep-hole openings in bottom of exterior doors to permit moisture to escape. Top of door to be flush and sealed joints in top edges of doors against water penetration.
b. Provide Polyurethane core.

2. Glazed Lites: Factory cut openings in doors with applied flush trim to fit.
3. Continuous Hinge Reinforcement: Provide welded continuous 12 gauge strap for continuous hinges specified in hardware sets in Division 8 Door Hardware.

4. Electrical Raceways: Provide raceways for electrified door hardware specified in hardware sets in Division 8 Door Hardware.

D. Hollow Metal Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.

1. Welded Frames: Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible. Continuously backweld joints at exterior frames.
2. Sidelight and Transom Bar Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.
3. Equal Rabbet Frames: Provide frames with equal rabbet dimensions unless glazing and removable stops required wider dimension on glass side of frame.
4. High Frequency Hinge Reinforcement: Provide high frequency hinge reinforcements at door openings 48-inch and wider with mortise/butt type hinges at top hinge location.
5. Continuous Hinge Reinforcement: Provide welded continuous 12 gauge strap for continuous hinges specified in hardware sets in Division 8 Door Hardware.
6. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated for removable stops, provide security screws at exterior locations.
7. Grout Guards: Weld guards boxes to frame at back of hardware mortises in frames at all hinge and strike preps regardless of grouting requirements.
8. Electrical Knock Out Boxes: Factory weld 18 gauge electrical knock out boxes to frame for electrical hardware preps; includes but not limited to electric thru wire hinges, electrical raceways, door position switches, electric strikes, and magnetic locks as noted in door hardware sets in Division 8 Door Hardware.

    a. Electrical knock out boxes are required at door position switches, electric strikes, and middle hinge locations for all exterior locations regardless of electrical hardware specified in Division 8 Door Hardware.
    b. Provide electrical knock out boxes with a dual 1/2-inch and 3/4-inch knockouts.
    c. Conduit to be coordinated and installed in field from middle hinge box and strike box to door position box.
    d. Electrical knock out boxes to comply with NFPA requirements and fit electrical door hardware as specified in hardware sets in Division 8 Door Hardware.
    e. Electrical knock out boxes for continuous hinges should be located in the center of the vertical dimension on the hinge jamb.

9. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.
10. Jamb Anchors: Provide number and spacing of anchors as follows:

    a. Masonry Type: Locate anchors not more than 18 inches (457 mm) from top and bottom of frame. Space anchors not more than 32 inches (813 mm) o.c. and as follows:

        1) Two anchors per jamb up to 60 inches (1524 mm) high.
        2) Three anchors per jamb from 60 to 90 inches (1524 to 2286 mm) high.
        3) Four anchors per jamb from 90 to 120 inches (2286 to 3048 mm) high.

4) Four anchors per jamb plus 1 additional anchor per jamb for each 24 inches (610 mm) or fraction thereof above 120 inches (3048 mm) high.

b. Stud-Wall Type: Locate anchors not more than 18 inches (457 mm) from top and bottom of frame. Space anchors not more than 32 inches (813 mm) o.c. and as follows:

1) Three anchors per jamb up to 60 inches (1524 mm) high.
2) Four anchors per jamb from 60 to 90 inches (1524 to 2286 mm) high.
3) Five anchors per jamb from 90 to 96 inches (2286 to 2438 mm) high.
4) Five anchors per jamb plus 1 additional anchor per jamb for each 24 inches (610 mm) or fraction thereof above 96 inches (2438 mm) high.
5) Two anchors per head for frames above 42 inches (1066 mm) wide and mounted in metal-stud partitions.

11. Door Silencers: Except on weather-stripped or gasketed doors, drill stops to receive door silencers as follows. Keep holes clear during construction. Silencers to be supplied by frame manufacture regardless if specified in division 8 Door Hardware.

a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.

E. Fabricate concealed stiffeners, edge channels, and hardware reinforcement from either cold- or hot-rolled steel sheet.

F. Hardware Preparation: Factory prepare hollow metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to the Door Hardware Schedule and templates furnished as specified in Division 08 Section "Door Hardware."

1. Locate hardware as indicated, or if not indicated, according to ANSI/SDI A250.8.
2. Reinforce doors and frames to receive non-templated, mortised and surface-mounted door hardware.
3. Comply with applicable requirements in ANSI/SDI A250.6 and ANSI/DHI A115 Series specifications for preparation of hollow metal work for hardware.
4. Coordinate locations of conduit and wiring boxes for electrical connections with Division 26 Sections.

G. Stops and Moldings: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with butted or mitered hairline joints at fabricators shop

1. Single Glazed Lites: Provide fixed stops and moldings welded on secure side of hollow metal work.
2. Multiple Glazed Lites: Provide fixed and removable stops and moldings so that glazed lites are capable of being removed independently.
3. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames.
4. Coordinate rabbet width between fixed and removable stops with type of glazing and type of installation indicated.
5. Gap for butted or mitered joints in glass stop should not exceed .0625-inch.

2.12 STEEL FINISHES

A. Prime Finish: Apply manufacturer's standard primer immediately after cleaning and pretreating.

1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with ANSI/SDI A250.10 acceptance criteria; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roughing-in for embedded and built-in anchors to verify actual locations before frame installation.

C. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.

B. Prior to installation, adjust and securely brace welded hollow metal frames for squareness, alignment, twist, and plumbness to the following tolerances:

1. Squareness: Plus or minus 1/16 inch (1.6 mm), measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
2. Alignment: Plus or minus 1/16 inch (1.6 mm), measured at jambs on a horizontal line parallel to plane of wall.
3. Twist: Plus or minus 1/16 inch (1.6 mm), measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
4. Plumbness: Plus or minus 1/16 inch (1.6 mm), measured at jambs on a perpendicular line from head to floor.

C. Drill and tap doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.

3.3 INSTALLATION

A. General: Install hollow metal work plumb, rigid, properly aligned, and securely fastened in place; comply with Drawings and manufacturer's written instructions.

B. Hollow Metal Frames: Install hollow metal frames of size and profile indicated. Comply with ANSI/SDI A250.11. Set all security hollow metal frames in accordance with HMMA 862-87 (Installation Instructions section).

1. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.
   a. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
   b. Install frames with removable glazing stops located on secure side of opening.
   c. Install door silencers in frames before grouting.
   d. Remove temporary braces necessary for installation only after frames have been properly set and secured.
   e. Check plumbness, squareness, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
   f. Field apply bituminous coating to backs of frames that are filled with grout containing antifreezing agents.

2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with post installed expansion anchors.

   a. Floor anchors may be set with powder-actuated fasteners instead of post installed expansion anchors if so indicated and approved on Shop Drawings.

3. Metal-Stud Partitions: Solidly pack mineral-fiber insulation behind frames.
4. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout.
5. Concrete Walls: Solidly fill space between frames and concrete with grout. Take precautions, including bracing frames, to ensure that frames are not deformed or damaged by grout forces.
6. Field Supplied Ceiling Struts: Extend struts vertically from top of frame at each jamb to overhead structural supports or substrates above frame unless frame is anchored to masonry or to other structural support at each jamb. Bend top of struts to provide flush contact for securing to supporting construction. Provide adjustable wedged or bolted anchorage to frame jamb members.
7. Grouting Requirements:

   a. Do not grout head of frames unless reinforcing has been installed in head of frame.
   b. Do not grout vertical or horizontal closed mullion members.

8. Installation Tolerances: Adjust hollow metal door frames for squareness, alignment, twist, and plumb to the following tolerances:

   a. Squareness: Plus or minus 1/16 inch (1.6 mm), measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.

b. Alignment: Plus or minus 1/16 inch (1.6 mm), measured at jambs on a horizontal line parallel to plane of wall.
c. Twist: Plus or minus 1/16 inch (1.6 mm), measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
d. Plumbness: Plus or minus 1/16 inch (1.6 mm), measured at jambs at floor.

C. Hollow Metal Doors: Fit hollow metal doors accurately in frames, within clearances specified below. Shim as necessary.

1. Non-Fire-Rated Standard Steel Doors:

a. Jambs and Head: 1/8 inch (3 mm) plus or minus 1/16 inch (1.6 mm).
b. Between Edges of Pairs of Doors: 1/8 inch (3 mm) plus or minus 1/16 inch (1.6 mm).
c. Between Bottom of Door and Top of Threshold: Maximum 3/8 inch (9.5 mm).
d. Between Bottom of Door and Top of Finish Floor (No Threshold): Maximum 3/4 inch (19 mm).

2. Smoke-Control Doors: Install doors according to NFPA 105.

D. Glazing: Comply with installation requirements in Division 08 Section "Glazing" and with hollow metal manufacturer's written instructions.

1. Secure stops with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches (230 mm) o.c. and not more than 2 inches (50 mm) o.c. from each corner.

a. Secure exterior removable stops with security head screws.

3.4 ADJUSTING AND CLEANING

A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow metal work that is warped, bowed, or otherwise unacceptable.

B. Remove grout and other bonding material from hollow metal work immediately after installation.

C. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.

D. Metallic-Coated Surfaces: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.

END OF SECTION 08110

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Service doors.

1.2 PERFORMANCE REQUIREMENTS

A. Structural Performance, Exterior Doors: Exterior overhead coiling doors shall withstand the wind loads, the effects of gravity loads, and loads and stresses within limits and under conditions indicated according to SEI/ASCE 7

1. Wind Loads: As indicated on Drawings

B. Windborne-Debris-Impact-Resistance Performance: Provide impact-protective overhead coiling doors that pass missile-impact and cyclic-pressure tests when tested.

1.3 SUBMITTALS

A. Product Data: For each type and size of overhead coiling door and accessory.

B. Shop Drawings: For each installation and for special components not dimensioned or detailed in manufacturer's product data. Include plans, elevations, sections, details, and attachments to other work.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for both installation and maintenance of units required for this Project.

PART 2 - PRODUCTS

2.1 DOOR CURTAIN MATERIALS AND CONSTRUCTION

A. Door Curtains: Fabricate overhead coiling-door curtain of interlocking metal slats, designed to withstand wind loading indicated, in a continuous length for width of door without splices. Unless otherwise indicated, provide slats of thickness and mechanical properties recommended by door manufacturer for performance, size, and type of door indicated, and as follows:
1. Insulation: Fill slats for insulated doors with manufacturer's standard thermal insulation complying with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, according to ASTM E 84. Enclose insulation completely within slat faces.

B. Bottom Bar for Service Doors: Consisting of two angles, each not less than 1-1/2 by 1-1/2 by 1/8 inch thick; fabricated from metal to match curtain slats and finish.

C. Curtain Jamb Guides: Manufacturer's standard angles or channels and angles of same material and finish as curtain slats unless otherwise indicated, with sufficient depth and strength to retain curtain, to allow curtain to operate smoothly, and to withstand loading. Slot bolt holes for guide adjustment. Provide removable stops on guides to prevent overtravel of curtain.

2.2 HOOD

A. General: Form sheet metal hood to entirely enclose coiled curtain and operating mechanism at opening head. Contour to fit end brackets to which hood is attached. Roll and reinforce top and bottom edges for stiffness. Form closed ends for surface-mounted hoods and fascia for any portion of between-jamb mounting that projects beyond wall face. Equip hood with intermediate support brackets as required to prevent sagging.

2.3 LOCKING DEVICES

A. Slide Bolt: Fabricate with side-locking bolts to engage through slots in tracks for locking by padlock, located on both left and right jamb sides, operable from coil side.

B. Locking Device Assembly: Fabricate with cylinder lock, spring-loaded dead bolt, operating handle, cam plate, and adjustable locking bars to engage through slots in tracks.

C. Chain Lock Keeper: Suitable for padlock.

2.4 COUNTERBALANCING MECHANISM

A. General: Counterbalance doors by means of manufacturer's standard mechanism with an adjustable-tension, steel helical torsion spring mounted around a steel shaft and contained in a spring barrel connected to top of curtain with barrel rings. Use grease-sealed bearings or self-lubricating graphite bearings for rotating members.

B. Brackets: Manufacturer's standard mounting brackets of either cast iron or cold-rolled steel plate.

2.5 MANUAL DOOR OPERATORS

A. Equip door with manufacturer's recommended manual door operator unless another type of door operator is indicated.

B. Chain-Hoist Operator: Consisting of endless steel hand chain, chain-pocket wheel and guard, and gear-reduction unit with a maximum 25 lbf force for door operation. Provide alloy-steel hand chain with chain holder secured to operator guide.
   1. Start, accelerate, and operate door in either direction from any position, at a speed not less than 8 in./sec. and not more than 12 in./sec., without exceeding nameplate ratings or service factor.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install overhead coiling doors and operating equipment complete with necessary hardware, anchors, inserts, hangers, and equipment supports; according to manufacturer's written instructions and as specified.

B. Adjust hardware and moving parts to function smoothly so that doors operate easily, free of warp, twist, or distortion. Lubricate bearings and sliding parts as recommended by manufacturer. Adjust seals to provide weathertight fit around entire perimeter.

3.2 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain overhead coiling doors.

END OF SECTION 08332

ALUMINUM WINDOWS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes fixed aluminum-framed windows.

1.2 PERFORMANCE REQUIREMENTS

A. General: Provide aluminum windows capable of complying with performance requirements indicated, based on testing manufacturer's windows that are representative of those specified, and that are of minimum test size required by AAMA/WDMA 101/I.S.2/NAFS.

B. Structural Performance: Provide aluminum windows capable of withstanding the effects of the following loads, based on testing units representative of those indicated for Project that pass AAMA/WDMA 101/I.S.2/NAFS, Uniform Load Structural Test:

1. Design Wind Loads: See Drawings for wind speed, pressures and exposure classification.

C. Windborne-Debris Resistance: Provide glazed windows capable of resisting impact from windborne debris, based on the pass/fail criteria as determined from testing glazed windows.

D. Thermal Movements: Provide aluminum windows, including anchorage, that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of aluminum window indicated.

B. Shop Drawings: Include plans, elevations, sections, details, hardware, attachments to other work, operational clearances, and installation details

C. Product Schedule: Use same designations indicated on Drawings.

1.4 INFORMATIONAL SUBMITTALS

A. Product test reports.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.6 QUALITY ASSURANCE

A. Installer: A qualified installer, approved by manufacturer to install manufacturer's products.

B. Glazing Publications: Comply with published recommendations of glass manufacturers and with GANA's "Glazing Manual" unless more stringent requirements are indicated.

1.7 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace aluminum windows that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Failure to meet performance requirements.
b. Structural failures including excessive deflection, water leakage, air infiltration, or condensation.
c. Deterioration of metals, other materials, and metal finishes beyond normal weathering.
d. Failure of insulating glass.

2. Warranty Period:

a. Window: Two years from date of Substantial Completion.
b. Glazing: Five years from date of Substantial Completion.
c. Metal Finish: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. DeSCo Windows.
2. EFCO Corporation.
3. Kawneer; an Alcoa Company.
4. Peerless Products Inc.
5. Thermal Windows, Inc.
6. TRACO.
7. YKK AP America Inc.

2.2 WINDOW

A. Window Type: Fixed

B. Comply with AAMA/WDMA 101/I.S.2/NAFS.

1. Performance Class: C
2. Performance Grade: See Structural Design Pressures
3. U-Factor: 0.60 Btu/sq. ft. x h x deg F (3.4 W/sq. m x K) or less.

2.3 GLAZING

A. Glass and Glazing Materials: Refer to Division 08 Section "Glazing" for glass units and glazing requirements applicable to glazed aluminum window units.

2.4 FABRICATION

A. Fabricate aluminum windows that are reglazable without dismantling sash or ventilator framing.

B. Weather Stripping: Provide full-perimeter weather stripping for each operable sash and ventilator.

C. Weep Holes: Provide weep holes and internal passages to conduct infiltrating water to exterior.

D. Provide water-shed members above side-hinged ventilators and similar lines of natural water penetration.

E. Mullions: Provide mullions and cover plates as shown, matching window units, complete with anchors for support to structure and installation of window units. Allow for erection tolerances and provide for movement of window units due to thermal expansion and building deflections, as indicated. Provide mullions and cover plates capable of withstanding design loads of window units.

F. Subframes: Provide subframes with anchors for window units as shown, of profile and dimensions indicated but not less than 0.062-inch- (1.6-mm-) thick extruded aluminum. Miter or cope corners, and weld and dress smooth with concealed mechanical joint fasteners. Finish to match window units. Provide subframes capable of withstanding design loads of window units.

G. Glazing Stops: Provide snap-on glazing stops coordinated with Division 08 Section "Glazing" and glazing system indicated. Provide glazing stops to match sash and ventilator frames.

2.5 ALUMINUM FINISHES

A. Aluminum Anodic Finish: Class II, clear anodic coating complying with AAMA 611

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with Drawings, Shop Drawings, and manufacturer's written instructions for installing windows, hardware, accessories, and other components.

B. Install windows level, plumb, square, true to line, without distortion or impeding thermal movement, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction.

C. Set sill members in bed of sealant or with gaskets, as indicated, for weathertight construction.

D. Install windows and components to drain condensation, water penetrating joints, and moisture migrating within windows to the exterior.

E. Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials.

F. Clean aluminum surfaces immediately after installing windows. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.

G. Clean factory-glazed glass immediately after installing windows. Comply with manufacturer's written recommendations for final cleaning and maintenance. Remove nonpermanent labels, and clean surfaces.

H. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.

END OF SECTION 08511

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 items known commercially as finish or door hardware that are required for swing, sliding, and folding doors, except special types of unique hardware specified in the same sections as the doors and door frames on which they are to be installed.

B. This Section includes the following:
1. Hinges.
2. Key control systems.
3. Lock cylinders and keys.
4. Lock and latch sets.
5. Bolts.
6. Push/pull units.
7. Closers.
8. Overhead holders.
9. Protection plates.
10. Weatherstripping for exterior doors.
11. Astragals or meeting seals on pairs of doors.
12. Thresholds.

C. Related Sections: The following Sections contain requirements that relate to this Section:
1. Division 6 Section “Interior Architectural Woodwork”.
2. Division 8 Section “Standard Steel Doors and Frames”.

1.3 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification sections.

B. Product data including manufacturer’s technical product data for each item of door hardware, installation instructions, maintenance of operating parts and finish, and other information necessary to show compliance with requirements.

C. Final hardware schedule coordinated with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
1. Final Hardware Schedule Content: Based on hardware indicated, organize schedule into “hardware sets” indicating complete designations of every item required for each door or opening. Include the following information:
a. Type, style, function, size, and finish of each hardware item.
b. Name and manufacturer of each item.
c. Fastenings and other pertinent information.
d. Location of each hardware set cross referenced to indications on Drawings, both on floor plans and in door and frame schedule.
e. Explanation of all abbreviations, symbols, and codes contained in schedule.
f. Mounting locations for hardware.
g. Door and frame sizes and materials.
h. Keying information.

2. Submittal Sequence: Submit final schedule at earliest possible date, particularly where acceptance of hardware schedule must precede fabrication of other work that is critical in the Project construction schedule. Include with schedule the product data, samples, shop drawings of other work affected by door hardware, and other information essential to the coordinated review of schedule.
3. Keying Schedule: Submit separate detailed schedule indicating clearly how the Owner's final instructions on keying of locks has been fulfilled.

D. Submit samples of each type of exposed hardware unit as required in finish indicated and tagged with full description for coordination with schedule. Submit samples prior to submission of final hardware schedule.
1. Samples will be returned to the supplier. Units that are acceptable and remain undamaged through submittal, review, and field comparison process may, after final check of operation, be incorporated in the Work, within limitations of keying coordination requirements.

E. Templates for doors, frames, and other work specified to be factory prepared for the installation of door hardware. Check shop drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

1.4 QUALITY ASSURANCE

A. Single Source Responsibility: Obtain each type of hardware (latch and lock sets, hinges, closers, etc.) from a single manufacturer.

B. Supplier Qualifications: A recognized architectural door hardware supplier, with warehousing facilities in the Project's vicinity, that has a record of successful in-service performance for supplying door hardware similar in quantity, type, and quality to that indicated for this Project and that employs an experienced architectural hardware consultant (AHC) who is available to Owner, Architect, and Contractor, at reasonable times during the course of the Work, for consultation.
1. Require supplier to meet with Owner to finalize keying requirements and to obtain final instructions in writing.

C. Fire-Rated Openings: Provide door hardware for fire-rated openings that complies with NFPA Standard No. 80 and requirements of authorities having jurisdiction. Provide only items of door hardware that are listed and are identical to products tested by UL, Warnock Hersey, FM, or other testing and inspecting organization acceptable to authorities having jurisdiction for use on types and sizes of doors indicated in compliance with requirements of fire-rated door and door frame labels. All fire seals required for fire rated wood doors shall be furnished by the door manufacturer or supplier.

D. Exterior Openings: All doors, frames and hardware for exterior openings shall be tested and approved for use at the required wind loads for this project. Copies of current valid Florida State or Metro-Dade County product approvals shall be furnished as proof of compliance with this requirement.

1.5 PRODUCT HANDLING

A. Tag each item or package separately with identification related to final hardware schedule, and include basic installation instructions with each item or package.

B. Packaging of door hardware is responsibility of supplier. As material is received by hardware supplier from various manufacturers, sort and repackage in containers clearly marked with appropriate hardware set number to match set numbers of approved hardware schedule. Two

or more identical sets may be packed in same container.

C. Inventory door hardware jointly with representatives of hardware supplier and hardware installer until each is satisfied that count is correct.

D. Deliver individually packaged door hardware items promptly to place of installation (shop or Project site).

E. Provide secure lock-up for door hardware delivered to the Project, but not yet installed. Control handling and installation of hardware items that are not immediately replaceable so that completion of the Work will not be delayed by hardware losses both before and after installation.

1.6 MAINTENANCE

A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Butts and Hinges:
      a. Bommer Industries, Inc.
      b. Hager Hinge Co.
      c. McKinney Products Co, an ASSA ABLOY Group Company.
   2. Key Control System
      a. Telkee Inc.
      b. Alladin
      c. Lund Equipment Company, Inc.
      d. MMF Industries
   3. Cylinders and Locks:
      a. Corbin Russwin Architectural Hardware, an ASSA ABLOY Group Company. ML2000 series, NSA trim, 630 finish.
      b. Sargent Manufacturing Company, an ASSA ABLOY Group Company. 8200 series, LNL trim, US32D finish.
      c. Schlage IR Security and Safety. L9000 series, 06A trim, 630 finish.
      d. Yale Commercial Locks and Hardware, an ASSA ABLOY Group Company. 8800FL series, AUR trim, US32D finish.
   4. Bolts
      a. Sargent Manufacturing Company, an ASSA ABLOY Group Company.
      b. McKinney Products Co, an ASSA ABLOY Group Company.
      c. Rockwood Manufacturing.
      d. Triangle Brass Manufacturing Company (TRIMCO).
   5. Overhead Closers:
      a. Corbin Russwin Architectural Hardware, an ASSA ABLOY Group Company. DC6000 series.
      b. LCN, IR Security and Safety. 4040 series.
      c. Norton Door Controls, an ASSA ABLOY Group Company. 7700 series.
      d. Sargent Manufacturing Company, an ASSA ABLOY Group Company. 351 series.

e. Yale Commercial Locks and Hardware, an ASSA ABLOY Group Company. 4400 series.

6. Door Control Devices:
   a. Baldwin Hardware Corp.
   b. McKinney Products Co, an ASSA ABLOY Group Company.
   c. Rixson Specialty Door Controls, an ASSA ABLOY Group Company.
   d. Rockwood Manufacturing.
   e. Triangle Brass Manufacturing Company (Trimco).
7. Kick, Mop, and Armor Plates:
   a. Baldwin Hardware Corp.
   b. McKinney Products Co, an ASSA ABLOY Group Company.
   c. Hiawatha, Inc.
   d. Rockwood Manufacturing.
   e. Triangle Brass Manufacturing Company (Trimco).
8. Door Stripping and Seals:
   a. National Guard Products, Inc.
   b. Pemko Manufacturing Co., Inc.
   c. Reese Enterprises, Inc.
   d. McKinney Products Co, an ASSA ABLOY Group Company.
   e. Zero International, Inc.
9. Thresholds:
   a. National Guard Products, Inc.
   b. Pemko Manufacturing Co., Inc.
   c. Reese Enterprises Inc.
   d. McKinney Products Co, an ASSA ABLOY Group Company.
   e. Zero International, Inc.
10. Astragals:
    a. National Guard Products, Inc.
    b. Pemko Manufacturing Co. Inc.
    c. Reese Enterprises, Inc.
    d. McKinney Products Co, an ASSA ABLOY Group Company.
    e. Zero International, Inc.

2.2 SCHEDULED HARDWARE

2.3 Requirements for design, grade, function, finish, size, and other distinctive qualities of each type of finish hardware are indicated in the “Hardware Schedule” at the end of this Section. Products are identified by using hardware designation numbers of the following:

1. Manufacturer’s Product Designations: The product designation and name of one manufacturer are listed for each hardware type required for the purpose of establishing minimum requirements. Provide either the product designated or, where more than one manufacturer is specified under the Article “Manufacturers” in Part 2 for each hardware type, the comparable product of one of the other manufacturers that complies with requirements.
2. ANSI/BHMA designations used elsewhere in this Section or in schedules to describe hardware items or to define quality or function are derived from the following standards. Provide products complying with these standards and requirements specified elsewhere in this Section.
   a. Butts and Hinges: ANSI/BHMA A156.1-06.
   b. Bored and Preassembled Locks and Latches: ANSI/BHMA A156.2-03.

c. Exit Devices: ANSI/BHMA A156.3-01.
d. Door Controls - Closers: ANSI/BHMA A156.4-00.
e. Auxiliary Locks and Associated Products: ANSI/BHMA A156.5-01.
f. Architectural Door Trim: ANSI/BHMA A156.6-05.
g. Template Hinge Dimensions: ANSI/BHMA A156.7-03.
h. Door Controls - Overhead Stops and Holders: ANSI/BHMA A156.8-05.
i. Interconnected Locks and Latches: ANSI/BHMA A156.12-05.
j. Mortise Locks and Latches Series 1000: ANSI/BHMA A156.13-05.
k. Sliding and Folding Door Hardware: ANSI/BHMA A156.14-07.
l. Release Devises – Closer Holder, Electromagnetic and Electromechanical: ANSI/BHMA A156.15-06.
m. Auxiliary Hardware: ANSI/BHMA A156.16-02.
n. Self-Closing Hinges and Pivots: ANSI/BHMA A156.17-04.
o. Recommended Practices for Materials and Finishes: ANSI/BHMA A156.18-06.
p. Power Assist and Low Energy Operated Doors: ANSI/BHMA A156.19-07.
q. Strap and Tee Hinges and Hasps: ANSI/BHMA A156.20-06.
r. Thresholds: ANSI/BHMA A156.21-06.
s. Door Gasketing and Edge Seal Systems: ANSI/BHMA A156.22-05.
t. Electromagnetic Locks: ANSI/BHMA A156.23-04.
u. Delayed Egress Locking Systems: ANSI/BHMA A156.24-03.
v. Electrified Locking Devices: ANSI/BHMA A156.25-02.
w. Continuous Hinges: ANSI/BHMA A156.27-06.
x. Recommended Practices for Keying Systems: ANSI/BHMA A156.28.07.
y. Exit Locks, Exit Locks with Exit Alarms, Exit Alarms, Alarms for Exit Devices: ANSI/BHMA A156.29-07.
z. High Security Cylinders: ANSI/BHMA A156.30-03.
aa. Electric Strikes and Frame Mounted actuators: ANSI/BHMA A156.31-07.

2.4 MATERIALS AND FABRICATION

A. Manufacturer's Name Plate: Do not use manufacturers' products that have manufacturer's name or trade name displayed in a visible location (omit removable nameplates) except in conjunction with required fire-rated labels and as otherwise acceptable to Architect.
   1. Manufacturer's identification will be permitted on rim of lock cylinders only.

B. Base Metals: Produce hardware units of basic metal and forming method indicated using manufacturer's standard metal alloy, composition, temper, and hardness, but in no case of lesser (commercially recognized) quality than specified for applicable hardware units for finish designations indicated.

C. Fasteners: Provide hardware manufactured to conform to published templates, generally prepared for machine screw installation. Do not provide hardware that has been prepared for self-tapping sheet metal screws, except as specifically indicated.

D. Furnish screws for installation with each hardware item. Provide Phillips flat-head screws except as otherwise indicated. Finish exposed (exposed under any condition) screws to match hardware finish or, if exposed in surfaces of other work, to match finish of this other work as closely as possible including "prepared for paint" surfaces to receive painted finish.

E. Provide concealed fasteners for hardware units that are exposed when door is closed except to the extent no standard units of type specified are available with concealed fasteners. Do not use thru-bolts for installation where bolt head or nut on opposite face is exposed in other

work unless their use is the only means of reinforcing the work adequately to fasten the hardware securely. Where thru-bolts are used as a means of reinforcing the work, provide sleeves for each thru-bolt or use sex screw fasteners.

2.5 HINGES, BUTTS, AND PIVOTS

A. Templates: Except for hinges and pivots to be installed entirely (both leaves) into wood doors and frames, provide only template-produced units.

B. Screws: Provide Phillips flat-head screws complying with the following requirements:
   1. For metal doors and frames install machine screws into drilled and tapped holes.
   2. For wood doors and frames install wood screws.
   3. For fire-rated wood doors install#12 x 1-1/4-inch, threaded-to-the-head steel wood screws.
   4. Finish screw heads to match surface of hinges or pivots.

C. Hinge Pins: Except as otherwise indicated, provide hinge pins as follows:
   1. Out-Swing Exterior Doors: Non-removable pins.
   2. Out-Swing Corridor Doors with Locks: Non-removable pins.
   3. Interior Doors: Non-rising pins.
   4. Tips: Flat button and matching plug, finished to match leaves, except where hospital tip (HT) is indicated.

D. Number of Hinges: Provide number of hinges indicated but not less than 3 hinges per door leaf for doors 90 inches or less in height and one additional hinge for each 30 inches of additional height.
   1. Fire-Rated Doors: Not less than 3 hinges per door leaf for doors 86 inches or less in height with same rule for additional hinges.

2.6 LOCK CYLINDERS AND KEYING

A. Standard System: Except as otherwise indicated, provide new masterkey system for Project.

B. Equip locks with manufacturer's special 6-pin tumbler cylinder with construction masterkey feature that permits voiding of construction keys without cylinder removal.

C. Metals: Construct lock cylinder parts from brass or bronze, stainless steel, or nickel silver.

D. Comply with Owner's instructions for masterkeying and, except as otherwise indicated, provide individual change key for each lock that is not designated to be keyed alike with a group of related locks.
   1. Permanently inscribe each key with number of lock that identifies cylinder manufacturer's key symbol, and notation, "DO NOT DUPLICATE".

E. Key Material: Provide keys of nickel silver only.

F. Key Quantity: Furnish 3 change keys for each lock, 5 master keys for each master system, and 5 grandmaster keys for each grandmaster system.
   1. Furnish one extra blank for each lock.
   2. Furnish ten construction Keys.
   3. Deliver all permanent keys to Owner.

2.7 KEY CONTROL SYSTEM

A. Provide a key control system including envelopes, labels, tags with self-locking key clips, receipt forms, 3-way visible card index, temporary markers, permanent markers, and standard

metal cabinet, all as recommended by system manufacturer, with capacity for 150 percent of the number of locks required for the Project.

1. Provide hinged-panel type cabinet for wall mounting.

2.8 LOCKS, LATCHES, AND BOLTS

A. Strikes: Provide manufacturer's standard wrought box strike for each latch or lock bolt, with curved lip extended to protect frame, finished to match hardware set, unless otherwise indicated.
   1. Provide flat lip strikes for locks with 3-piece, anti-friction latchbolts as recommended by manufacturer.
   2. Provide extra long strike lips for locks used on frames with applied wood casing trim.
   3. Provide recess type top strikes for bolts locking into frame heads, unless otherwise indicated.
   4. Provide dust-proof strikes for foot bolts, except where special threshold construction provides non-recessed strike for bolt.
   5. Provide roller type strikes where recommended by manufacturer of the latch and lock units.
   6. Provide standard (open) strike plates for interior doors of residential units where wood door frames are used.

B. Lock Throw: Provide 5/8-inch minimum throw of latch on pairs of doors. Comply with UL requirements for throw of bolts and latch bolts on rated fire openings.
   1. Provide 1/2-inch minimum throw of latch for other bored and pre-assembled types of locks and 3/4-inch minimum throw of latch for mortise locks. Provide 1-inch minimum throw for all dead bolts.

2.9 CLOSERS AND DOOR CONTROL DEVICES

A. Size of Units: Except as otherwise specifically indicated, furnish units that are adjustable through a range of sizes (1 – 6).
   1. Provide parallel arms for all overhead closers, except as otherwise indicated.

B. Access-Free Manual Closers: Where manual closers are indicated for doors required to be accessible to the physically handicapped, provide adjustable units complying with ANSI A117.1 provisions for door opening force and delayed action closing.

C. Provide black resilient parts for exposed bumpers.

2.10 DOOR TRIM UNITS

A. Fasteners: Provide manufacturer's standard exposed fasteners for door trim units consisting of either machine screws or self-tapping screws.

B. Fabricate protection plates not more than 2 inches less than door width on hinge side and not more than 2 inch less than door width on pull side by height indicated.
   1. Metal Plates: Stainless steel, 0.050 inch(U.S. 18 gage).

2.11 WEATHERSTRIPPING AND SEALS

A. General: Provide continuous weatherstripping on exterior doors and smoke, light, or sound seals on interior doors where indicated or scheduled. Provide non-corrosive fasteners for exterior applications and elsewhere as indicated.

B. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strip is easily replaceable and readily available from stocks maintained by manufacturer.

2.12 THRESHOLDS

A. General: Except as otherwise indicated, provide standard metal threshold unit of type, size, and profile as shown or scheduled.

2.13 HARDWARE FINISHES

A. Match items to the manufacturer's standard color and texture finish for the latch and lock sets (or push-pull units if no latch or lock sets).

B. Provide finishes that match those established by BHMA or, if none established, match the Architect's sample.

C. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware.

D. Provide protective lacquer coating on all exposed hardware finishes of brass, bronze, and aluminum, except as otherwise indicated. The suffix A-NL@ is used with standard finish designations to indicate "no lacquer".

E. The designations used in schedules and elsewhere to indicate hardware finishes are those listed in ANSI/BHMA A156.18, "Materials and Finishes", including coordination with the traditional U.S. finishes shown by certain manufacturers for their products.

F. The designations used in schedules and elsewhere to indicate hardware finishes are the industry-recognized standard commercial finishes, except as otherwise noted.
   1. Rust-Resistant Finish: For iron and steel base metal required for exterior work and in areas shown as "High Humidity" areas (and also when designed with the suffix-RR), provide 0.2-mil-thick copper coating on base metal before applying brass, bronze, nickel, or chromium plated finishes.

PART 3 EXECUTION

3.1 INSTALLATION

A. Mount hardware units at heights indicated in following applicable publications, except as specifically indicated or required to comply with governing regulations and except as otherwise directed by Architect.
   1. "Recommended Locations for Builders Hardware for Standard Steel Doors and Frames" by the Door and Hardware Institute.
   2. WDMA Industry Standard I.S.1.7, "Hardware Locations for Wood Flush Doors".

B. Install each hardware item in compliance with the manufacturer's instructions and recommendations. Where cutting and fitting is required to install hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation or application of surface protection with finishing work specified in the Division 9 Sections. Do not install surface-mounted items until finishes have been completed on the substrates involved.

C. Set units level, plumb, and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.

D. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors in accordance with industry standards.

E. Set thresholds for exterior doors in full bed of butyl-rubber or polyisobutylene mastic sealant complying with requirements specified in Division 7 Section "Joint Sealers".

F. Weatherstripping and Seals: Comply with manufacturer's instructions and recommendations to the extent installation requirements are not otherwise indicated.

3.2 ADJUSTING, CLEANING, AND DEMONSTRATING

A. Adjust and check each operating item of hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate freely and smoothly or as intended for the application made.
   1. Where door hardware is installed more than one month prior to acceptance or occupancy of a space or area, return to the installation during the week prior to acceptance or occupancy and make final check and adjustment of all hardware items in such space or area. Clean operating items as necessary to restore proper function and finish of hardware and doors. Adjust door control devices to compensate for final operation of heating and ventilating equipment.

B. Clean adjacent surfaces soiled by hardware installation.

C. Instruct Owner's personnel in the proper adjustment and maintenance of door hardware and hardware finishes.

D. Six-Month Adjustment: Approximately six months after the date of Substantial Completion, the Installer, accompanied by representatives of the manufacturers of latchsets and locksets and of door control devices, and of other major hardware suppliers, shall return to the Project to perform the following work:
   1. Examine and re-adjust each item of door hardware as necessary to restore function of doors and hardware to comply with specified requirements.
   2. Consult with and instruct Owner's personnel in recommended additions to the maintenance procedures.
   3. Replace hardware items that have deteriorated or failed due to faulty design, materials, or installation of hardware units.
   4. Prepare a written report of current and predictable problems (of substantial nature) in the performance of the hardware.

3.3 HARDWARE SCHEDULE

A. General: Provide hardware for each door to comply with requirements of Section "Door Hardware", hardware set numbers indicated in door schedule, and in the following schedule of hardware sets.
   1. Hardware sets indicate quantity, item, manufacturer and product designation, size, and finish or color, as applicable.

Hardware Sets

SET #1.00

Doors: 100A, 110B, 110C, 116A

3	Hinges	TA2314 4 1/2 X 4 1/2 NRP	32D	MC
1	Lockset	ML2067 NSA	630	CR
1	Closer	DC6210 A11	689	CR
1	Kick Plate	K1050 10" x 34"	US32D	RO
1	Head / jamb seals	S88 D 17'		PE
1	Door Bottom	345 AV 36"		PE

1	Threshold	2005 AV 36"		PE
1	Rain Drip	347 A 40"		PE
1	Drip Seal	68 AR 36"		PE

SET #2.00

Doors: 103A

6	Hinges	TA2314 4 1/2 X 4 1/2 NRP	32D	MC
2	Surface Bolt Kit	988CR		CR
1	Lockset	ML2059 NSA	630	CR
2	Overhead Holder	9-316	630	RX
1	Head / jamb seals	S88 D 20'		PE
1	Split astragal	303 ASTST 84"		PE
2	Door Bottom	345 AV 36"		PE
1	Threshold	2005 AV 72"		PE
1	Rain Drip	347 A 76"		PE
1	Drip Seal	68 AR 36"		PE

SET #3.00

Doors: 105A

3	Hinges	TA2314 4 1/2 X 4 1/2	32D	MC
1	Passage Set	ML2010 NSA	630	CR
1	Overhead Holder	9-316	630	RX
3	Door Silencers	608	GREY	RO

SET #4.00

Doors: 111A, 117A

3	Hinges	TA2314 4 1/2 X 4 1/2 NRP	32D	MC
1	Lockset	ML2059 NSA	630	CR
1	Closer	DC6210 A11	689	CR
1	Kick Plate	K1050 10" x 34"	US32D	RO
1	Head / jamb seals	S88 D 17'		PE
1	Door Bottom	345 AV 36"		PE
1	Threshold	2005 AV 36"		PE
1	Rain Drip	347 A 40"		PE
1	Drip Seal	68 AR 36"		PE

SET #5.00

Doors: 112A, 113A

3	Hinges	TA2314 4 1/2 X 4 1/2 NRP	32D	MC
1	Lockset	ML2072 NSA	630	CR
1	Closer	DC6210 A11	689	CR
1	Kick Plate	K1050 10" x 34"	US32D	RO
1	Head / jamb seals	S88 D 17'		PE
1	Threshold	2005 AV 36"		PE

SET #5.01

Doors: 118A, 118B, 119A, 119B

3	Hinges	TA2314 4 1/2 X 4 1/2 NRP	32D	MC
1	Lockset	ML2072 NSA	630	CR
1	Closer	DC6210 A11	689	CR
1	Kick Plate	K1050 10" x 34"	US32D	RO
1	Head / jamb seals	S88 D 17'		PE
1	Door Bottom	345 AV 36"		PE
1	Threshold	2005 AV 36"		PE
1	Rain Drip	347 A 40"		PE
1	Drip Seal	68 AR 36"		PE

SET #6.00

Doors: 110A, 111B, 114A, 114B

NOTE: All hardware by door mfgr

Manufacturer List

Code	Name
CR	Corbin Russwin
MC	McKinney
PE	Pemko
RO	Rockwood
RX	Rixson

END OF SECTION

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes glazing for the following products and applications, including those specified in other Sections where glazing requirements are specified by reference to this Section:

1. Windows.

1.2 PERFORMANCE REQUIREMENTS

A. General: Provide glazing systems capable of withstanding normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, and installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.

B. Glass Design: Glass thickness designations indicated are minimums and are for detailing only. Confirm glass thicknesses by analyzing Project loads and in-service conditions. Provide glass lites in the thickness designations indicated for various size openings, but not less than thicknesses and in strengths (annealed or heat treated) required to meet or exceed the following criteria:

1. Glass Thicknesses: Select minimum glass thicknesses to comply with ASTM E 1300, according to the following requirements:

a. Specified Design Wind Loads: As indicated.

C. Thermal Movements: Provide glazing that allows for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures acting on glass framing members and glazing components. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1.3 SUBMITTALS

A. Product Data: For each glass product and glazing material indicated.

1.4 WARRANTY

A. Manufacturer's Special Warranty on Laminated Glass: Manufacturer's standard form, made out to Owner and signed by laminated-glass manufacturer agreeing to replace laminated-glass units that deteriorate as defined in "Definitions" Article, f.o.b. the nearest shipping point to Project site, within specified warranty period indicated below.

1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products specified.
2. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.

2.2 GLASS PRODUCTS

A. Annealed Float Glass: ASTM C 1036, Type I (transparent flat glass), Quality-Q3; of class indicated.

1. Ultra-Clear (Low-Iron) Float Glass: Class I (clear); with a minimum 91 percent visible light transmission and a minimum solar heat gain coefficient of 0.87.

a. Available Products:

1) AFG Industries Inc.; Krystal Klear.
2) Pilkington Building Products North America; Optiwhite.
3) PPG Industries, Inc.; Starphire.

B. Heat-Treated Float Glass: ASTM C 1048; Type I (transparent flat glass); Quality-Q3; of class, kind, and condition indicated.

1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed, unless otherwise indicated.
2. Provide Kind HS (heat-strengthened) float glass in place of annealed float glass where needed to resist thermal stresses induced by differential shading of individual glass lites and to comply with glass design requirements specified in Part 1 "Performance Requirements" Article.
3. For uncoated glass, comply with requirements for Condition A.
4. For coated vision glass, comply with requirements for Condition C (other uncoated glass).
5. Provide Kind FT (fully tempered) float glass in place of annealed or Kind HS (heat-strengthened) float glass where safety glass is indicated.

C. Laminated Glass: ASTM C 1172, and complying with other requirements specified and with the following:

1. Interlayer: Polyvinyl butyral or cured resin of thickness indicated with a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after laminating glass lites and installation.

2.3 INSULATING GLASS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. AFG Industries, Inc.
2. Guardian Industries
3. Pilkington Building Products
4. PPG Industries

B. Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified according to ASTM E 2190, and complying with other requirements specified.

1. Sealing System: Dual seal.
2. Spacer: Manufacturer's standard spacer material and construction

2.4 MISCELLANEOUS GLAZING MATERIALS

A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.

B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.

C. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).

2.5 FABRICATION OF GLAZING UNITS

A. Fabricate glazing units in sizes required to glaze openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.

PART 3 - EXECUTION

3.1 GLAZING

A. General: Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.

1. Glazing channel dimensions, as indicated on Drawings, provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances. Adjust as required by Project conditions during installation.
2. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction sealant-substrate testing.

3. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
4. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
5. Provide spacers for glass lites where length plus width is larger than 50 inches.

3.2 CLEANING AND PROTECTION

A. Protect exterior glass from damage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels, and clean surfaces. Protect glass from contact with contaminating substances resulting from construction operations, including weld splatter. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended by glass manufacturer.

B. Remove and replace glass that is broken, chipped, cracked, or abraded or that is damaged from natural causes, accidents, and vandalism, during construction period.

END OF SECTION 08800

NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes non-load-bearing steel framing members for the following applications:

1. Interior framing systems (e.g., supports for partition walls, framed soffits, furring, etc.).
2. Interior suspension systems (e.g., supports for ceilings, suspended soffits, etc.).

1.2 SUBMITTALS

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

1.3 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate non-load-bearing steel framing, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.

B. Sound Transmission Characteristics: For STC-rated assemblies that incorporate non-load-bearing steel framing, 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.

PART 2 - PRODUCTS

2.1 NON-LOAD-BEARING STEEL FRAMING, GENERAL

A. Recycled Content of Steel Products: Provide products with average recycled content of steel products such that postconsumer recycled content plus one-half of preconsumer recycled content is not less than 25 percent.

B. Framing Members, General: Comply with ASTM C 754 for conditions indicated.

1. Steel Sheet Components: Comply with ASTM C 645 requirements for metal, unless otherwise indicated.

2.2 STEEL FRAMING FOR FRAMED ASSEMBLIES

A. Steel Studs and Runners: ASTM C 645.

1. Minimum Base-Metal Thickness: As indicated on Drawings

B. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.

1. Minimum Base-Metal Thickness: As indicated on Drawings

C. Hat-Shaped, Rigid Furring Channels: ASTM C 645.

1. Minimum Base Metal Thickness: As indicated on Drawings
2. Depth: As indicated on Drawings

D. Resilient Furring Channels: 1/2-inch deep, steel sheet members designed to reduce sound transmission.

2.3 AUXILIARY MATERIALS

A. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Installation Standard: ASTM C 754.

1. Gypsum Plaster Assemblies: Also comply with requirements in ASTM C 841 that apply to framing installation.
2. Portland Cement Plaster Assemblies: Also comply with requirements in ASTM C 1063 that apply to framing installation.
3. Gypsum Board Assemblies: Also comply with requirements in ASTM C 840 that apply to framing installation.

3.2 INSTALLING FRAMED ASSEMBLIES

A. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.

B. Install tracks (runners) at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings, except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts penetrating partitions above ceiling.
1. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.
2. Fire-Resistance-Rated Partitions: Install framing to comply with fire-resistance-rated assembly indicated and support closures and to make partitions continuous from floor to underside of solid structure.
3. Sound-Rated Partitions: Install framing to comply with sound-rated assembly indicated.

END OF SECTION 09221

PORTLAND CEMENT PLASTERING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
1. Exterior portland cement plasterwork (stucco) on unit masonry and monolithic concrete.

1.2 SUBMITTALS

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

1.3 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: For portland cement plaster assemblies with fire-resistance ratings, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.

B. Mockups: Before plastering, install mockups of at least 100 sq. ft. in surface area to demonstrate aesthetic effects and set quality standards for materials and execution.

1.4 PROJECT CONDITIONS

A. Comply with ASTM C 926 requirements.

B. Exterior Plasterwork: Apply plaster when ambient temperature is greater than 40 deg F.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products specified.

2.2 NONSTRUCTURAL STEEL FRAMING MEMBERS, GENERAL

A. Components, General: Comply with ASTM C 1063. For steel sheet components not included in ASTM C 1063, comply with ASTM C 645 requirements for metal, unless otherwise indicated.

2.3 ACCESSORIES

A. General: Comply with ASTM C 1063 and coordinate depth of trim and accessories with thicknesses and number of plaster coats required.

B. Plastic Trim: Fabricated from high-impact PVC.

1. Cornerbeads: With perforated flanges.

a. Small-nose style; use unless otherwise indicated.

2. Casing Beads: With perforated flanges in depth required to suit plaster bases indicated and flange length required to suit applications indicated.

a. Square-edge style; use unless otherwise indicated.

3. Control Joints: One-piece-type, folded pair of unperforated screeds in M-shaped configuration; with perforated flanges and removable protective tape on plaster face of control joint.
4. Expansion Joints: Two-piece type, formed to produce slip-joint and square-edged ½ inch wide reveal; with perforated concealed flanges.

2.4 MISCELLANEOUS MATERIALS

A. Water for Mixing: Potable and free of substances capable of affecting plaster set or of damaging plaster, lath, or accessories.

B. Bonding Compound: ASTM C 932.

C. Steel Drill Screws: For metal-to-metal fastening, ASTM C 1002 or ASTM C 954, as required by thickness of metal being fastened; with pan head that is suitable for application; in lengths required to achieve penetration through joined materials of not fewer than three exposed threads.

D. Fasteners for Attaching Metal Lath to Substrates: Complying with ASTM C 1063.

2.5 PLASTER MATERIALS

A. Portland Cement: ASTM C 15

1. Color for Finish Coats: Gray.

B. Lime: ASTM C 206, Type S; or ASTM C 207, Type S.

C. Ready-Mixed Finish-Coat Plaster: Mill-mixed portland cement, aggregates, coloring agents, and proprietary ingredients.

1. Available Products:

a. California Stucco Products Corp.; Conventional Portland Cement Stucco.

b. ChemRex; Thoro Stucco.
c. Florida Stucco Corp
d. Highland Stucco & Lime Products, Inc
e. United States Gypsum Co.; Oriental Exterior Finish Stucco.

2.6 PLASTER MIXES

A. General: Comply with ASTM C 926 for applications indicated.

B. Portland Cement Base-Coat Mixes:

1. Over Monolithic Concrete: Single base coats for two-coat plasterwork as follows:

a. For cementitious material, mix 1 part portland cement and 0 to 3/4 part lime. Use 2-1/2 to 4 parts aggregate per part of cementitious material (sum of separate volumes of each component material).

2. Over Concrete Unit Masonry: Single base coats for two-coat plasterwork as follows:

a. For cementitious material, mix 1 part portland cement and 3/4 to 1-1/2 parts lime. Use 2-1/2 to 4 parts aggregate per part of cementitious material (sum of separate volumes of each component material).

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect adjacent work from soiling, spattering, moisture deterioration, and other harmful effects caused by plastering.

B. Prepare solid-plaster bases that are smooth or that do not have the suction capability required to bond with plaster according to ASTM C 926.

3.2 INSTALLING NONSTRUCTURAL STEEL FRAMING, GENERAL

A. General: Comply with requirements in ASTM C 1063 for applications indicated.

B. Install supplementary framing, blocking, and bracing at terminations in plaster assemblies to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.

C. Isolate steel framing from building structure to prevent transfer of loading imposed by structural movement.

D. Do not bridge building control and expansion joints with steel framing or furring members. Frame both sides of joints independently.

E. Soffits: Unless otherwise detailed on Drawings, install furred or suspended soffits to comply with requirements for ceiling installation; install framed soffits to comply with requirements for partition installation.

3.3 INSTALLING ACCESSORIES

A. Install according to ASTM C 1063 and at locations indicated on Drawings.

B. Control Joints: Install control joints at locations indicated on Drawings.

1. As required to delineate plasterwork into areas (panels) of the following maximum sizes:

a. Vertical Surfaces: 144 sq. ft.
b. Horizontal and other Nonvertical Surfaces: 100 sq. ft.

2. At distances between control joints of not greater than 18 feet o.c.
3. As required to delineate plasterwork into areas (panels) with length-to-width ratios of not greater than 2-1/2:1.
4. Where control joints occur in surface of construction directly behind plaster.

3.4 PLASTER APPLICATION

A. General: Comply with ASTM C 926.

B. Bonding Compound: Apply on unit masonry and concrete plaster bases.

END OF SECTION 09240

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Interior gypsum board.

1.2 SUBMITTALS

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

1.3 QUALITY ASSURANCE

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.

PART 2 - PRODUCTS

2.1 INTERIOR GYPSUM BOARD

A. General: Complying with ASTM C 36/C 36M or ASTM C 1396/C 1396M, as applicable to type of gypsum board indicated and whichever is more stringent.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. American Gypsum Co.
b. BPB America Inc.
c. G-P Gypsum.
d. Lafarge North America Inc.
e. National Gypsum Company.
f. PABCO Gypsum.
g. Temple.
h. USG Corporation.

B. Type X:

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

C. Ceiling Type: Manufactured to have more sag resistance than regular-type gypsum board.

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

D. Moisture- and Mold-Resistant Type: With moisture- and mold-resistant core and surfaces.

1. Core: 5/8 inch, Type X.
2. Long Edges: Tapered.

2.2 TRIM ACCESSORIES

A. Interior Trim: ASTM C 1047.
1. 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.

B. Exterior Trim: ASTM C 1047.

1. Material: PVC.

2.3 JOINT TREATMENT MATERIALS

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

B. Joint Tape:

1. Interior Gypsum Wallboard: Paper.

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

2.4 AUXILIARY MATERIALS

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

B. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.

1. Use adhesives that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

C. 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 (0.84 to 2.84 mm) thick.
2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.

D. Acoustical Sealant: As specified in Division 07 Section "Joint Sealants."

1. Provide sealants that have a VOC content of **250** g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

PART 3 - EXECUTION

3.1 APPLYING AND FINISHING PANELS, GENERAL

A. Comply with ASTM C 840.

B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.

C. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments, except floors. 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.

3.2 APPLYING INTERIOR GYPSUM BOARD

A. Install interior gypsum board in the following locations:

1. Regular Type: As indicated on Drawings
2. Type X: As indicated on Drawings
3. Abuse-Resistant Type: As indicated on Drawings
4. Moisture- and Mold-Resistant Type: As indicated on Drawings

3.3 INSTALLING TRIM ACCESSORIES

A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.

B. Control Joints: Install control joints according to ASTM C 840 and in specific locations approved by Architect for visual effect.

3.4 FINISHING GYPSUM BOARD

A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.

B. Apply joint tape over gypsum board joints, except those with trim having flanges not intended for tape.

C. Gypsum Board Finish Levels: Finish panels to levels indicated below:
1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
2. Level 4: At panel surfaces that will be exposed to view, unless otherwise indicated
3. Level 5: Where indicated on Drawings

3.5 APPLYING TEXTURE FINISHES

A. Surface Preparation and Primer: Prepare and apply primer to gypsum panels and other surfaces receiving texture finishes. Apply primer to surfaces that are clean, dry, and smooth.

B. Prevent texture finishes from coming into contact with surfaces not indicated to receive texture finish by covering them with masking agents, polyethylene film, or other means. If, despite these precautions, texture finishes contact these surfaces, immediately remove droppings and overspray to prevent damage according to texture-finish manufacturer's written recommendations.

3.6 PROTECTION

A. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.

B. Remove and replace panels that are wet, moisture damaged, and mold damaged.

END OF SECTION 09290

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Ceramic tile.
2. Cementitious backer units installed as part of tile installations.

1.2 SUBMITTALS

A. Product Data: For each product indicated.
B. Samples:

1. Each type, composition, color, and finish of tile.

1.3 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Tile and Trim Units: Furnish quantity of full-size units equal to 3 percent of amount installed, for each type, composition, color, pattern, and size indicated.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply for product selection:

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the products specified.
2. Products: Subject to compliance with requirements, provide one of the products specified.
3. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the manufacturers specified.
4. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.
5. Basis-of-Design Product: The design for each tile type is based on the product named. Subject to compliance with requirements, provide either the named product or a comparable product by one of the other manufacturers specified.

2.2 TILE PRODUCTS

A. Paver Tile.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following]

a. American Marazzi Tile, Inc.
b. Crossville, Inc.
c. Daltile; Division of Dal-Tile International Inc.
d. Florida Tile Industries, Inc.
e. GranitiFiandre; c/o Trans Ceramica, Ltd.
f. Interceramic.
g. Portobello America, Inc.
h. Seneca Tiles, Inc.
i. United States Ceramic Tile Company.

2. Face Size: 12 x12
3. Finish: Mat, clear
4. Tile Color and Pattern: As selected by Architect from manufacturer's full range
5. Grout Color: As selected by Architect from manufacturer's full range
6. Trim Units:
   a. Base Cove: Cove, module size same as adjoining flat tile
   b. Internal Corners: Cove, module size same as adjoining flat tile
7. Coefficient of Friction: Exceeds minimum recommended for ADAAG for level floors

B. Wall Tile

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following]

   a. American Marazzi Tile, Inc.
   b. Crossville, Inc.
   c. Daltile; Division of Dal-Tile International Inc.
   d. Florida Tile Industries, Inc.
   e. GranitiFiandre; c/o Trans Ceramica, Ltd.
   f. Interceramic.
   g. Portobello America, Inc.
   h. Seneca Tiles, Inc.
   i. United States Ceramic Tile Company.

2. Face Size: 4 x 4
3. Finish: Mat, clear
4. Tile Color and Pattern: As selected by Architect from manufacturer's full range
5. Grout Color: As selected by Architect from manufacturer's full range
6. Trim Units:
   a. Wainscot Cap: Surface bullnose to match tile size

2.3 ACCESSORY MATERIALS

A. Thresholds: Fabricate to provide transition between adjacent floor finishes. Bevel edges at 1:2 slope, limit height of bevel to 1/2 inch or less, and finish bevel to match face of threshold.

2.4 SETTING AND GROUTING MATERIALS

A. Manufacturers:

1. Atlas Minerals & Chemicals, Inc.
2. Boiardi Products Corporation.
3. Bonsal, W. R., Company.
4. Bostik.
5. Custom Building Products.
6. DAP, Inc.
7. Jamo Inc.
8. LATICRETE International Inc.
9. MAPEI Corporation.
10. Southern Grouts & Mortars, Inc.
11. Summitville Tiles, Inc.
12. TEC Specialty Products Inc.

B. Dry-Set Portland Cement Mortar (Thin Set): ANSI A118.1.

1. For wall applications, provide nonsagging mortar.

C. Latex-Portland Cement Mortar (Thin Set): ANSI A118.4.

1. Prepackaged dry-mortar mix containing dry additive to which only water must be added.
2. Prepackaged dry-mortar mix combined with liquid-latex additive.
3. For wall applications, provide nonsagging mortar.

D. Standard Sanded Cement Grout: ANSI A118.6, color as indicated.
E. Standard Unsanded Cement Grout: ANSI A118.6, color as indicated.
F. Polymer-Modified Tile Grout: ANSI A118.7, color as indicated.

1. Polymer Type: Dry, redispersible form, prepackaged with other dry ingredients.
2. Polymer Type: Liquid-latex form for addition to prepackaged dry-grout mix.

PART 3 - EXECUTION

3.1 PREPARATION

A. Remove coatings, including curing compounds and other substances that contain soap, wax, oil, or silicone, that are incompatible with tile-setting materials.
B. Fill cracks, holes, and depressions with trowelable leveling and patching compound according to tile-setting material manufacturer's written instructions.

3.2 INSTALLATION, GENERAL

A. ANSI Tile Installation Standards: Comply with parts of ANSI A108 Series "Specifications for Installation of Ceramic Tile" that apply to types of setting and grouting materials and to methods indicated in ceramic tile installation schedules.

B. Apply grout sealer to grout joints in tile floors according to grout-sealer manufacturer's written instructions. As soon as grout sealer has penetrated grout joints, remove excess sealer and sealer that has gotten on tile faces by wiping with soft cloth.

END OF SECTION 09300

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 indicated.

1.3 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.4 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.

1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

1.5 PROJECT CONDITIONS

A. Maintain ambient temperatures within range recommended by manufacturer in spaces to receive floor tile.

B. Close spaces to traffic for 48 hours after floor tile installation.

C. Install floor tile after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. FloorScore Compliance: Resilient tile flooring shall comply with requirements of FloorScore Standard.

B. Low-Emitting Materials: Flooring system shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.2 VINYL COMPOSITION FLOOR TILE

A. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

1. AB ColorPlus, American Biltrite (Canada) Ltd.
2. Armstrong World Industries, Inc.
3. Mannington Mills, Inc.

B. Size: 12 by 12 inches (305 by 305 mm).

C. Colors and Patterns As selected by Architect from full range of industry colors.

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 manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by manufacturer to suit floor tile and substrate conditions indicated.

C. FloorScore Compliance: Resilient tile flooring shall comply with requirements of FloorScore Standard.

1. Adhesives shall comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):

a. VCT and Asphalt Tile Adhesives: Not more than 50 g/L.

D. Floor Polish: Provide protective liquid floor polish products as recommended by manufacturer.

PART 3 - EXECUTION

3.1 PREPARATION

A. Prepare substrates according to 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 manufacturer. Do not use solvents.
3. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.
4. Moisture Testing: Perform tests recommended by floor covering manufacturer. Proceed with installation only after substrates pass testing.

C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.

D. Do not install floor tiles until they are same temperature as space where they are to be installed.

1. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.

E. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.

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.

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.

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. Adhere floor tiles to flooring substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

3.3 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protection of floor tile.

B. Floor Polish: Remove soil, visible adhesive, and surface blemishes from floor tile surfaces before applying liquid floor polish.

1. Apply two coat(s).

C. Cover floor tile until Substantial Completion.

END OF SECTION 09651

RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Resilient base.
2. Resilient molding accessories.

1.2 SUBMITTALS

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

1.3 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.

1.4 PROJECT CONDITIONS

A. Maintain ambient temperatures within range recommended by manufacturer in spaces to receive resilient products.
B. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer.
C. Install resilient products after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 RESILIENT BASE

A. Resilient Base:

1. Manufacturers: Subject to compliance with requirements, provide Johnsonite Wall Base or an equal from the following list of manufacturers:

a. Armstrong World Industries, Inc.
b. Endura Rubber Flooring; Division of Burke Industries, Inc.
c. Flexco, Inc.
d. Johnsonite.
e. Nora Rubber Flooring; Freudenberg Building Systems, Inc.

B. Resilient Base Standard: ASTM F 1861.

1. Material Requirement: Type TV (vinyl, thermoplastic)
2. Style: Cove (base with toe)

C. Minimum Thickness:0.080 inch
D. Height: 4 inches
E. Outside Corners: Preformed
F. Inside Corners: Preformed
G. Finish: As selected by Architect from manufacturer's full range

H. Colors and Patterns: As selected by Architect from full range of industry colors.

2.2 INSTALLATION MATERIALS

A. Adhesives: Water-resistant type recommended by manufacturer to suit 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. Do not install resilient products until they are same temperature as the space where they are to be installed.

C. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.

3.2 RESILIENT BASE INSTALLATION

A. Comply with manufacturer's written instructions for installing resilient base.

B. Install resilient base in lengths as long as practicable without gaps at seams and with tops of adjacent pieces aligned.

3.3 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protection of resilient products.

END OF SECTION 09653

PART 1 - GENERAL

1.1 SUMMARY

A. All field painting of interior and exterior exposed items and surfaces required to complete the work of this project including the following:

1. Except where natural finish of material is specifically noted as a surface not to be painted, paint exposed surfaces whether or not colors are designated in the schedules and drawings. Where items or sources are not specifically mentioned, paint the same as similar adjacent material or area.

1.2 SUBMITTALS

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

B. Samples: For each finish and for each color and texture required.

1. Before starting painting work, Owner will submit to Contractor a "Color Schedule" identifying coating type/sheen and color name/number from paint manufacturer approved for the work. The Color Schedule could be composed of as many as 8 different colors.

C. Sustainable Submittals:

1. Product Data: For paints and coatings, including printed statement of VOC content.

1.3 QUALITY ASSURANCE

A. Manufacturer: Company specializing in paint manufacture with 10 years experience.

B. Employ only qualified painters with a minimum of 3 years experience for painting the materials specified in this section.

1.4 EXTRA MATERIALS

A. Furnish extra materials described below that are from same production run (batch mix) as materials applied and that are packaged for storage and identified with labels describing contents.

1. Quantity: Furnish an additional 5 percent, but not less than 3-gallons of each material and color applied.

2. Label each container with color, texture, and room locations, in addition to the manufacturer's label.

PART 2 - PRODUCTS

2.1 PAINT, GENERAL

A. Material Compatibility:

1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

B. VOC Content of Field-Applied Interior Paints and Coatings: Provide products that comply with the following limits for VOC content, exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24); these requirements do not apply to paints and coatings that are applied in a fabrication or finishing shop:

1. Flat Paints, Coatings, and Primers: VOC content of not more than 50 g/L.
2. Nonflat Paints, Coatings, and Primers: VOC content of not more than 150 g/L.
3. Anti-Corrosive and Anti-Rust Paints Applied to Ferrous Metals: VOC not more than 250 g/L.
4. Floor Coatings: VOC not more than 100 g/L.

C. Colors: As selected by Architect from manufacturer's full range

D. For purpose of designating type and quality of paint required, "Painting Schedule" specified in this section is based on paints manufactured by Sherwin Williams Company.

1. "Paint Schedule" specifies the minimum number of primer and finish coats acceptable, which establishes the paint "system" required for the work.

2.2 SUBSTITUTIONS

A. The following manufacturers are acceptable only after compliance with requirements of this section:
1. Benjamin Moore and Company
2. ICI North America
3. Porter Paint Company
4. Duron Paints and Wall Coverings

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of work.

B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:

1. Concrete: 12 percent.
2. Masonry: 12 percent.
3. Wood: 15 percent.
4. Gypsum Board: 12 percent.
5. Plaster: 12 percent.

C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.

D. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.

3.2 PREPARATION AND APPLICATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates indicated.

B. Clean substrates of substances that could impair bond of paints, including dirt, oil, grease, and incompatible paints and encapsulants.

1. Remove incompatible primers and reprime substrate with compatible primers as required to produce paint systems indicated.

C. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

D. Painting Mechanical and Electrical Work: Paint items exposed in equipment rooms and occupied spaces including, but not limited to, the following:

1. Mechanical Work:

a. Uninsulated metal piping.
b. Uninsulated plastic piping.
c. Pipe hangers and supports.
d. Tanks that do not have factory-applied final finishes.
e. Visible portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets.
f. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
g. Mechanical equipment that is indicated to have a factory-primed finish for field painting.

2. Electrical Work:

a. Switchgear.
b. Panelboards.

c. Electrical equipment that is indicated to have a factory-primed finish for field painting.

E. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

F. Remove hardware, hardware accessories, machined surfaces, plates, lighting fixtures and similar items in place which are not to be painted OR provide surface-applied protection prior to surface preparation and painting operations.

3.3 EXTERIOR PAINTING SCHEDULE

A. Concrete Substrates, Nontraffic Surfaces:

1. Acrylic Latex System:

a. Prime Coat: Sherwin Williams (S-W) Loxon XP Waterproof Coating-A24 Series
b. Topcoat: Sherwin Williams (S-W) Loxon XP Waterproof Coating-A24 Series

B. Concrete Substrates, Traffic Surfaces:

1. Water-Based Clear Sealer System: MPI INT 3.2G.

a. First Coat: Interior/exterior clear concrete floor sealer (water based).
b. Topcoat: Interior/exterior clear concrete floor sealer (water based).

C. CMU Substrates:

1. Acrylic Latex System:

a. Prime Coat: Sherwin Williams (S-W) Loxon Block Surfacer-A24W200
b. Intermediate Coat: Sherwin Williams (S-W) Loxon XP Waterproof Coating-A24 Series
c. Topcoat: Sherwin Williams (S-W) Loxon XP Waterproof Coating-A24 Series

D. Wood Substrate

1. Transparent Polyurethane Finish (Semi-gloss)

a. First Coat: Sherwin Williams (S-W) Minwax Helmsman Spar Urethane, 013205000 at 500 SF per gallon.
b. Second Coat: Sherwin Williams (S-W) Minwax Helmsman Spar Urethane, 01320500 at 500 SF per gallon.
c. Third Coat: Sherwin Williams (S-W) Minwax Helmsman Spar Urethane, 01320500 at 500 SF per gallon.

E. Steel Substrates:

1. Alkyd Enamel System:

a. Prime Coat: Sherwin Williams (S-W) Kem Kromik Universal Metal Primer-B50WZ1

b. Intermediate Coat: Sherwin Williams (S-W) Industrial Enamel Urethane-B54-150 Series
c. Topcoat: Sherwin Williams (S-W) Industrial Enamel Urethane-B54-150 Series

F. Aluminum Substrates:

1. Acrylic Latex System

a. Prime Coat: Sherwin Williams (S-W) ProCryl Universal Metal Primer-B66W310
b. Intermediate Coat: Sherwin Williams (S-W) SherCryl HPA Semi-Gloss-B66-300 Series
c. Topcoat: Sherwin Williams (S-W) SherCryl HPA Semi-Gloss-B66-300 Series

G. Cement Plaster (Cementitious) Substrates:

1. Acrylic Latex System:

a. Prime Coat: Sherwin Williams (S-W) Loxon XP Waterproof Coating-A24 Series
b. Topcoat: Sherwin Williams (S-W) Loxon XP Waterproof Coating-A24 Series

INTERIOR PAINTING SCHEDULE

H. Concrete Substrates, Nontraffic Surfaces:

1. Acrylic Latex System:

a. Prime Coat: Sherwin Williams (S-W) ProGreen 200 Primer-B28W600
b. Intermediate Coat: Sherwin Williams (S-W) ProGreen 200 Eg-Shell B20-600 Series
c. Topcoat: Sherwin Williams (S-W) ProGreen 200 Eg-Shell B20-600 Series

I. Concrete Substrates, Traffic Surfaces:

1. Water-Based Clear Sealer System:

a. First Coat: Sherwin Williams (S-W) Loxon 7% Siloxane Water Repellent.
b. Topcoat: Sherwin Williams (S-W) Loxon 7% Siloxane Water Repellent.

J. CMU Substrates

1. Acrylic Latex System:

a. Prime Coat: Sherwin Williams (S-W) Loxon Block Surfacer-A24W200
b. Intermediate Coat: Sherwin Williams (S-W) ProGreen 200 Eg-Shell B20-600 Series
c. Topcoat: Sherwin Williams (S-W) ProGreen 200 Eg-Shell B20-600 Series

K. Wood Substrate

1. Transparent Waterbased Polyurethane Finish (Semi-gloss)

a. First Coat: Sherwin Williams (S-W) Woodclassics Waterborne Polyurethane Varnish, A68 Series at 3.2-4.0 wet mils, 0.8-1.0 mils dry.

b. Second Coat: Sherwin Williams (S-W) Woodclassics Waterborne Polyurethane Varnish, A68 Series at 3.2-4.0 wet mils, 0.8-1.0 mils dry.

L. Steel Substrates:

1. Acrylic Latex System (Tube steel railings, hollow metal doors):

a. Prime Coat: Sherwin Williams (S-W) ProCryl Universal Metal Primer-B66W310
b. Intermediate Coat: Sherwin Williams (S-W) ProClassic Waterborne Acrylic Semi-Gloss-B31 Series
c. Topcoat: Sherwin Williams (S-W) ProClassic Waterborne Acrylic Semi-Gloss-B31 Series

M. Gypsum Wallboard (All interior walls-egg shell finish):

1. Eg-Shell Acrylic Latex System:

a. Prime Coat: Sherwin Williams (S-W) ProGreen 200 Primer-B28W600
b. Intermediate Coat: Sherwin Williams (S-W) ProGreen 200 Eg-Shell B20-600 Series
c. Topcoat: Sherwin Williams (S-W) ProGreen 200 Eg-Shell B2o-600 Series

N. Gypsum Wallboard (Wet areas- walls & ceilings semi-gloss finish):

1. Semi-Gloss Acrylic Latex System:

a. Prime Coat: Sherwin Williams (S-W) ProGreen 200 Primer-B28W600
b. Intermediate Coat: Sherwin Williams (S-W) ProGreen 200 Semi-Gloss-B31-600 Series
c. Topcoat: Sherwin Williams (S-W) ProGreen 200 Semi-Gloss-B31-600 Series

END OF SECTION 09912

SIGNAGE

Section 10140 – Page 1 of 2

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
1. Dimensional characters.

1.2 ACTION SUBMITTALS

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

PART 2 - PRODUCTS

2.1 DIMENSIONAL CHARACTERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. ACE Sign Systems, Inc.
2. Advance Corporation; Braille-Tac Division.
3. A. R. K. Ramos.
4. ASI-Modulex, Inc.
5. Bunting Graphics, Inc.
6. Charleston Industries, Inc.
7. Gemini Incorporated.
8. Grimco, Inc.
9. Innerface Sign Systems, Inc.
10. Metal Arts; Div. of L&H Mfg. Co.
11. Mills Manufacturing Company.
12. Mohawk Sign Systems.
13. Nelson-Harkins Industries.
14. Signature Signs, Incorporated.
15. Southwell Company (The).

B. Cutout Characters: Provide characters with square-cut edges. Comply with the following requirements:

1. Acrylic: 0.50 inch thick.

a. Color: As selected by Architect from manufacturer's full range

2. Mounting: Projected with concealed noncorroding studs for substrates encountered.

2.2 ACCESSORIES

A. Anchors and Inserts: Provide nonferrous-metal or hot-dip galvanized anchors and inserts for exterior installations and elsewhere as required for corrosion resistance. Use toothed steel or lead expansion-bolt devices for drilled-in-place anchors. Furnish inserts, as required, to be set into concrete or masonry work.

2.3 ACRYLIC SHEET FINISHES

A. Colored Coatings for Acrylic Sheet: For copy colors, provide colored coatings, including inks, dyes, and paints, that are recommended by acrylic manufacturers for optimum adherence to acrylic surface and that are UV and water resistant for five years for application intended.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Locate signs and accessories where indicated, using mounting methods of types described and complying with manufacturer's written instructions.

1. Install signs level, plumb, and at heights indicated, with sign surfaces free of distortion and other defects in appearance.

B. Dimensional Characters: Mount characters using standard fastening methods to comply with manufacturer's written instructions for character form, type of mounting, wall construction, and condition of exposure indicated. Provide heavy paper template to establish character spacing and to locate holes for fasteners.

1. Projected Mounting: Mount characters at projection distance from wall surface indicated.

END OF SECTION 10140

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes phenolic-core / solid-polymer units as follows:

1. Toilet Enclosures
2. Urinal Screens

1.2 SUBMITTALS

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

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

C. Samples: For each exposed finish.

PART 2 - PRODUCTS

2.1 PHENOLIC-CORE UNITS

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

1. Accurate Partitions Corporation.
2. American Sanitary Partition Corporation.
3. Ampco.
4. Bobrick Washroom Equipment, Inc.
5. Bradley Corporation; Mills Partitions.
6. Capitol Partitions, Inc.
7. Flush Metal Partition Corp.
8. General Partitions Mfg. Corp.
9. Global Steel Products Corp.
10. Knickerbocker Partitions Corp.
11. Lambaton Universal.
12. Metpar Corp.
13. Partition Systems, Inc.
14. Sanymetal; a Crane Plumbing Company.
15. Tex-Lam Manufacturing, Inc.
16. Weis-Robart Partitions, Inc.
17. Young Group, Ltd. (The); DesignRite Partitions.

B. Door, Panel and Pilaster Construction: Solid phenolic-core panel material with melamine facing on both sides fused to substrate during panel manufacture (not separately laminated), and with eased and polished edges. Provide minimum 3/4-inch thick doors and pilasters and minimum 1/2-inch thick panels.

1. Facing Sheet Color: Two colors in each room as selected by Architect from manufacturer's full range of colors.
2. Core Color: Manufacturer's standard dark color.

C. Pilaster Shoes and Sleeves (Caps): Stainless steel, ASTM A 666, Type 302 or 304.

2.2 SOLID-POLYMER UNITS

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

1. Accurate Partitions Corporation.
2. Ampco.
3. Bradley Corporation; Mills Partitions.
4. Capitol Partitions, Inc.
5. Comtec Industries.
6. General Partitions Mfg. Corp.
7. Global Steel Products Corp.
8. Metpar Corp.
9. Santana Products, Inc.
10. Sanymetal; a Crane Plumbing Company.
11. Weis-Robart Partitions, Inc.

B. Door, Panel, and Pilaster Construction: Solid, high-density polyethylene (HDPE) or polypropylene (PP) panel material, not less than 1 inch (25 mm) thick, seamless, with eased edges, and with homogenous color and pattern throughout thickness of material.

C. Pilaster Shoes and Sleeves (Caps)

D. Brackets (Fittings):

2.3 ACCESSORIES

A. Hardware and Accessories: Manufacturer's standard design, heavy-duty operating hardware and accessories.

2.4 FABRICATION

A. Doors: Unless otherwise indicated, provide 24-inch wide in-swinging doors for standard toilet compartments and 36-inch wide out-swinging doors with a minimum 32-inchwide clear opening for compartments indicated to be accessible to people with disabilities.
1. Latch and Keeper: Manufacturer's standard surface-mounted latch unit designed for emergency access and with combination rubber-faced door strike and keeper. Provide units that comply with accessibility requirements of authorities having jurisdiction at compartments indicated to be accessible to people with disabilities.
2. Coat Hook: Manufacturer's standard combination hook and rubber-tipped bumper, sized to prevent door from hitting compartment-mounted accessories.
3. Door Bumper: Manufacturer's standard rubber-tipped bumper at out-swinging doors

4. Door Pull: Manufacturer's standard unit at out-swinging doors that complies with accessibility requirements of authorities having jurisdiction. Provide units on both sides of doors at compartments indicated to be accessible to people with disabilities.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Comply with manufacturer's written installation instructions. Install units rigid, straight, level, and plumb. Secure units in position with manufacturer's recommended anchoring devices.

3.2 ADJUSTING

A. Hardware Adjustment: Adjust and lubricate hardware according to manufacturer's written instructions for proper operation. Set hinges on in-swinging doors to hold doors open approximately 30 degrees from closed position when unlatched. Set hinges on out-swinging doors and doors in entrance screens to return doors to fully closed position.

END OF SECTION 10211

ACCORDION FOLDING PARTITIONS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Manually operated, accordion folding partitions.

1.2 PERFORMANCE REQUIREMENTS

A. Acoustical Performance: Provide accordion folding partitions tested by a qualified testing agency for the following acoustical properties according to test methods indicated:

1. Sound-Transmission Requirements: STC tested according to ASTM E 90 and calculated according to ASTM E 413.
2. Noise Reduction Requirements: Tested sound-absorption performance according to ASTM C 423.

1.3 ACTION SUBMITTALS

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

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

1. Indicate storage and operating clearances.
2. Indicate facing-material seam locations if any.

C. Operation and Maintenance data

D. Warranty: Sample of special warranty

1.4 QUALITY ASSURANCE

A. Installer Qualifications: An employer of workers trained and approved by manufacturer.

1.5 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of accordion folding partitions that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 ACCORDION FOLDING PARTITION

A. Accordion Folding Partition: Accordion folding frame sections designed for horizontal extension and retraction, covered with decorative facing material, reinforced for hardware attachment, supported by overhead suspension system, and equipped with manufacturer's standard air-release method to prevent billowing.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Modernfold Model SM 12 or comparable product by one of the following:

a. Cornell Iron Works, Inc.
b. Curtition; a division of T&C Industries, Inc.
c. Holcomb & Hoke Mfg. Co., Inc.
d. Hufcor, Inc.
e. KWIK-WALL Company.
f. Moderco Inc.
g. Modernfold, Inc.; a DORMA Group company.
h. Panelfold Inc.

B. STC Rating: 40

C. Facing Material: Woven fabric

1. Color/Pattern: As selected by Architect from manufacturer's full range.

2.2 SUSPENSION SYSTEMS

A. Suspension Tracks: Steel or aluminum designed for type of operation, size, and weight of accordion folding partition indicated. Size track to support partition operation and storage without damage to suspension system, accordion folding partitions, or adjacent construction. Limit track deflection to no more than 0.10 inch (2.54 mm) between bracket supports. Provide a continuous system of track sections and accessories to accommodate configuration and layout indicated for partition operation and storage.

B. Carriers: Trolley system as required for size and weight of partition and for easy, quiet operation; with ball-bearing carriers at lead post and ball-bearing carriers at intermediate panel supports.

C. Track Switches and Accessories: Manufacturer's standard switches as required for type of operation, storage, track configuration, and layout indicated.

2.3 FACING MATERIALS

A. General: Provide facing materials with appropriate backing that comply with indicated fire-test-response characteristics, and that are factory attached to accordion folding partitions with concealed fasteners.

B. Woven Fabric: Manufacturer's standard woven fabric, from same dye lot, treated to resist stains.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Comply with ASTM E 557 except as otherwise required by accordion folding partition manufacturer's written installation instructions. Install accordion folding partitions level and plumb, with tight joints and uniform appearance, and free of deformation and surface and finish irregularities.

B. Install accordion folding partitions and accessories after other finishing operations, including painting, have been completed.

END OF SECTION 10222

FIRE EXTINGUISHER CABINETS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes fire protection cabinets for fire extinguishers.

1.2 SUBMITTALS

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

B. Maintenance data.

1.3 QUALITY ASSURANCE

A. Fire-Rated, Fire Protection Cabinets: Listed and labeled to comply with requirements in ASTM E 814 for fire-resistance rating of walls where they are installed.

B. Coordinate size of fire protection cabinets to ensure that type and capacity of fire extinguishers indicated are accommodated.

C. Coordinate sizes and locations of fire protection cabinets with wall depths.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B.

B. Aluminum: Alloy and temper recommended by aluminum producer and manufacturer for type of use and finish indicated, and as follows:

1. Sheet: ASTM B 209 (ASTM B 209M).
2. Extruded Shapes: ASTM B 221 (ASTM B 221M).

C. Stainless-Steel Sheet: ASTM A 666, Type 304.

D. Break Glass: Clear annealed float glass, ASTM C 1036, Type I, Class 1, Quality q3, 1.5 mm thick, single strength.

E. Tempered Break Glass: ASTM C 1048, Kind FT, Condition A, Type I, Quality q3, 1.5 mm thick.

2.2 FIRE PROTECTION CABINET

A. Cabinet Type: Suitable for fire extinguisher.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

    a. Fire End & Croker Corporation
    b. J. L. Industries, Inc., a division of Activar Construction Products Group
    c. Kidde Residential and Commercial Division, Subsidiary of Kidde plc
    d. Larsen's Manufacturing Company
    e. Modern Metal Products, Division of Technico Inc
    f. Moon-American
    g. Potter Roemer LLC
    h. Watrous Division, American Specialties, Inc.

B. Cabinet Construction:

1. Fire-Rated Cabinets: Construct fire-rated cabinets with double walls fabricated from 0.0428-inch thick, cold-rolled steel sheet lined with minimum 5/8-inch thick, fire-barrier material. Provide factory-drilled mounting holes.

C. Cabinet Material: Steel sheet.

D. Semirecessed Cabinet: Cabinet box partially recessed in walls of sufficient depth to suit style of trim indicated; with one-piece combination trim and perimeter door frame overlapping surrounding wall surface with exposed trim face and wall return at outer edge (backbend). Provide where walls are of insufficient depth for recessed cabinets but are of sufficient depth to accommodate semirecessed cabinet installation.

E. Door Material: Aluminum sheet.

F. Door Style: Vertical duo panel with frame.

G. Door Glazing: Tempered float glass (clear).

H. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.

I. Accessories:

1. Mounting Bracket: Manufacturer's standard steel, designed to secure fire extinguisher to fire protection cabinet, of sizes required for types and capacities of fire extinguishers indicated, with plated or baked-enamel finish.
2. Door Lock: Cam lock that allows door to be opened during emergency by pulling sharply on door handle
3. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as directed by Architect

    a. Identify fire extinguisher in fire protection cabinet with the words "FIRE EXTINGUISHER”

        1) Location: Applied to cabinet door
        2) Application Process: Pressure-sensitive vinyl letters.
        3) Orientation: Vertical

J. Finishes:

1. Clear anodic.

2.3 FABRICATION

A. Fire Protection Cabinets: Provide manufacturer's standard box (tub), with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated. Miter and weld joints and grind smooth.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Examine walls and partitions for suitable framing depth and blocking where recessed and semirecessed cabinets will be installed and prepare recesses as required by type and size of cabinet and trim style.

B. Install fire protection cabinets in locations and at mounting heights indicated

C. Fire Protection Cabinets: Fasten cabinets to structure, square and plumb.

D. Adjust fire protection cabinet doors to operate easily without binding. Verify that integral locking devices operate properly.

E. Replace fire protection cabinets that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 10441

FIRE EXTINGUISHERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes portable, hand-carried fire extinguishers and mounting brackets for fire extinguishers.

1.2 SUBMITTALS

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

B. Operation and maintenance data.

1.3 QUALITY ASSURANCE

A. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."

B. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.

C. Coordinate type and capacity of fire extinguishers with fire protection cabinets to ensure fit and function.

1.4 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace fire extinguishers that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Failure of hydrostatic test according to NFPA 10.
b. Faulty operation of valves or release levers.

2. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PORTABLE, HAND-CARRIED FIRE EXTINGUISHERS

A. Fire Extinguishers: Type, size, and capacity for each fire protection cabinet and mounting bracket indicated.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

    a. Amerex Corporation.
    b. Ansul Incorporated; Tyco International Ltd.
    c. Badger Fire Protection; a Kidde company.
    d. Buckeye Fire Equipment Company.
    e. Fire End & Croker Corporation.
    f. J. L. Industries, Inc.; a division of Activar Construction Products Group.
    g. Kidde Residential and Commercial Division; Subsidiary of Kidde plc.
    h. Larsen's Manufacturing Company.
    i. Moon-American.
    j. Pem All Fire Extinguisher Corp.; a division of PEM Systems, Inc.
    k. Potter Roemer LLC.
    l. Pyro-Chem; Tyco Safety Products.

2. Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B

B. Regular Dry-Chemical Type: UL-rated nominal capacity, with sodium bicarbonate-based dry chemical in manufacturer's standard enameled container.

C. Multipurpose Dry-Chemical Type: UL-rated with monoammonium phosphate-based dry chemical in manufacturer's standard enameled container.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Examine fire extinguishers for proper charging and tagging.

1. Remove and replace damaged, defective, or undercharged fire extinguishers.

B. Install fire extinguishers in locations indicated and in compliance with requirements of authorities having jurisdiction.

C. Mounting Brackets (FE): Fasten mounting brackets to surfaces, square and plumb, at locations indicated.

D. Mounting in Cabinets (FEC): See 10442 – Fire Extinguisher Cabinets

END OF SECTION 10442

FLAGPOLES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes ground-mounted aluminum flagpoles.

1.2 PERFORMANCE REQUIREMENTS

A. Structural Performance: Flagpole assemblies, including anchorages and supports, shall withstand the effects of gravity loads, and the following loads and stresses within limits and under conditions indicated according to the following design criteria:
1. Wind Loads: 123 mph, Exposure B

1.3 ACTION SUBMITTALS

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

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. American Flagpole; a Kearney-National Inc. company.
2. Atlantic Fiberglass Products, Inc.
3. Baartol Company.
4. Concord Industries, Inc.
5. Eder Flag Manufacturing Company, Inc.
6. Ewing Flagpoles.
7. Lingo Inc.; Acme Flagpole Company Division.
8. Millerbernd Manufacturing Company.
9. Morgan-Francis; Division of Original Tractor Cab Co., Inc.
10. PLP Composite Technologies, Inc.
11. Pole-Tech Company Inc.
12. U.S. Flag & Flagpole Supply, LP.
13. USS Manufacturing Inc.

2.2 FLAGPOLE

A. Exposed Height: 30 feet (9 m)

B. Aluminum Flagpoles: Provide flagpoles fabricated from seamless extruded tubing complying with ASTM B 241/B 241M, Alloy 6063, with a minimum wall thickness of 3/16 inch (4.8 mm).

C. Metal Foundation Tube: Manufacturer's standard corrugated-steel foundation tube, not less than 0.064-inch- (1.6-mm-) nominal wall thickness. Provide with 3/16-inch (4.8-mm) steel bottom plate and support plate; 3/4-inch- (19-mm-) diameter, steel ground spike; and steel centering wedges welded together. Galvanize steel after assembly. Provide loose hardwood wedges at top of foundation tube for plumbing pole. Provide flashing collar of same material and finish as flagpole.

D. External Halyard Ball-bearing, nonfouling, revolving truck assembly of cast metal with continuous braided polypropylene halyard and 9-inch (228-mm) cast-metal cleats with fasteners. Finish exposed metal surfaces to match flagpole.

E. Halyard Flag Snaps: Provide two swivel snap hooks per halyard.

2.3 ALUMINUM FINISHES

A. Clear Anodic Finish: AAMA 611, AA-M12C22A31, Class II, 0.010 mm or thicker.

PART 3 - EXECUTION

3.1 FLAGPOLE INSTALLATION

A. General: Install flagpoles where shown and according to manufacturer's written instructions.

B. Ground Set: Place foundation tube, center, and brace to prevent displacement during concreting. Install flagpole, plumb, in foundation tube. Place tube seated on bottom plate between steel centering wedges and install hardwood wedges to secure flagpole in place. Place and compact sand in foundation tube and remove hardwood wedges. Seal top of foundation tube with a 2-inch (50-mm) layer of elastomeric joint sealant and cover with flashing collar.

END OF SECTION 107500

PART 1 GENERAL - BASIC METHODS AND REQUIREMENTS

1.1 DESCRIPTION

A. Related Documents: Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this Section.

B. This Section, Basic Methods and Requirements (Electrical) applies to all sections of Division 26.

C. Furnish and install electrical wiring, systems, equipment and accessories in accordance with the specifications and drawings. Generally, capacities and ratings of motors, transformers, cable, switchboards, switchgear, panelboards, motor control centers, and other items and arrangements for the specified items are shown on drawings.

D. Electrical service entrance equipment (arrangements for temporary and permanent connections to the power company's system) shall conform to the power company's requirements.

E. Wiring ampacities specified or shown on the drawings are based on copper conductors, with the conduit and raceways accordingly sized. Aluminum conductors are prohibited.

1.2 MINIMUM REQUIREMENTS

A. At a minimum, the work shall be in conformance with the following codes:

Code	Title	Year
NFPA 70	National Electric Code	2008
NFPA 72	National Fire Alarm Code	2006
NFPA 101	Life Safety Code	2006
FBC	Florida Building Code including 2009 supplements	2007

B. The installation shall also comply with all applicable rules and regulations of local and state laws and ordinances. Include in the work, without extra cost, any labor, materials, services, apparatus and drawings required to comply with all applicable laws, ordinances, rules and regulations. Inform the Architect/Engineer of any work or material which conflict with any applicable codes, standards, laws and regulations before submitting the bid.

C. Drawings and other specification sections shall govern in those instances where requirements are greater than those specified in the above standards.

1.3 TEST STANDARDS

A. All materials and equipment shall be listed, labeled or certified by a nationally recognized testing laboratory to meet Underwriters Laboratories, Inc., standards where test standards have been established. Equipment and materials which are not covered by UL Standards

will be accepted provided equipment and material is listed, labeled, certified or otherwise determined to meet safety requirements of a nationally recognized testing laboratory.

B. Definitions:

1. Listed; equipment or device of a kind mentioned which:

a. Is published by a nationally recognized laboratory which makes periodic inspection of production of such equipment.

b. States that such equipment meets nationally recognized standards or has been tested and found safe for use in a specified manner.

2. Labeled; equipment or device is when:

a. It embodies a valid label, symbol, or other identifying mark of a nationally recognized testing laboratory such as Underwriters Laboratories, Inc.

b. The laboratory makes periodic inspections of the production of such equipment.

c. The labeling indicated compliance with nationally recognized standards or tests to determine safe use in a specified manner.

3. Certified; equipment or product is which:

a. Has been tested and found by a nationally recognized testing laboratory to meet nationally recognized standards or to be safe for use in a specified manner.

b. Production of equipment or product is periodically inspected by a nationally recognized testing laboratory.

c. Bears a label, tag, or other record of certification.

4. Nationally recognized testing laboratory; laboratory which approved, in accordance with OSHA regulations, by the Secretary of Labor.

1.4 QUALIFICATIONS (PRODUCTS AND SERVICES)

A. Manufacturer’s Qualifications: The manufacturer shall regularly and presently produce, as one of the manufacturer’s principal products, the equipment and material specified for this project and shall have manufactured the item for at least three years.

B. Product Qualification:

1. Manufacturer’s product shall have been in satisfactory operation, on three installations of similar size and type as this project, for approximately three years.

2. The owner reserves the right to require the contractor to submit a list of installations where the products have been in operation before approval.

C. Service Qualifications: There shall be a permanent service organization maintained or trained by the manufacturer which will render satisfactory service to this installation within four hours of receipt of notification that service is needed. Submit name and address of service organization.

1.5 MANUFACTURED PRODUCTS

A. Materials and equipment furnished shall be of current production by manufacturers regularly engaged in the manufacture of such items, for which replacement parts shall be available.

B. When more than one unit of the same class of equipment is required, such units shall be the product of a single manufacturer.

C. Equipment Assemblies and Components:

1. Components of an assembled unit need not be products of the same manufacturer.
2. Manufacturers of equipment assemblies, which include components made by others, shall assume complete responsibility for the final assembled unit.
3. Components shall be compatible with each other and with the total assembly for the intended service.
4. Constituent parts which are similar shall be the product of a single manufacturer.

D. Factory wiring shall be identified on the equipment being furnished and on all wiring diagrams.

E. When Factory Testing Is Specified :

1. The owner shall have the option of witnessing factory tests. The contractor shall notify the Architect/Engineer a minimum of 15 working days prior to the manufacturers making the factory tests.
2. Four copies of certified test reports containing all test data shall be furnished to the Architect/Engineer prior to final inspection and not more than 90 days after completion of the tests.
3. When equipment fails to meet factory test and reinspection is required, the contractor shall be liable for all additional expenses, including the expenses of the owner.

1.6 EQUIPMENT REQUIREMENTS

A. Where variations from the contract requirements are requested in accordance with Divisions 00 and 01, the connecting work and related components shall include, but not be limited to additions or changes to branch circuits, circuit protective devices, conduits, wire, feeders, controls, panels and installation methods.

B. No substitution will be considered unless written request has been submitted to the owner at least ten (10) days prior to the date for receipt of bids.

C. If the owner approves any proposed substitutions, such approval will be set forth in an addendum.

1.7 EQUIPMENT PROTECTION

A. Equipment and materials shall be protected during shipment and storage against physical damage, dirt, moisture, cold and rain:

1. During installation, enclosures, equipment, controls, controllers, circuit protective devices, and other like items, shall be protected against entry of foreign matter; and be vacuum cleaned both inside and outside before testing, operating, final inspection, and repainting if required.
2. Damaged equipment shall be, as determined by the Architect/Engineer, placed in first class operating condition or be returned to the source of supply for repair or replacement.
3. Painted surfaces shall be protected with a factory installed removable heavy kraft paper, sheet vinyl or equal.
4. Damaged paint on equipment and materials shall be refinished with the same quality of paint and workmanship as used by the manufacturer so repaired areas are not obvious.

B. Rough-in:

1. Verify final locations for rough-ins with field measurements and with the requirements of the actual equipment to be connected.
2. Refer to equipment specifications in Divisions 02 through 23 for additional rough-in requirements.

1.8 WORK PERFORMANCE

A. All electrical work must comply with the requirements of NFPA 70 (NEC), NFPA 70B, NFPA 70E, OSHA Part 1910 subpart J, OSHA Part 1910 subpart S and OSHA Part 1910 subpart k in addition to other references required by contract.

B. Job site safety and worker safety is the responsibility of the contractor.

C. Electrical work shall be accomplished with all affected circuits or equipment deenergized. When an electrical outage cannot be accomplished in this manner for the required work, the following requirements are mandatory :

1. Electricians must use and wear full protective equipment (PPE) (i.e., certified and tested insulating material to cover exposed energized electrical components, certified and tested insulated tools, etc.) while working on energized systems in accordance with NFPA 70E. The level of PPE shall be determined by a computer generated arc flash calculation provided and paid for by the contractor. The arc flash data shall be presented with the work plan below.
2. Work on energized circuits or equipment cannot begin until prior written approval is obtained from the owner.

D. For work on existing stations, arrange, phase and perform work to assure electrical service for other buildings at all times. Refer to Section 01 01 00, GENERAL REQUIREMENTS.

E. New work shall be installed and connected to existing work neatly and carefully. Disturbed or damaged work shall be replaced or repaired to its prior conditions, as required by Divisions 00 and 01.

1.9 EQUIPMENT INSTALLATION AND REQUIREMENTS

A. Equipment location shall be as close as practical to locations shown on the drawings.

B. Working spaces shall not be less than specified in the NEC for all voltages specified.

C. Inaccessible Equipment :

1. Where the owner determines that the contractor has installed equipment not conveniently accessible for operation and maintenance, the equipment shall be removed and reinstalled as directed at no additional cost to the owner.

2. “Conveniently accessible” is defined as being capable of being reached without the use of ladders, or without climbing or crawling under or over obstacles such as, but not limited to, motors, pumps, belt guards, transformers, piping, ductwork, conduit and raceways.:

1.10 DEMOLITION

A. Visit the site before submitting a bid to observe existing conditions.

B. Work in existing buildings shall be scheduled well in advance with the owner. Work shall be performed at such times and under such conditions as suit the convenience of the owner. Plan the work to minimize disruption of normal operations. Notify electrical staff before any circuit is de-energized in occupied areas.

C. Reconnect circuits to other panelboards when required to complete the renovation shown.

D. In areas to be remodeled remove existing conduit and wire not required to remain in use back to nearest wiring to remain in use. Splice and terminate in junction boxes as appropriate. Where entire circuit is to be removed, remove conduit and wire back to existing panelboard. Where such work would not be possible without disturbing areas not to be renovated, consult with the Architect to prior performing the work.

E. Where circuit is interrupted by removal of a device or fixture from that circuit, install wire and conduit as required to restore service to the remaining devices and fixtures on that circuit. Ensure proper grounding is maintained.

F. Lighting fixtures, wiring devices, panelboards, equipment, conduits and conductors removed shall be transported to the owner’s designated location and offered to the owner’s representative. If he chooses to retain these items, turn those chosen over to him. Items rejected by the owner’s representative shall be removed completely from the project site and disposed of legally by the Contractor.

1.11 ELECTRICAL INSTALLATIONS

A. Make a thorough examination of the site and the contract documents. No claim for extra compensation will be recognized if difficulties are encountered which an examination of site conditions and contract documents prior to executing contract would have revealed.

B. Coordinate electrical equipment and materials installation with other building components.

C. Verify all dimensions by field measurements.

D. Arrange for chases, slots and openings in other building components to allow for electrical installations.

E. Coordinate installations of required supporting devices and sleeves to be set in poured-in-place concrete and other structural components, as they are constructed. Sequence, coordinate and integrate installations of electrical materials and equipment for efficient flow of the work. Give particular attention to large equipment requiring positioning prior to closing-in the building.

F. Coordinate the cutting and patching of building components to accommodate the installation of electrical equipment and materials.

G. Install electrical equipment to facilitate maintenance and repair or replacement of equipment components. As much as practical, connect equipment for ease of disconnecting, with minimum of interference with other installations.

H. Coordinate the installation of electrical materials and equipment above ceilings with suspension system, mechanical equipment and systems, and structural components.

I. Temporary electrical service and construction lighting shall be provided under this section. Provide for all electrical service for construction period, making all connections and removal of same at job conclusion. Furnish and install temporary lighting for construction period. At job completion, all temporary lamps shall be removed and replaced with new lamps.

J. All existing and new conduit/raceways within this project area shall be properly supported. Add support to existing conduit as required to comply with NEC.

K. Coordinate location of equipment and conduit with other trades to minimize interference. See Divisions 00 and 01.

1.12 CUTTING AND PATCHING

A. Refer to the Divisions 00 and 01 for general requirements for cutting and patching.

B. Do not endanger or damage installed work through procedures and processes of cutting and patching.

C. Arrange for repairs required to restore other work because of damage caused as a result of electrical installations.

D. No additional compensation will be authorized for cutting and patching that is necessitated by ill-timed, defective, or non-conforming installations.

E. Perform cutting, fitting, and patching of electrical equipment and materials required to :

1. Uncover work to provide installations of ill-timed work.
2. Remove and replace defective work.
3. Remove and replace work not conforming to requirements of the contract documents.

4. Remove samples of installed work as specified for testing.
5. Install equipment and materials in existing structures.
6. Upon written instructions from the Architect/Engineer, uncover and restore work to provide for Architect/Engineer observation of concealed work.

F. Cut, remove and legally dispose of, selected electrical equipment, components, and materials as indicated; including, but not limited to, removal of electrical items indicated to be removed and items made obsolete by the new work.

G. Protect the structure, furnishings, finishes, and adjacent materials not indicated or scheduled to be removed.

H. Provide and maintain temporary partitions or dust barriers adequate to prevent the spread of dust and dirt to adjacent areas.

I. Locate, identify, and protect electrical services passing through remodeling or demolition area and serving other areas required to be maintained operational. When transit services must be interrupted, provide temporary services for the affected areas and notify the owner prior to changeover.

1.13 DELIVERY, STORAGE AND HANDLING

A. Deliver products to project properly identified with names, model numbers, types, grades, compliance labels, and similar information needed for distinct identifications; adequately packaged and protected to prevent damage during shipment, storage, and handling.

B. Store equipment and materials at the site, unless off-site storage is authorized in writing. Protect stored equipment and materials from damage.

C. Coordinate deliveries of electrical materials and equipment to minimize construction site congestion. Limit each shipment of materials and equipment to the items and quantities needed for smooth and efficient flow of installation.

1.14 EQUIPMENT IDENTIFICATION

A. In addition to the requirements of the NEC, install an identification sign which clearly indicates information required for use and maintenance of items such as panelboards, cabinets, motor controllers (starters), safety switches, separately enclosed circuit breakers, individual breakers and controllers in switchboards, switchgear and motor control assemblies, control devices and other significant equipment.

B. Above listed equipment nameplates shall be laminated phenolic resin (color as designated in specification section 26 05 53) with a white core with engraved lettering, a minimum of 6 mm (1/4 inch) high. Secure nameplates with stainless steel screws. Switchboards and switchgear shall have similar nameplates but with minimum 5/8” high letters. Nameplates that are furnished by manufacturer as a standard catalog item, or where other method of identification is herein specified, are exceptions.

1.15 SUBMITTALS

A. Submit in accordance with Divisions 00 and 01.

B. All submittals shall include adequate descriptive literature, catalog cuts, shop drawings and other data necessary for the Architect/Engineer to ascertain that the proposed equipment and materials comply with specification requirements. Catalog cuts submitted for approval shall be legible and clearly identify equipment being submitted.

C. Submittals for individual systems and equipment assemblies which consist of more than one item or component shall be made for the system or assembly as a whole. Partial submittals will not be considered for approval.

1. Mark the submittals, “SUBMITTED UNDER SECTION _____”.

2. Submittals shall be marked to show specification reference including the section and paragraph numbers.

3. Submit each section separately.

D. Submittal of shop drawings, product data, and samples will be accepted only when submitted by the contractor. Data submitted from subcontractors and material suppliers directly to the Architect/Engineer will not be processed.

E. Product Options and Substitutions: Refer to the Instructions to Bidders and the Division 1 Section “Products and Substitutions” for requirements in selecting products and requesting substitutions.

F. Submittals shall include the following :

1. Information that confirms compliance with contract requirements. Include the manufacturer’s name, model or catalog numbers, catalog information, technical data sheets, shop drawings, pictures, nameplate data and test reports as required.

2. Parts list which shall include those replacement parts recommended by the equipment manufacturer, quantity of parts, current price and availability of each part.

G. Manuals: Submit in accordance with Divisions 00 and 01.

1. Maintenance and Operation Manuals: Submit as required for systems and equipment specified in the technical sections. Furnish three copies, bound in hardback binders, (manufacturer’s standard binders) or an approved equivalent. Furnish one complete manual as specified in the technical section but in no case later than prior to performance of systems or equipment test, and furnish the remaining manuals prior to contract completion.

2. Inscribe the following identification on the cover: the words “MAINTENANCE AND OPERATION MANUAL,” the name and location of the system, equipment, building, name of contractor, and contract number. Include in the manual the names, addresses, and telephone numbers of each subcontractor installing the system or equipment and the local representatives for the system or equipment.

3. Provide a “Table of Contents” and assemble the manual to conform to the table of contents, with tab sheets placed before instructions covering the subject. The instructions shall be legible and easily read, with large sheets of drawings folded in.

4. The manuals shall include:
    a. Internal and interconnecting wiring and control diagrams with data to explain detailed operation and control of the equipment.
    b. A control sequence describing start-up, operation, and shutdown.
    c. Description of the function of each principal item of equipment.
    d. Installation and maintenance instructions.
    e. Safety precautions.
    f. Diagrams and illustrations.
    g. Testing methods.
    h. Performance data.
    i. Lubrication schedule including type, grade, temperature range, and frequency.
    j. Pictorial “exploded” parts list with part numbers. Emphasis shall be placed on the use of special tools and instruments. The list shall indicate sources of supply, recommended spare parts, and name of servicing organization.
    k. Appendix; list of qualified permanent servicing organizations for support of the equipment, including addresses and certified qualifications.

H. Record Documents :
1. Refer to the Divisions 00 and 01 for requirements. The following paragraphs supplement the requirements of Division 01.
2. Accurately and clearly red-line clean drawings to indicate revisions to conduit size and location, both exterior and interior; actual equipment locations, dimensioned from column lines; concealed equipment, dimensioned to column lines; distribution and branch electrical circuitry; fuse and circuit breaker size and arrangements; support and hanger details; change orders; concealed control system devices.
3. Accurately and clearly red-line clean specifications to indicate approved substitutions; change orders; actual equipment and materials used.

1.16 SINGULAR NUMBER

A. Where any device or part of equipment is referred to in these specifications in the singular number (e.g., “the switch”), this reference shall be deemed to apply as many such devices as are required to complete the installation as shown on the drawings.

1.17 TRAINING

A. Training shall be provided in accordance with Article, INSTRUCTIONS, of Divisions 00 and 01.

B. Training shall be provided for the particular equipment or system as required in each associated specification.

C. A training schedule shall be developed and submitted by the contractor and approved by the owner at least 30 days prior to the planned training.

1.18 WARRANTIES

A. Refer to the Division 01 Section: SPECIFIC WARRANTIES for procedures and submittal requirements for warranties. Refer to individual equipment specifications for warranty requirements.

B. Compile and assemble the warranties specified in Division 26 into separated set of vinyl-covered, three-ring binders, tabulated and indexed for easy reference.

C. Provide complete warranty information for each item to include product or equipment; date or beginning of warranty or bond; duration of warranty or bond; and names, addresses, and telephone numbers and procedures for filing a claim and obtaining warranty services.

PART 2 GENERAL – EQUIPMENT WIRING CONNECTIONS

2.1 SUMMARY

A. Section includes electrical connections to equipment.

B. Related Sections:

1. Section 26 05 19 - Low-Voltage Electrical Power Conductors and Cables.
2. Section 26 05 33 - Raceway and Boxes for Electrical Systems.

C. Related Documents:

1. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 01 Specification sections, apply to work of this Section.
2. This Section is a Division 26 Common Work Results for Electrical section, and is part of each Division 26 section making reference to electrical connections for equipment specified herein.

2.2 REFERENCES

Latest Adopted Editions of:

A. National Electrical Manufacturers Association:

1. NEMA WD 1 - General Requirements for Wiring Devices.
2. NEMA WD 6 - Wiring Devices-Dimensional Requirements.

B. NEC Compliance: Comply with applicable requirements of NEC as to type products used and installation of electrical power connections (terminals and splices) for junction boxes, motor starters, and disconnect switches.

C. UL Compliance: Comply with UL Std 486A, “Wire Connectors and Soldering Lugs for Use with Copper Conductors” including, but not limited to, tightening of electrical connectors to torque values indicated. Provide electrical connection products and materials which are UL listed and labeled.

2.3 SUBMITTALS

A. Divisions 00 and 01: Submittal procedures.

B. Product Data: Submit wiring device manufacturer’s catalog information showing dimensions, configurations, and construction.

C. Manufacturer's installation instructions.

2.4 CLOSEOUT SUBMITTALS

A. Divisions 00 and 01 - Execution and Closeout Requirements: Submittal procedures.

B. Project Record Documents: Record actual locations, sizes, and configurations of equipment connections.

2.5 COORDINATION

A. Divisions 00 and 01 - Administrative Requirements: Coordination and project conditions.

B. Obtain and review shop drawings, product data, manufacturer’s wiring diagrams, and manufacturer's instructions for equipment furnished under other sections.

C. Determine connection locations and requirements.

D. Sequence rough-in of electrical connections to coordinate with installation of equipment.

E. Sequence electrical connections to coordinate with start-up of equipment.

PART 3 PRODUCTS

3.1 MATERIALS AND COMPONENTS

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

B. Wire, Cables, and Connectors:
General: Provide wires, cables, and connectors complying with Division 26.

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

D. Manufacturers:

1. Pass & Seymour.
2. Hubbell.

3. Cooper.
4. Substitutions: Not Permitted.

E. Attachment Plug Construction: Conform to NEMA WD 1.

F. Configuration: NEMA WD 6; match receptacle configuration at outlet furnished for equipment.

G. Cord Construction: Type SO multiconductor flexible cord with identified equipment grounding conductor, suitable for use in damp locations. Only allowed where shown on drawings.

H. Size: Suitable for connected load of equipment, length of cord, and rating of branch circuit overcurrent protection.

PART 4 EXECUTION

4.1 EXAMINATION

A. Divisions 00 and 01 - Administrative Requirements: Coordination and project conditions.

B. Verify equipment is ready for electrical connection, for wiring, and to be energized.

4.2 EXISTING WORK

A. Remove exposed abandoned equipment wiring connections, including abandoned connections above accessible ceiling finishes.

B. Disconnect abandoned utilization equipment and remove wiring connections. Remove abandoned components when connected raceway is abandoned and removed. Install blank cover for abandoned boxes and enclosures not removed.

C. Extend existing equipment connections using materials and methods as specified.

4.3 INSTALLATION

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

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

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

D. Make electrical connections.

E. Make conduit connections to equipment using flexible conduit. Use liquidtight flexible conduit with watertight connectors in exterior, damp, wet, corrosive, oil and grease locations.

F. Connect heat producing equipment using wire and cable with insulation suitable for temperatures encountered.

G. Install receptacle outlet to accommodate connection with attachment plug.

H. Install cord and cap for field-supplied attachment plug.

I. Install suitable strain-relief clamps and fittings for cord connections at outlet boxes and equipment connection boxes.

J. Install disconnect switches, controllers, control stations, and control devices to complete equipment wiring requirements.

K. Install terminal block jumpers to complete equipment wiring requirements.

L. Install interconnecting conduit and wiring between devices and equipment to complete equipment wiring requirements.

4.4 ADJUSTING

A. Divisions 00 and 01 - Execution and Closeout Requirements: Testing, adjusting, and balancing.

B. Cooperate with utilization equipment installers and field service personnel during checkout and starting of equipment to allow testing and balancing and other startup operations. Provide personnel to operate electrical system and checkout wiring connection components and configurations.

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

END OF SECTION

LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 GENERAL

1.1 SUMMARY

A. Section includes building wire and cable; nonmetallic-sheathed cable; direct burial cable; service entrance cable; Communications wiring; and wiring connectors and connections.

B. Related Sections:

1. Section 26055 - Identification for Electrical Systems.
2. Section 26050 – Common Work Results for Electrical.
3. Section 26052.6 – Grounding and Bonding for Electrical Systems.
4. Section 26053 – Raceway and Boxes for Electrical Systems.

1.2 REFERENCES

Latest Adopted Editions of:

A. International Electrical Testing Association:

1. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.

B. National Fire Protection Association:

1. NFPA 70 - National Electrical Code.
2. NFPA 262 - Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces.

C. Underwriters Laboratories, Inc.:

1. UL 1277 - Standard for Safety for Electrical Power and Control Tray Cables with Optional Optical-Fiber Members.
2. 44-99 – Thermoset-Insulated Wires and Cables.
3. 83-98 – Thermoplastic-Insulated Wires and Cables.
4. 467-93 – Electrical Grounding and Bonding Equipment.
5. 486A-97 – Wire Connectors and Soldering Lugs for Use with Copper Conductors.
6. 486C-97 – Splicing Wire Connectors
7. 486D-97 – Insulated Wire Connector Systems for Underground Use or in Damp or Wet Locations.
8. 486E-94 – Equipment Wiring Terminals for Use with Aluminum and/or Copper Conductors.
9. 493-95 – Thermoplastic-Insulated Underground Feeder and Branch Circuit Cable.

10. 514B-97 – Fittings for Cable and Conduit
11. 1479-94 – Fire Tests of Through-Penetration Fire Stops.

1.3 SYSTEM DESCRIPTION

A. Cable and Wire shall be:

1. Provide factory-fabricated wires of sizes, ampacity ratings and materials for applications and services indicated.
2. Annealed copper.
3. Conductor insulation shall be dual type THHN/THWN-2 90°C for dry, damp, and wet locations. Conductor insulation with single type marking THHN 90°C (194°F) may be used for dry locations only.
4. Solid conductor for feeders and branch circuits 10 AWG and smaller. Shall be stranded for No. 8 AWG and larger.
5. Stranded conductors for control circuits.
6. Conductors not smaller than 12 AWG for power and lighting circuits.
7. Conductors not smaller than 14 AWG for control circuits.
8. Increase wire size in branch circuits to limit voltage drop to a maximum of 3 percent.

1.4 SPLICES AND JOINTS

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

B. Branch circuits (No. 10 AWG and smaller):

1. Connectors: Solderless, screw on, reusable pressure cable type, 600 Volt, 105 degree C with integral insulation, approved for copper and aluminum conductors.
2. The integral insulator shall have a skirt to completely cover the stripped wires.
3. The number, size, and combination of conductors, as listed on the manufacturers packaging shall be strictly complied with.
4. Branch circuits over 75 feet in length shall be No. 10 AWG unless otherwise noted.

C. Feeder Circuits:

1. Connectors shall be indent, hex screw, or bolt clamp-type of high conductivity and corrosion-resistant material.
2. Field installed compression connectors for cable sizes 250 kcmil and larger shall have not less than two clamping elements or compression indents per wire.
3. Insulate splices and joints with materials approved for the particular use, location, voltage, and temperature. Insulate with not less than that of the conductor level that is being joined.

4. Plastic electrical insulating tape: Fed Spec. HH-I-595 shall apply including flame retardant, cold and weather resistant.

1.5 CONTROL WIRING

A. Control wiring shall be large enough so that the voltage drop under inrush conditions does not adversely affect operation of the controls.

1.6 COMMUNICATION AND SIGNAL WIRING

A. Shall conform to the recommendations of the manufacturers of the communication and signal systems; however, not less than what is shown.

B. Wiring shown is for typical systems. Provide wiring as required for the systems being furnished.

C. Multi-conductor cables shall have the conductors color-coded.

1.7 WIRE LUBRICATING COMPOUND

A. Suitable for the wire insulation and conduit it is used with, and shall not harden or become adhesive.

B. Shall not be used on wire for isolated type electrical power systems.

1.8 FIREPROOFING TAPE

A. The tape shall consist of a flexible, conformable fabric of organic composition coated one side with flame-retardant elastomer.

B. The tape shall be self-extinguishing and shall not support combustion. It shall be arc-proof and fireproof.

C. The tape shall not deteriorate when subjected to water, gases, salt water, sewage, or fungus and be resistant to sunlight and ultraviolet light.

D. The finished application shall withstand a 200-Ampere arc for not less than 30 seconds.

E. Securing tape: Glass cloth electrical tape not less than 0.18 mm (7 mils) thick, and 19 mm (3/4 inch) wide.

1.9 SUBMITTALS

A. Division 01 - Submittal Procedures: Requirements for submittals.

B. Product Data: Submit for each building and conductor cable assembly type.

1.10 CLOSEOUT SUBMITTALS

A. Division 01 - Execution and Closeout Requirements: Requirements for submittals.

B. Project Record Documents: Record actual locations of components and circuits.

1.11 QUALITY ASSURANCE

A. Provide wiring materials located in plenums with peak optical density not greater than 0.5, average optical density not greater than 0.15, and flame spread not greater than 5 feet (1.5 m) when tested in accordance with NFPA 262.

B. Perform Work in accordance with Authority Having Jurisdiction's requirements, codes and standards, and standard industry practice.

C. Maintain minimum one copy of each document on site.

1.12 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience. Product shall be manufactured in North America.

1.13 FIELD MEASUREMENTS

A. Verify field measurements are as indicated on Drawings.

1.14 COORDINATION

A. Division 01 - Administrative Requirements: Requirements for coordination.

B. Where conductors and cable destination is indicated and routing is not shown, determine routing and lengths required.

PART 2 PRODUCTS

2.1 TERMINATIONS

A. Terminal Lugs for Wires 6 AWG and Smaller: Solderless, compression type copper.

B. Lugs for Wires 4 AWG and Larger: Color keyed, compression type copper, with insulating sealing collars.

PART 3 EXECUTION

3.1 EXAMINATION

A. Division 01 - Administrative Requirements: Coordination and project conditions.

B. Verify interior of building has been protected from weather.

C. Verify mechanical work likely to damage wire and cable has been completed.

D. Verify raceway installation is complete and supported.

3.2 EXISTING WORK

A. Remove exposed abandoned wire and cable, including abandoned wire and cable above accessible ceiling finishes. Patch surfaces where removed cables pass through building finishes.

B. Disconnect abandoned circuits and remove circuit wire and cable. Remove abandoned boxes when wire and cable servicing boxes is abandoned and removed. Install blank cover for abandoned boxes not removed.

C. Provide access to existing wiring connections remaining active and requiring access. Modify installation or install access panel.

D. Extend existing circuits using materials and methods compatible with existing electrical installations, or as specified.

E. Clean and repair existing wire and cable remaining or wire and cable to be reinstalled.

3.3 INSTALLATION

A. Route wire and cable to meet Project conditions.

B. Neatly train and lace wiring inside boxes, equipment, and panelboards.

C. Identify and color code wire and cable under provisions of Section 26 05 53 in each junction box, panelboards, and all terminations. Identify each conductor with its circuit number or other designation indicated.

D. Special Techniques--Building Conductors in Raceway:

1. Pull conductors into raceway at same time.
2. Install building wire 4 AWG and larger with pulling equipment.

E. Special Techniques - Cable:

1. Protect exposed cable from damage.

2. Support cables above accessible ceiling, using wire management system, spring metal clips or metal cable ties to support cables from structure. Do not rest cable on ceiling panels.
3. Use suitable cable fittings and connectors.

F. Special Techniques - Wiring Connections:

1. Clean conductor surfaces before installing lugs and connectors.
2. Make splices, taps, and terminations to carry full ampacity of conductors with no perceptible temperature rise.
3. Tape uninsulated conductors and connectors with electrical tape to 150 percent of insulation rating of conductor.
4. Install split bolt connectors for copper conductor splices and taps, 6 AWG and larger.
5. Install solderless pressure connectors with insulating covers for copper conductor splices and taps, 8 AWG and smaller.
6. Install insulated spring wire connectors with plastic caps for copper conductor splices and taps, 10 AWG and smaller.

3.4 INSTALLATION, GENERALLY

A. Install in accordance with the NEC, and as specified.

B. Install all building conductors and wiring in raceway systems unless specifically excluded.

C. Splice cables and wires only in outlet boxes, junction boxes, pull boxes, manholes, or handholes.

D. Install cable supports for all vertical feeders in accordance with the NEC. Provide split wedge type, which firmly clamps each individual cable and tightens due to cable weight.

E. For panelboards, cabinets, wireways, switches, and equipment assemblies, neatly form, train, and tie the cables in individual circuits.

F. Seal cable and wire entering a building from underground, between the wire and conduit where the cable exits the conduit, with a nonhardening approved compound.

G. Wire Pulling:

1. Provide installation equipment that will prevent the cutting or abrasion of insulation during pulling of cables.
2. Use ropes made of nonmetallic material for pulling feeders.
3. Attach pulling lines for feeders by means of either woven basket grips or pulling eyes attached directly to the conductors, as approved by the owner.
4. Pull in multiple cables together in a single conduit.

3.5 SPLICE INSTALLATION

A. Splices and terminations shall be mechanically and electrically secure.

B. Where the owner or Architect/Engineer determines that unsatisfactory splices or terminations have been installed, remove the devices and install approved devices at no additional cost to the owner/architect/engineer.

C. Prior to beginning splice work, obtain owner/architect/engineer's approval for all splices for conductors No. 3 and larger.

3.6 CONTROL, COMMUNICATION AND SIGNAL WIRING INSTALLATION

A. Unless otherwise specified in other sections of these specifications, install wiring and connect to perform the functions shown and specified in other sections of these specifications.

B. Except where otherwise required, install a separate power supply circuit for each system so that malfunctions in any system will not affect other systems.

C. Where power supply circuits are not shown for systems, connect them to the nearest panelboards of suitable voltages, which are intended to supply such systems and have suitable spare circuit breakers or space for installation.

D. Install a red warning indicator on the handle of the branch circuit breaker for the power supply circuit for each system to prevent accidental de-energizing of the systems.

E. System voltages shall not exceed 120 Volts and shall be lower voltages where shown on the drawings or required by the NEC.

3.7 CONTROL, COMMUNICATION AND SIGNAL SYSTEM IDENTIFICATION

A. Install a permanent wire marker on each wire at each termination.

B. Identifying numbers and letters on the wire markers shall correspond to those on the wiring diagrams used for installing the systems.

C. Wire markers shall retain their markings after cleaning.

3.8 FEEDER INDENTIFICATION

A. In each interior pullbox and junction box, install labels on each circuit cables and wires to clearly designate their circuit identification and voltage.

3.9 WIRE COLOR

A. General:

1. Install conductor colors in accordance with the following:

a. Black, red, and blue for circuits at 208/120 volts single or three phase.

2. For wire sizes 8 AWG and larger, identify wire with colored tape at terminals, splices and boxes. Colors are as follows:

a. Black, red, and blue for circuits at 208/120 volts single or three phase.

B. Neutral Conductors: White. When two or more neutrals are located in one conduit, individually identify each with proper circuit number.

C. Branch Circuit Conductors: Install three or four wire home runs with each phase uniquely color coded.

D. Parallel Circuit Conductors: Uniquely identify each phase.

E. Ground Conductors:

1. For 6 AWG and smaller: Green.

2. For 4 AWG and larger: Identify with green tape at both ends and visible points including junction boxes.

3.10 FIELD QUALITY CONTROL

A. Division 01: Field inspecting, testing, adjusting, and balancing.

B. Inspect and test in accordance with NETA ATS, except Section 4.

C. Perform inspections and tests listed in NETA ATS, Section 7.3.1.

3.11 FIELD TESTING

A. Prior to energization of circuitry, check newly installed feeder conductors with megohm meter to determine insulation resistance levels to ensure requirements are fulfilled. A list of feeders tested shall be submitted to the engineer indicating the insulation resistance level for each cable.

B. Tests shall be performed by megger and conductors shall test free from short-circuits and grounds.

C. Test conductors phase-to-phase and phase-to-ground.

D. The Contractor shall furnish the instruments, materials, and labor for these tests.

END OF SECTION

PART 1 GENERAL

1.1 SUMMARY

A. This section specifies general grounding and bonding requirements of electrical installations for personnel safety and to provide a low impedance path for possible ground fault currents.

B. “Grounding Electrode system” refers to all electrodes required by NEC, as well as including made, supplementary, lightning protection system and telecommunications system grounding electrodes.

C. The terms “connect” and “bond” are used interchangeably in this specification and have the same meaning.

D. The type of electrical grounding and bonding work specified in this Section includes the following: Solidly Grounded.

E. Applications of electrical grounding and bonding include but are not limited to:

1. Electrical Power Systems.
2. Telecommunications Systems.
3. Low Voltage Systems.
4. Separately Derived Systems.
5. Service Equipment.
6. Raceways and Enclosures.
7. Interior, Exterior, and Site Lighting.
8. Equipment – interior and exterior.

F. Section 26050 Common Work Results for Electrical: General electrical requirements and items that are common to more than one section of Division 26.

G. This section is a part of each Division 26 making reference to grounding specified herein, regardless of voltage level.

1.2 REFERENCES

A. Institute of Electrical and Electronics Engineers:

1. IEEE 142 - Recommended Practice for Grounding of Industrial and Commercial Power Systems.
2. IEEE 1100 - Recommended Practice for Powering and Grounding Electronic Equipment.

B. International Electrical Testing Association:

1. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.

C. National Fire Protection Association:

1. NFPA 70 - National Electrical Code.

D. Underwriters Laboratories, Inc (UL):

1. 44-1999 – Thermoset-Insulated Wires and Cables.
2. 83-1998 – Thermoplastic-Insulated Wires and Cables.
3. 467-1993 – Grounding and Bonding Equipment.
4. 486A – 2000 – Wire Connectors and Soldering Lugs for Use with Copper Conductors.
5. 869 – Electrical Service Equipment.

E. American Society for Testing and Materials (ASTM):

1. B1-2001 – Standard Specification for Hard-Drawn Copper Wire.
2. B8-1999 – Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft.

1.3 SYSTEM DESCRIPTION

A. Grounding systems use the following elements as grounding electrodes:

1. Metal underground water pipe.
2. Metal building frame.
3. Concrete-encased electrode.
4. Rod electrode.

1.4 PERFORMANCE REQUIREMENTS

A. Grounding System Resistance: 25 ohms maximum unless otherwise shown on drawings.

1.5 SUBMITTALS

A. Divisions 00 and 01 - Submittal Procedures: Requirements for submittals.

B. Product Data: Submit data on grounding electrodes and connections.

C. Test Reports: Indicate overall resistance to ground.

D. Manufacturer's Installation Instructions: Submit for active electrodes.

E. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

1.6 CLOSEOUT SUBMITTALS

A. Divisions 00 and 01 - Execution and Closeout Requirements: Requirements for submittals.

B. Project Record Documents: Record actual locations of components and grounding electrodes.

1.7 QUALITY ASSURANCE

A. Provide grounding materials conforming to requirements of NEC, IEEE 142, and UL labeled.

B. Perform Work in accordance AHJ requirements, codes and standards, and generally accepted industry practices.

C. Maintain one copy of each document on site.

1.8 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum three years documented experience.

B. Installer: Company specializing in performing work of this section with minimum five years documented experience.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Divisions 00 and 01 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.

B. Accept materials on site in original factory packaging, labeled with manufacturer's identification.

C. Protect from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original packaging.

D. Do not deliver items to project before time of installation. Limit shipment of bulk and multiple-use materials to quantities needed for immediate installation.

1.10 COORDINATION

A. Divisions 00 and 01 - Administrative Requirements: Requirements for coordination.

B. Complete grounding and bonding of building reinforcing steel prior concrete placement.

PART 2 PRODUCTS

2.1 ROD ELECTRODES

A. Manufacturers:

1. Erico, Inc.
2. O-Z Gedney Co.
3. Thomas & Betts, Electrical
4. Substitutions: Not Permitted.

B. Product Description:

1. Material: Copper-clad steel.
2. Diameter: 3/4 inch.
3. Length: 10 feet.

C. Connector: Connector for exothermic welded connection.

2.2 WIRE

A. Material: Stranded copper.

B. Foundation Electrodes: size as shown on drawings.

C. Grounding Electrode Conductor: Copper conductor bare.

D. Bonding Conductor: Copper conductor bare.

2.3 GROUNDING WELL COMPONENTS

A. Well Pipe: 8 inches NPS by 24 inches long concrete or fiberglass pipe with belled end.

B. Well Cover: Cast iron or Fiberglass with legend "GROUND" embossed on cover.

2.4 MECHANICAL CONNECTORS

A. Manufacturers:

1. Erico, Inc.
2. ILSCO Corporation.
3. O-Z Gedney Co.
4. Thomas & Betts, Electrical.

B. Description: Bronze connectors, suitable for grounding and bonding applications, in configurations required for particular installation.

2.5 EXOTHERMIC CONNECTIONS

A. Manufacturers:

1. Copperweld, Inc.
2. ILSCO Corporation.
3. O-Z Gedney Co.
4. Thomas & Betts, Electrical.
5. Substitutions: [Section 01 60 00 - Product Requirements].

B. Furnish materials in accordance with AHJ requirements and applicable codes and standards.

C. Product Description: Exothermic materials, accessories, and tools for preparing and making permanent field connections between grounding system components.

PART 3 EXECUTION

3.1 EXAMINATION

A. Divisions 00 and 01 - Administrative Requirements: Verification of existing conditions before starting work.

B. Verify final backfill and compaction has been completed before driving rod electrodes.

3.2 PREPARATION

A. Remove all surface contaminants at connection points.

3.3 EXISTING WORK

A. Modify existing grounding system to maintain continuity to accommodate renovations.

B. Extend existing grounding system using materials and methods as specified.

3.4 INSTALLATION

A. Install in accordance with IEEE 142 and 1100.

B. Install electrical grounding and bonding systems as indicated, in accordance with manufacturer’s instructions; applicable portions of NEC, NECA’s “Standard of Installation”, and in accordance with recognized industry practices, to ensure that products comply with requirements.

C. Permanently ground entire light and power system in accordance with NEC, including service equipment, distribution panels, lighting panelboards, switch and starter enclosures,

motor frames, grounding type receptacles, and other exposed non-current carrying metal parts of electrical equipment.

D. Coordinate with other electrical work as necessary to interface installation of electrical grounding and bonding system work with other work.

E. Ground electrical service system neutral at service entrance to the building cold water line, building structural steel, and to a minimum three ground rods spaced ten feet (10') apart.

F. Install required number of rod electrodes to achieve specified resistance to ground.

G. System Grounding:

1. Secondary service neutrals: Ground at the supply side of the secondary disconnecting means and at related transformers.
2. Separately derived systems (Transformers downstream from the service entrance): Ground the secondary neutral to separate grounding electrode.
3. Standby Systems: Ground the neutral to separate grounding electrodes.

H. Install grounding and bonding conductors concealed from view.

I. Install grounding well pipe with cover at each rod location. Install well pipe top flush with finished grade.

J. Install grounding electrode conductor and connect to reinforcing steel in foundation footing as indicated on Drawings. Electrically bond steel together.

K. Bond together metal siding not attached to grounded structure; bond to ground.

L. Bond together each metallic raceway, pipe, duct and other metal object entering space under access floors. Bond to underfloor ground grid. Install 2 AWG bare copper bonding conductor.

M. Install isolated grounding conductor for circuits as shown on drawings in accordance with IEEE 1100.

N. Equipment Grounding Conductor (E.G.): Install separate, insulated conductor within each feeder and branch circuit raceway. Terminate each end on suitable lug, bus, or bushing.

O. Connect to site grounding system.

P. Install continuous grounding using underground cold water system (1" Diameter or larger) building steel and driven ground rods as grounding electrode. Where water piping is not available, install artificial station ground by means of driven rods or buried electrodes.

Q. Accomplish grounding of electrical system by using insulated grounding conductor installed within feeder and branch circuit raceway. Grounding conductor sizes in accordance with drawings and NEC. Install from grounding bus of serving panel to ground bus of served panel, grounding screw of receptacles, lighting fixture housing, light switch outlet boxes or

metal enclosures of service equipment. Ground conduits by means of grounding bushings on terminations at panelboards with installed number 12 conductor to grounding bus.

R. Ground electrical system using continuous metal raceway system enclosing circuit conductors in accordance with NEC.

S. Permanently attach equipment and grounding conductors prior to energizing equipment.

T. Equipment Grounding: Metallic structures (including ductwork and building steel), enclosures, raceways, junction boxes, outlet boxes, cabinets, machine frames, and other conductive items in close proximity with electrical circuits shall be bonded and grounded.

U. All branch circuits serving patient care areas shall be provided with a ground path for fault current by installation in a metal raceway system. The metal raceway shall qualify as an equipment grounding return path in accordance with NEC 250-91.

V. All raceways with No. 10 or 12 AWG phase conductors for receptacles, lighting fixtures and similar circuits shall be provided with a parity-sized green equipment ground conductor. Ground conductor shall be installed in entire raceway system, including wall switches and flexible conduit to light fixtures. Equipment ground conductor sizes for circuits with phase conductors larger than No. 12 AWG are indicated on drawings. Ground conductors shall be connected to ground bus in panelboards.

W. Terminate feeder and branch circuit insulated equipment-grounding conductors with grounding lug, bus or bushing. Conductors looped under screw or bolt heads will not be permitted.

X. Install clamp-on connectors on clean metal contact surfaces to ensure electrical conductivity and circuit integrity.

Y. Provide grounding busing and a continuous copper-bonding jumper from the busing to the equipment ground bus in all feeders. The bonding jumper shall be the same size as the equipment ground conductor.

Z. Motors and Starters: Provide lugs in motor terminal box and starter housing or motor control center compartment to terminate equipment grounding conductors.

AA. Receptacles shall not be grounded through their mounting screws. Ground with a jumper from the receptacle green ground terminal to the device box ground screw and the branch circuit equipment grounding conductor.

BB. Ground lighting fixtures to the equipment grounding conductor of the wiring system. Fixtures connected with flexible conduit shall have a green ground wire included with the power wires from the fixture through the flexible conduit to the first outlet box.

CC. Fixed electrical appliances and equipment shall be provided with a ground lug for termination of the equipment grounding conductor.

3.5 INACCESSIBLE GROUNDING CONNECTIONS

A. Make grounding connections which are buried or otherwise normally inaccessible (except connections for which periodic testing access is required) by exothermic weld.

3.6 CONDUCTIVE PIPING

A. Bond all conductive piping systems, interior and exterior, to the building to the grounding electrode system. Bonding connections shall be made as close as practical to the equipment ground bus.

3.7 TELECOMMUNICATIONS SYSTEM

A. Bond telecommunications system grounding equipment to the electrical grounding electrode system.

3.8 GROUND ROD INSTALLATION

A. Drive each rod vertically in the earth.

B. Make connections by the exothermic process to form solid metal joints.

C. Where rock prevents the driving of vertical ground rods, install angled ground rods or grounding electrodes in horizontal trenches to achieve the specified resistance.

3.9 FIELD QUALITY CONTROL

A. Divisions 00 and 01: Field inspecting, testing, adjusting, and balancing.

B. Inspect and test in accordance with NETA ATS, except Section 04.

C. Perform ground resistance testing in accordance with IEEE 142.

D. Perform leakage current tests in accordance with NFPA 99.

E. Perform continuity testing in accordance with IEEE 142.

F. When improper grounding is found on receptacles, check receptacles in entire project and correct. Perform retest.

END OF SECTION

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Conduit supports.
2. Formed steel channels.
3. Spring steel clips.
4. Sleeves.
5. Equipment bases and supports.

1.2 REFERENCES

A. ASTM International:

ASTM E84	Standard Test Method for Surface Burning Characteristics of Building Materials
ASTM E119	Standard Test Methods for Fire Tests of Building Construction and Materials
ASTM E814	Standard Test Method for Fire Tests of Through-Penetration Fire Stops.
ASTM E1966	Standard Test Method for Fire-Resistive Joint Systems

B. FM Global:

FM	Approval Guide, A Guide to Equipment, Materials & Services Approved By Factory Mutual Research For Property Conservation.

C. National Fire Protection Association:

NFPA 70	National Electrical Code

D. Underwriters Laboratories Inc.:

UL 263	Fire Tests of Building Construction and Materials
UL 723	Tests for Surface Burning Characteristics of Building Materials
UL 1479	Fire Tests of Through-Penetration Firestops
UL 2079	Tests for Fire Resistance of Building Joint Systems
UL	Fire Resistance Directory

E. Intertek Testing Services (Warnock Hersey Listed):

WH	Certification Listings

1.3 DEFINITIONS

A. Firestopping (Through-Penetration Protection System): Sealing or stuffing material or assembly placed in spaces between and penetrations through building materials to arrest movement of fire, smoke, heat, and hot gases through fire rated construction.

1.4 SYSTEM DESCRIPTION

A. Firestopping Materials: Achieve fire ratings as noted on Drawings for adjacent construction, but not less than 1 hour fire rating.

1. Ratings may be 3-hours for firestopping in through-penetrations of 4-hour fire rated assemblies unless otherwise required by applicable codes.

B. Surface Burning: UL 723 with maximum flame spread / smoke developed rating of 25/450.

C. Firestop interruptions to fire rated assemblies, materials, and components.

1.5 PERFORMANCE REQUIREMENTS

A. Firestopping: Conform to applicable code for fire resistance ratings and surface burning characteristics.

B. Firestopping: Provide certificate of compliance from authority having jurisdiction indicating approval of materials used.

1.6 SUBMITTALS

A. Divisions 00 and 01 - Submittal Procedures: Requirements for submittals.

B. Product Data:

1. Hangers and Supports: Submit manufacturers catalog data including load capacity.

2. Firestopping: Submit data on product characteristics, performance and limitation criteria.

C. Firestopping Schedule: Submit schedule of opening locations and sizes, penetrating items, and required listed design numbers to seal openings to maintain fire resistance rating of adjacent assembly.

D. Design Data: Indicate load carrying capacity of trapeze hangers and hangers and supports for feeders greater than 400 Amps.

E. Manufacturer's Installation Instructions:

1. Hangers and Supports: Submit special procedures and assembly of components.

2. Firestopping: Submit preparation and installation instructions.

F. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

G. Engineering Judgements: For conditions not covered by UL or WH listed designs, submit judgements by licensed professional engineer suitable for presentation to authority having jurisdiction for acceptance as meeting code fire protection requirements.

1.7 QUALITY ASSURANCE

A. Through Penetration Firestopping of Fire Rated Assemblies: UL 1479 or ASTM E814 with 0.10 inch water gage minimum positive pressure differential to achieve fire F-Ratings and temperature T-Ratings as indicated on Drawings, but not less than 1-hour.

1. Wall Penetrations: Fire F-Ratings as indicated on Drawings, but not less than 1-hour.

2. Floor Penetrations: Fire F-Ratings and temperature T-Ratings as indicated on Drawings, but not less than 1-hour.

a. Floor Penetrations within Wall Cavities: T-Rating is not required.

B. Through Penetration Firestopping of Non-Fire Rated Floor and Roof Assemblies: Materials to resist free passage of flame and products of combustion.

1. Noncombustible Penetrating Items: Noncombustible materials for penetrating items connecting maximum of three stories.

2. Penetrating Items: Materials approved by authorities having jurisdiction for penetrating items connecting maximum of two stories.

C. Coordinate with Architectural Drawings for roof penetrations.

D. Fire Resistant Joints in Fire Rated Floor, Roof, and Wall Assemblies: ASTM E1966 or UL 2079 to achieve fire resistant rating as indicated on Drawings for assembly in which joint is installed.

E. Fire Resistant Joints Between Floor Slabs and Exterior Walls: ASTM E119 with 0.10 inch water gage minimum positive pressure differential to achieve fire resistant rating as indicated on Drawings for floor assembly.

F. Surface Burning Characteristics: 25/450 flame spread/smoke developed index when tested in accordance with ASTM E84.

G. Perform Work in accordance with AHJ’s requirements and applicable codes and standards.

H. Maintain one copy of each document on site.

1.8 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum three years experience.

B. Installer: Company specializing in performing work of this section with minimum two years documented experience.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Divisions 00 and 01 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.

B. Accept materials on site in original factory packaging, labeled with manufacturer's identification.

C. Protect from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original packaging.

1.10 ENVIRONMENTAL REQUIREMENTS

A. Divisions 00 and 01 - Product Requirements: Environmental conditions affecting products on site.

B. Do not apply firestopping materials when temperature of substrate material and ambient air is below 60 degrees F.

C. Maintain this minimum temperature before, during, and for minimum 3 days after installation of firestopping materials.

D. Provide ventilation in areas to receive solvent cured materials.

PART 2 PRODUCTS

2.1 CONDUIT SUPPORTS

A. Manufacturers:

1. Allied Tube & Conduit Corp.
2. Electroline Manufacturing Company.
3. O-Z Gedney Co.

B. Hanger Rods: Threaded high tensile strength galvanized carbon steel with free running threads.

C. Beam Clamps: Malleable Iron, with tapered hole in base and back to accept either bolt or hanger rod. Set screw: hardened steel.

D. Conduit clamps for trapeze hangers: Galvanized steel, notched to fit trapeze with single bolt to tighten.

E. Conduit clamps - general purpose: One hole malleable iron for surface mounted conduits.

F. Cable Ties: High strength nylon temperature rated to 185 degrees F. Self locking.

2.2 FORMED STEEL CHANNEL

A. Manufacturers:

1. Allied Tube & Conduit Corp.
2. B-Line Systems.
3. Midland Ross Corporation, Electrical Products Division.
4. Unistrut Corp.

B. Product Description: Galvanized 12 gage thick steel. With holes 1-1/2 inches on center.

2.3 SLEEVES

A. Furnish materials in accordance with AHJ, codes and standards, and generally accepted industry practices.

B. Sleeves through Fire Rated and Fire Resistive Floors and Walls, and Fire Proofing: Prefabricated fire rated sleeves including seals, UL listed.

C. Fire-stopping Insulation: Glass fiber type, non-combustible.

2.4 MECHANICAL SLEEVE SEALS

A. Manufacturers:

1. Thunderline Link-Seal, Inc.
2. NMP Corporation.
3. Substitutions: Divisions 00 and 01 - Product Requirements.

B. Product Description: Modular mechanical type, consisting of interlocking synthetic rubber links shaped to continuously fill annular space between object and sleeve, connected with bolts and pressure plates causing rubber sealing elements to expand when tightened, providing watertight seal and electrical insulation.

2.5 FIRESTOPPING

A. Manufacturers:

1. Dow Corning Corp.
2. Fire Trak Corp.
3. International Protective Coating Corp.
4. 3M fire Protection Products.
5. Specified Technology, Inc.

B. Product Description: Different types of products by multiple manufacturers are acceptable as required to meet specified system description and performance requirements.

C. Color: As selected from manufacturer's full range of colors.

PART 3 EXECUTION

3.1 EXAMINATION

A. Divisions 00 and 01 - Verification of existing conditions before starting work.

B. Verify openings are ready to receive sleeves.

C. Verify openings are ready to receive firestopping.

3.2 PREPARATION

A. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other matter affecting bond of firestopping material.

B. Remove incompatible materials affecting bond.

C. Install materials to arrest liquid material leakage.

D. Obtain permission from Owner before using powder-actuated anchors.

E. Do not drill or cut structural members.

3.3 INSTALLATION - HANGERS AND SUPPORTS

A. Install conduit and raceway support and spacing in accordance with NEC.

B. Install hangers, anchors, sleeves, and seals as indicated, in accordance with manufacturer's written instructions and with recognized industry practices to insure supporting devices comply with requirements. Comply with requirements of NECA and NEC for installation of supporting devices.

C. Coordinate with other electrical work, including raceway and wiring work, as necessary to interface installation of supporting devices with other work.

D. Install hangers, supports and attachments to support piping properly from building structure. Arrange for grouping of parallel runs horizontal conduits to be supported together on trapeze type hangers where possible. Install supports with spacings indicated and in compliance with NEC requirements.

E. Do not fasten supports to pipes, ducts, mechanical equipment, or conduit.

F. Install multiple conduit runs on common hangers.

G. Supports:

1. Fabricate supports from structural steel or formed steel channel. Install hexagon head bolts to present neat appearance with adequate strength and rigidity. Install spring lock washers under nuts.
2. Install surface mounted cabinets and panelboards with minimum of four anchors.
3. Support vertical conduit at every floor.

3.4 INSTALLATION - FIRESTOPPING

A. Install material at fire rated construction perimeters and openings containing penetrating sleeves, piping, ductwork, conduit and other items, requiring firestopping.

B. Apply primer where recommended by manufacturer for type of firestopping material and substrate involved, and as required for compliance with required fire ratings.

C. Apply firestopping material in sufficient thickness to achieve required fire and smoke rating.

D. Compress fibered material to maximum 40 percent of its uncompressed size.

E. Remove dam material after firestopping material has cured.

F. Fire Rated Surface:

1. Seal opening as follows:
    a. Install sleeve through opening and extending beyond minimum of 1 inch on both sides of building element.
    b. Size sleeve allowing minimum of 1 inch void between sleeve and building element.
    c. Pack void with backing material.
    d. Seal ends of sleeve with UL listed fire resistive silicone compound to meet fire rating of structure penetrated.
2. Where cable tray and conduit penetrate fire rated surface, install firestopping product in accordance with manufacturer's instructions.

G. Non-Rated Surfaces:

1. Seal opening through non-fire rated wall, partition, floor, ceiling, and roof opening as follows:
    a. Install sleeve through opening and extending beyond minimum of 1 inch on both sides of building element.
    b. Size sleeve allowing minimum of 1 inch void between sleeve and building element.
    c. Install type of firestopping material recommended by manufacturer.
2. Install escutcheons where conduit, penetrates non-fire rated surfaces in occupied spaces. Occupied spaces include rooms with finished ceilings and where penetration occurs below finished ceiling.

3. Exterior wall openings below grade: Assemble rubber links of mechanical seal to size of conduit and tighten in place, in accordance with manufacturer's instructions.
4. Interior partitions: Seal pipe penetrations at telecommunication rooms. Apply sealant to both sides of penetration to completely fill annular space between sleeve and conduit.

3.5 INSTALLATION - EQUIPMENT BASES AND SUPPORTS

A. Using templates furnished with equipment, install anchor bolts, and accessories for mounting and anchoring equipment.

B. Construct supports of steel members or formed steel channel. Brace and fasten with flanges bolted to structure.

3.6 INSTALLATION - SLEEVES

A. Exterior watertight entries: Seal with adjustable interlocking rubber links.

B. Conduit penetrations not required to be watertight: Sleeve and fill with silicon foam.

C. Set sleeves in position in forms. Provide reinforcing around sleeves.

D. Size sleeves large enough to allow for movement due to expansion and contraction. Provide for continuous insulation wrapping.

E. Extend sleeves through floors 4 inches above finished floor level. Caulk sleeves.

F. Where conduit or raceway penetrates floor, ceiling, or wall, close off space between conduit or raceway and adjacent work with fire stopping insulation and caulk. Provide close fitting metal collar or escutcheon covers at both sides of penetration.

G. Install stainless steel escutcheons at finished surfaces.

3.7 FIELD QUALITY CONTROL

A. Divisions 00 and 01 - Field inspecting, testing, adjusting, and balancing.

B. Inspect installed firestopping for compliance with specifications and submitted schedule.

3.8 CLEANING

A. Divisions 00 and 01 - Requirements for cleaning.

B. Clean adjacent surfaces of firestopping materials.

3.9 PROTECTION OF FINISHED WORK

A. Divisions 00 and 01 - Requirements for protecting finished Work.

B. Protect adjacent surfaces from damage by material installation.

END OF SECTION

PART 1 GENERAL

1.1 SUMMARY

A. Section includes conduit and tubing, surface raceways, wireways, outlet boxes, pull and junction boxes, and handholes.

1.2 REFERENCES

A. American National Standards Institute:

1. ANSI C80.1 - Rigid Steel Conduit, Zinc Coated.
2. ANSI C80.3 - Specification for Electrical Metallic Tubing, Zinc Coated.

B. National Electrical Manufacturers Association:

1. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).
2. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies.
3. NEMA OS 1 - Sheet Steel Outlet Boxes, Device Boxes, Covers, and Box Supports.
4. NEMA OS 2 - Nonmetallic Outlet Boxes, Device Boxes, Covers, and Box Supports.
5. NEMA TC 2 - Electrical Polyvinyl Chloride (PVC) Tubing and Conduit.

C. National Fire Protection Association (NFPA):

1. 70 – National Electrical Code (NEC)

D. Underwriters Laboratories, Inc. (UL):

1. 1-93 – Flexible Metal Conduit
2. 5-96 – Surface Metal Raceway and Fittings
3. 6-97 – Rigid Metal Conduit
4. 50-95 – Enclosures for Electrical Equipment
5. 467-93 – Grounding and Bonding Equipment
6. 514A-96 – Metallic Outlet Boxes
7. 514B-97 – Fittings for Cable and Conduit
8. 797-93 – Electrical Metallic Tubing

1.3 SYSTEM DESCRIPTION

A. Raceway and boxes located as indicated on Drawings, and at other locations required for splices, taps, wire pulling, equipment connections, and compliance with regulatory

requirements. Raceway and boxes are shown in approximate locations unless dimensioned. Provide raceway to complete wiring system.

B. Underground More than 5 feet outside Foundation Wall: Provide schedule 40 PVC conduit. Provide cast metal boxes or nonmetallic handhole.

C. Underground Within 5 feet from Foundation Wall: Provide plastic coated RMC conduit. Provide cast metal or nonmetallic boxes.

D. Outdoor Locations, Above Grade: Provide rigid steel or electrical metallic tubing (above 6' A.F.F.). Provide cast metal or nonmetallic outlet, pull, and junction boxes.

E. In Slab Above Grade: Provide rigid steel conduit or thickwall nonmetallic conduit. Provide cast boxes.

F. Concealed Dry Locations: Provide electrical metallic tubing. Provide sheet-metal boxes. Provide flush mounting outlet boxes in finished areas. Provide hinged enclosure for large pull boxes.

G. Exposed Dry Locations: Provide rigid steel or electrical metallic tubing (EMT above 6' A.F.F.). Provide sheet-metal boxes. Provide flush mounting outlet box in finished areas. Provide hinged enclosure for large pull boxes.

1.4 DESIGN REQUIREMENTS

A. Minimum Raceway Size: 3/4 inch unless otherwise specified.

1.5 SUBMITTALS

A. Divisions 00 and 01 - Submittal Procedures: Submittal procedures.

B. Product Data: Submit for the following:

1. All types of conduit planned for the project.
2. Handholes, manholes, and NEMA 3R pullboxes.

C. Manufacturer's Installation Instructions: Submit application conditions and limitations of use stipulated by Product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, and installation of Product.

1.6 CLOSEOUT SUBMITTALS

A. Divisions 00 and 01 - Execution and Closeout Requirements: Closeout procedures.

B. Project Record Documents:

1. Record actual routing of conduits larger than 2 inch.
2. Record actual locations and mounting heights of outlet, pull, and junction boxes.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Divisions 00 and 01 - Product Requirements: Product storage and handling requirements.

B. Protect conduit from corrosion and entrance of debris by storing above grade. Provide appropriate covering.

1.8 COORDINATION

A. Divisions 00 and 01- Administrative Requirements: Coordination and project conditions.

B. Coordinate installation of outlet boxes for equipment connected under Section 26 05 00.

C. Coordinate mounting heights, orientation and locations of outlets mounted above counters, benches, and backsplashes.

PART 2 PRODUCTS

2.1 MATERIAL

A. General: Provide metal conduit, tubing and fittings of types, grades, sizes and weights (wall thickness) for each service indicated.

B. Where types and grades are not indicated, provide proper selection determined by installer to fulfill wiring requirements and comply with applicable portions of NEC for raceways.

C. Conduit Size: In accordance with the NEC, but not less than 3/4 inch unless otherwise shown. Where permitted by the NEC, 1/2inch flexible conduit may be used for tap connections to recessed lighting fixtures.

D. Conduit:

1. Rigid steel (RMC): UL 6, hot dipped galvanized, threaded type.
2. Electrical metallic tubing (EMT): U.L. 797. Maximum size 125 mm (5 inch). Permitted only with cable rated 600 volts or less.
3. Flexible steel conduit (commercial Greenfield): UL 1, formed from continuous length of spirally-wound, interlocked, zinc-coated strip steel. Permitted only with cable rated 600 volts or less.
4. Liquid-tight flexible metal conduit: Flexible galvanized steel tubing covered with extruded liquid-tight jacket of polyvinyl chloride (PVC). Provide conduit with a continuous copper bonding conductor wound spirally between convolutions. Permitted only with cable rated 600 volts or less.
5. Underground PVC plastic conduit: UL 651 and UL 651A, heavy wall PVC. Heavy Wall Conduit: C, UL-rated, constructed of Schedule 40, polyvinyl chloride. For direct burial, UL listed and in conformity with NEC Article 347.
6. Surface metal raceway: UL 5. Permitted only with cable rated 600 volts or less.

E. Conduit Fittings:

1. Rigid steel conduit fittings:

   a. Standard threaded couplings, locknuts, bushings, and elbows: Only steel or malleable iron materials are acceptable.

   b. Locknuts: Bonding type with sharp edges for digging into the metal wall of an enclosure.

   c. Bushings: Metallic insulation type, consisting of an insulating insert molded or locked into the metallic body of the fitting. Bushings made entirely of metal or nonmetallic material are not permitted.

   d. Erickson (union-type) and set screw type couplings: Approved for use to complete a conduit run where conduit is installed in concrete. Use set screws of case hardened steel with hex head and cup point to firmly seat in conduit wall for positive ground. Tightening of set screws with pliers is prohibited.

   e. Sealing fittings: Threaded cast iron type. Use continuous drain type sealing fitting to prevent passage of water vapor. In concealed work, install fittings in flush steel boxes with blank coverplates having the same finishes as that of other electrical plates in the room.

2. Electrical metallic tubing fittings:

   a. Only steel or malleable iron material are acceptable.

   b. Couplings and connectors: Concrete tight and rain tight, with connectors having insulated throats. Use gland and ring compression type couplings and connectors for conduit sizes over 50 mm (2 inches). If set screw type is used, then set screw or compression types are permitted for conduits less than 2 inches. Use set screws of case-hardened steel with hex head and cup point to firmly seat in wall of conduit for positive grounding.

   c. Indent type connectors of couplings prohibited.

   d. Die-cast or pressure-cast zinc-alloy fittings or fittings made of “pot metal” are prohibited.

3. Flexible steel conduit (greenfield) fittings:

   a. UL 5. Only steel or malleable iron materials are acceptable.

   b. Straight Terminal Connectors: One piece body. Female end with clamp and deep slotted machine screw for securing conduit and male threaded end provided with locknut.

   c. 45° or 90° Terminal Angle Connectors: Two-piece body construction with removable upper section, female end with clamp and deep slotted machine screw for securing conduit and male threaded end provided with locknut.

4. Liquid-tight flexible metal conduit fittings:

   a. Only steel or malleable iron materials are acceptable.

   b. Fittings must incorporate a threaded grounding cone, a steel or plastic compression ring, and a gland for tightening. Connectors shall have insulated throats.

5. Underground PVC plastic conduit fittings: As recommended by the conduit manufacturer. Make solvent cemented joints in accordance with recommendations of manufacturer.
6. Surface metal raceway fittings: As recommended by the raceway manufacturer.
7. Expansion and deflection couplings:
    a. UL 467 and UL 514B.
    b. Accommodate, 19 mm (0.75 inch) deflection, expansion, or contraction in any direction, and allow 30 degree angular deflections.
    c. Include internal flexible metal braid sized to guarantee conduit ground continuity and fault currents in accordance with UL 467, and the NEC code tables for ground conductors.
    d. Jacket: Flexible, corrosion-resistant, watertight, moisture and heat resistant molded rubber material with stainless steel jacket clamps.

F. Conduit Supports:
1. Parts and hardware: Zinc-coat or provide equivalent corrosion protection.
2. Individual Conduit Hangers: Designed for the purpose, having a pre-assembled closure bolt and nut, and provisions for receiving a hanger rod.
3. Multiple conduit (trapeze) hangers: Not less than 38 mm by 38 mm (1-1/2 by 1-1/2 inch), 12 gage steel, cold formed, lipped channels; with not less than 9 mm (3/8 inch) diameter steel hanger rods.
4. Solid Masonry and Concrete Anchors: Self-drilling expansion shields, or machine bolt expansion.

G. Outlet, Junction, and Pull Boxes:
1. UL-50 and UL-514A.
2. Cast metal where required by the NEC and equipped with waterproof, rustproof covers.
3. Sheet metal boxes: Galvanized steel, except where otherwise shown.

H. Wireways: Equip with hinged covers, except where removable covers are shown.

2.2 OUTLET BOXES

A. Manufacturers:
1. Carlon Electrical Products.
2. Hubbell Wiring Devices.
3. Thomas & Betts Corp.
4. Walker Systems Inc.

5. The Wiremold Co.

B. Sheet Metal Outlet Boxes: NEMA OS 1, galvanized steel.

1. Luminaire and Equipment Supporting Boxes: Rated for weight of equipment supported; furnish 1/2 inch male fixture studs where required.

2. Concrete Ceiling Boxes: Concrete type.

C. Nonmetallic Outlet Boxes: NEMA OS 2.

D. Cast Boxes: NEMA FB 1, Type FD, cast feralloy. Furnish gasketed cover by box manufacturer. Furnish threaded hubs.

E. Wall Plates for Finished Areas: As specified in Section 26 27 26.

F. Wall Plates for Unfinished Areas: Furnish gasketed cover.

2.3 PULL AND JUNCTION BOXES

A. Manufacturers:

1. Carlon Electrical Products.

2. Hubbell Wiring Devices.

3. Thomas & Betts Corp.

4. Walker Systems Inc.

5. The Wiremold Co.

B. Sheet Metal Boxes: NEMA OS 1, galvanized steel.

C. Hinged Enclosures: As specified in Section 26 27 16.

D. Surface Mounted Cast Metal Box: NEMA 250, Type 4X; flat-flanged, surface mounted junction box:

1. Material: Galvanized cast iron.

2. Cover: Furnish with ground flange, neoprene gasket, and stainless steel cover screws.

E. In-Ground Cast Metal Box: NEMA 250, Type 6, flanged, recessed cover box for flush mounting:

1. Material: Galvanized cast iron.

2. Cover: Nonskid cover with neoprene gasket and stainless steel cover screws.

3. Cover Legend: "ELECTRIC".

F. Fiberglass Concrete composite Handholes: Die-molded, glass-fiber concrete composite hand holes:

1. Cable Entrance: Minimum size required for conduits entering and existing.
2. Cover: concrete composite, weatherproof cover with nonskid finish, screw-down with inscription (“Electric”, “Low Voltage”, etc.).

PART 3 EXECUTION

3.1 EXAMINATION

A. Divisions 00 and 01 - Administrative Requirements: Coordination and project conditions.

B. Verify outlet locations and routing and termination locations of raceway prior to rough-in.

3.2 EXISTING WORK

A. Remove exposed abandoned raceway, including abandoned raceway above accessible ceiling finishes. Cut raceway flush with walls and floors, and patch surfaces.

B. Remove concealed abandoned raceway to its source.

C. Disconnect abandoned outlets and remove devices. Remove abandoned outlets when raceway is abandoned and removed. Install blank cover for abandoned outlets not removed.

D. Maintain access to existing boxes and other installations remaining active and requiring access. Modify installation or provide access panel.

E. Extend existing raceway and box installations using materials and methods as specified.

F. Clean and repair existing raceway and boxes to remain or to be reinstalled.

3.3 INSTALLATION

A. Ground and bond raceway and boxes in accordance with Section 26 05 26.

B. Fasten raceway and box supports to structure and finishes in accordance with Section 26 05 29.

C. Identify raceway and boxes in accordance with Section 26 05 53.

D. Arrange raceway and boxes to maintain headroom and present neat appearance.

3.4 INSTALLATION - RACEWAY

A. Raceway routing is shown in approximate locations unless dimensioned. Route to complete wiring system.

B. Arrange raceway supports to prevent misalignment during wiring installation.

C. Support raceway using coated steel or malleable iron straps, lay-in adjustable hangers, clevis hangers, and split hangers.

D. Group related raceway; support using conduit rack. Construct rack using steel channel specified in Section 26 05 29

E. Do not support raceway with wire or perforated pipe straps. Remove wire used for temporary supports

F. Do not attach raceway to ceiling support wires or other piping systems.

G. Construct wireway supports from steel channel specified in Section 26 05 29.

H. Route exposed raceway parallel and perpendicular to walls.

I. Route raceway installed above accessible ceilings parallel and perpendicular to walls.

J. Route conduit in and under slab from point-to-point.

K. Maximum Size Conduit in Slab Above Grade: ¾ inch. Do not cross conduits in slab larger than 1/2 inch.

L. Maintain clearance between raceway and piping for maintenance purposes.

M. Maintain 12 inch clearance between raceway and surfaces with temperatures exceeding 104 degrees F.

N. Cut conduit square using saw or pipe cutter; de-burr cut ends.

O. Bring conduit to shoulder of fittings; fasten securely.

P. Join nonmetallic conduit using cement as recommended by manufacturer. Wipe nonmetallic conduit dry and clean before joining. Apply full even coat of cement to entire area inserted in fitting. Allow joint to cure for minimum 20 minutes.

Q. Install conduit hubs to fasten conduit to sheet metal boxes in damp and wet locations and to cast boxes.

R. Install no more than equivalent of three 90 degree bends between boxes. Install conduit bodies to make sharp changes in direction, as around beams. Install factory elbows for bends in metal conduit larger than 2 inch size.

S. Avoid moisture traps; install junction box with drain fitting at low points in conduit system.

T. Install fittings to accommodate expansion and deflection where raceway crosses control and expansion joints.

U. Install suitable pull string or cord in each empty raceway except sleeves and nipples.

V. Install suitable caps to protect installed conduit against entrance of dirt and moisture.

W. Surface Raceway: Install flat-head screws, clips, and straps to fasten raceway channel to surfaces; mount plumb and level. Install insulating bushings and inserts at connections to outlets and corner fittings.

X. Close ends and unused openings in wireway.

3.5 INSTALLATION - BOXES

A. Install wall mounted boxes at elevations to accommodate mounting heights as indicated on Drawings.

B. Adjust box location up to 1 foot prior to rough-in to accommodate intended purpose.

C. Orient boxes to accommodate wiring devices oriented as specified in Section 26 27 26.

D. Install pull boxes and junction boxes above accessible ceilings and in unfinished areas only.

E. In Accessible Ceiling Areas: Install outlet and junction boxes no more than 6 inches from ceiling access panel or from removable recessed luminaire.

F. Locate flush mounting box in masonry wall to require cutting of masonry unit corner only. Coordinate masonry cutting to achieve neat opening.

G. Do not install flush mounting box back-to-back in walls; install with minimum 6 inches separation. Install with minimum 24 inches separation in acoustic rated walls.

H. Secure flush mounting box to interior wall and partition studs. Accurately position to allow for surface finish thickness.

I. Install stamped steel bridges to fasten flush mounting outlet box between studs.

J. Install flush mounting box without damaging wall insulation or reducing its effectiveness.

K. Install adjustable steel channel fasteners for hung ceiling outlet box.

L. Do not fasten boxes to ceiling support wires or other piping systems.

M. Support boxes independently of conduit.

N. Install gang box where more than one device is mounted together. Do not use sectional box.

O. Install gang box with plaster ring for single device outlets.

3.6 INTERFACE WITH OTHER PRODUCTS

A. Install conduit to preserve fire resistance rating of partitions and other elements, using materials and methods.

B. Route conduit through roof openings for piping and ductwork or through suitable roof jack with pitch pocket. Coordinate requirements, sealing, and locations with architect prior to work.

C. Locate outlet boxes to allow luminaires positioned as indicated on Drawings.

D. Align adjacent wall mounted outlet boxes for switches, thermostats, and similar devices.

3.7 ADJUSTING

A. Divisions 00 and 01 - Execution and Closeout Requirements: Testing, adjusting, and balancing.

B. Adjust flush-mounting outlets to make front flush with finished wall material.

C. Install knockout closures in unused openings in boxes.

3.8 CLEANING

A. Divisions 00 and 01- Execution and Closeout Requirements: Final cleaning.

B. Clean interior of boxes to remove dust, debris, and other material.

C. Clean exposed surfaces and restore finish.

END OF SECTION

PART 1 GENERAL

1.1 RELATED DOCUMENTS:

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Divisions 00 and 01 Specification sections, apply to work of this Section.

B. This Section is a Division 26 Basic Electrical Materials and Methods section, and is part of each Division 26 section making reference to electrical identification specified herein.

1.2 DESCRIPTION OF WORK

A. Extent of electrical identification work is indicated by drawings and schedules.

B. Types of electrical identification work specified in this Section include the following: Equipment/system identification signs.

PART 2 PRODUCTS

2.1 ELECTRICAL IDENTIFICATION MATERIALS:

A. Engraved Plastic-Laminate Signs:

1. General: Provide engraving stock melamine plastic laminate in sizes and thicknesses indicated, engraved with engraver's standard letter style of sizes and wording indicated; punched for mechanical fastening.
2. Signs shall be colored face with white core plies (letter color).
    a. Thickness: 1/16", except as otherwise indicated.
    b. Fasteners: Self-tapping stainless steel screws, except contact-type permanent adhesive where screws cannot, or should not, penetrate substrate.
    c. Nameplate colors shall be:
        1. Black – Normal, utility power, less than 600 Volts.
        2. Orange – Medium voltage power.
        3. Red – Fire alarm system.

B. Dymo-Labels: Identify all receptacles and wall switches (new and existing) with panelboard and branch circuit number. Attach to coverplate.

2.2 LETTERING AND GRAPHICS:

A. Coordinate names, abbreviations, and other designations used in electrical identification work with corresponding designations shown, specified, or scheduled. Provide numbers, lettering and wording as indicated, or if not otherwise indicated, as recommended by

manufacturer or as required for proper identification and operation/maintenance of electrical systems and equipment.

PART 3 EXECUTION

3.1 APPLICATION AND INSTALLATION:

A. General Installation Requirements:

1. Install electrical identification products as indicated, in accordance with manufacturer's written instructions and requirements of NEC.
2. Coordination: Where identification is to be applied to surfaces that require finish, install identification after painting.
3. Regulations: Comply with governing regulations and requests of governing authorities for identification of electrical work.

B. Equipment/System Identification:

1. General: Install engraved plastic-laminate sign on each major unit or electrical equipment in building; including central or master unit of each electrical system including communication/control/signal systems, unless unit is specified with its own self-explanatory identification or signal system. Provide text matching terminology and numbering of the contract documents and shop drawings. Provide signs for each unit of the following categories of electrical work:
    a. Panelboards, electrical cabinets and enclosures
    b. Access panels/doors to electrical facilities
    c. Transformers
    d. Generator control panels
    e. Switchgear, switchboards, ATSs
    f. Fire alarm equipment cabinets
    g. Disconnect switches, motor starters, and contractors, including current origination
    h. PMH Switches
    i. Equipotential grounding system
2. Install signs at locations indicated or, where not otherwise indicated, at location for best convenience of viewing without interference with operation and maintenance equipment. Secure to substrate with fasteners, except use adhesive where fasteners should not, or cannot, penetrate substrate.

END OF SECTION

PART 1 GENERAL

1.1 SUMMARY

A. Section includes distribution and branch circuit panelboards.

B. Related Sections:

1. Section 26052 - Grounding and Bonding for Electrical Systems.
2. Section 26055 - Identification for Electrical Systems.

1.2 REFERENCES

A. Institute of Electrical and Electronics Engineers:

1. IEEE C62.41 - Recommended Practice on Surge Voltages in Low-Voltage AC Power Circuits.

B. National Electrical Manufacturers Association:

1. NEMA AB 1 - Molded Case Circuit Breakers and Molded Case Switches.
2. NEMA ICS 2 - Industrial Control and Systems: Controllers, Contactors, and Overload Relays, Rated Not More Than 2000 Volts AC or 750 Volts DC.
3. NEMA ICS 5 - Industrial Control and Systems: Control Circuit and Pilot Devices.
4. NEMA KS 1 - Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum).
5. NEMA PB 1 - Panelboards.
6. NEMA PB 1.1 - General Instructions for Proper Installation, Operation, and Maintenance of Panelboards Rated 600 Volts or Less.

C. International Electrical Testing Association:

1. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.

D. National Fire Protection Association:

1. NFPA 70 - National Electrical Code.

E. Underwriters Laboratories Inc.:

1. UL 67 - Safety for Panelboards.
2. UL 1283 - Electromagnetic Interference Filters.
3. UL 1449 - Transient Voltage Surge Suppressors.

1.3 SUBMITTALS

A. Divisions 00 and 01- Submittal Procedures: Requirements for submittals.

B. Shop Drawings: Indicate as a minimum outline and support point dimensions, voltage, main bus ampacity, integrated short circuit ampere rating and circuit breaker arrangement and sizes.

C. Product Data: Submit catalog data showing specified features of standard products.

D. Complete nameplate data including manufacturer's name and catalog number.

1.4 CLOSEOUT SUBMITTALS

A. Divisions 00 and 01 - Execution and Closeout Requirements: Requirements for submittals.

B. Project Record Documents: Record actual locations of panelboards and record actual circuiting arrangements.

C. Operation and Maintenance Data: Submit spare parts listing; source and current prices of replacement parts and supplies; and recommended maintenance procedures and intervals.

1.5 QUALITY ASSURANCE:

A. Manufacturer's Qualifications: Firms regularly engaged in the manufacture of panelboards and enclosures, of types, sizes and ratings required; whose products have been in satisfactory use in similar service for not less than (5) five years.

B. Installer's Qualifications: A firm with at least three (3) years of successful installation experience on projects utilizing panelboards similar to those required for this project.

C. Codes and Standards:

1. Electrical Code Compliance: Comply with applicable local code requirements of the authority having jurisdiction and NEC Article 384 as applicable to the installation and construction of electrical panelboards and enclosures.

2. UL Compliance: Comply with applicable requirements of UL 67, "Electric Panelboards", and UL Codes 50, 869 and 1053 pertaining to panelboards, accessories and enclosures. Provide panelboard units that are UL listed and labeled.

1.6 MAINTENANCE MATERIALS

A. Furnish two of each panelboard key. Panelboards keyed alike to Owner's current keying system.

PART 2 PRODUCTS

2.1 PANELBOARDS

A. Panelboards shall be in accordance with UL, NEMA, NEC, and as shown on the drawings.

B. Panelboards shall be standard manufactured products. All components of the panelboards shall be the product and assembly of the same manufacturer. All similar units of all panelboards to be of the same manufacturer.

C. All panelboards shall be dead front safety type. Arrange sections for easy removal without disturbing other sections.

D. All panelboards shall be completely factory assembled with molded case circuit breakers.

E. Panelboards shall have main breaker or main lugs, bus size, voltage, phase, top or bottom feed, and flush or surface mounting as shown on scheduled and on the drawings.

F. Power Distribution Panelboards shall be Square D type 'I Line', General Electric type 'Spectra' or Cutler Hammer type 'PRL3a'. Voltage shall be indicated.

G. Lighting and Appliance: Panelboards shall be Square D type 'NQOD' or 'NF', General Electric A-series or 'S2', or Cutler-Hammer type PRL2. Panelboard boxes shall be five and three-fourths (5 ¾") deep. Voltage shall be as indicated.

H. Panelboards shall have the following features:

1. Nonreduced size copper bus bars, and connection straps bolted together and rigidly supported on molded insulators. Bus bar taps for panels with single pole branches shall be arranged for sequence phasing of branch circuit devices.
2. Full size neutral bar (unless shown otherwise on drawings), mounted on insulated supports.
3. Ground bar with sufficient terminals for all grounding wires. Buses braced for the available short circuit current. See drawings.
4. All breakers and phase bus connections shall be arranged so that it will be possible to substitute a 2-pole breaker for two single pole breakers, and a 3-pole breaker for three single pole breakers, when trip is 30 Amps or less and frame size is 100 amperes or less, without having to drill and tap the main bus bars at bus straps.
5. Design interior so that protective devices can be replaced without removing adjacent units, main bus connectors, and without drilling or tapping. Panel phase bus connections to protective devices shall not be riveted to the panel bus and shall be field removable by means of a screw driver.
6. Where designated on panel schedule as "space", include all necessary bussing, device support and connections. Provide blank cover for each space.
7. In two section panelboards, the main bus in each section shall be full size. The first section shall be furnished with subfeed or feed-through lugs as shown on drawings on the line side with cable connections to the second section. Panelboard sections with tapped bus or crossover bus are not acceptable.
8. Series rated panelboards are not permitted.
9. Provide keyed alike system for all panelboards. In existing buildings where new panels are installed, provide keyed alike locks as directed by owner.
10. Provide a type written directory card, metal holder, and transparent cover. Permanently mount holders on inside of doors.

I. Painting: Factory primed and painted.

2.2 MOLDED CASE CIRCUIT BREAKERS FOR PANELBOARDS

A. Breakers shall be UL listed and labeled, in accordance with the NEC, as shown on the drawings, and as specified.

B. Circuit breakers in panelboards shall be bolt on type on phase bus bar or branch circuit bar.

C. Molded case circuit breakers for lighting and appliance branch circuit panelboards shall have minimum interrupting rating as indicated.

D. Breaker features shall be as follows.

1. A rugged, integral housing of molded insulating material.
2. Silver alloy contacts.
3. Arc quenches and phase barriers for each pole.
4. Over-center, trip-free, toggle-type, quick-make, quick-break, operating mechanisms.
5. A trip element for each pole, thermal magnetic type with long time delay and instantaneous characteristics, a common trip bar for all poles and a single operator.
6. Electrically and mechanically trip free.
7. An operating handle which indicates ON, TRIPPED, and OFF positions.
    a. Line connections shall be bolted.
    b. Interrupting rating shall not be less than the maximum short circuit current available at the line terminals as indicated on the drawings.
8. An overload on one pole of a multipole breaker shall automatically cause all the poles of the breaker to open.
9. For circuit breakers being added to existing panelboards, coordinate the breaker type with existing panelboards. Modify the panel directory.
10. Factory assembled.
11. Construct breakers for mounting and operating in any physical position and operating in ambient temperature of 40°C.
12. Provide breakers with mechanical screw type removable connector lugs; /CU rated.

E. Circuit Breakers shall be UL Listed for air conditioning branch circuits.

2.3 SEPARATELY ENCLOSED MOLDED CASE CIRCUIT BREAKERS

A. Where separately enclosed molded case circuit breakers are shown on the drawings, provide circuit breakers in accordance with the applicable requirements of those specified for panelboards.

B. Enclosures are to be of the NEMA types shown on the drawings. Where the types are not shown, they are to be the NEMA type most suitable for the environmental conditions where the breakers are being installed.

PART 3 EXECUTION

3.1 EXISTING WORK

A. Disconnect abandoned panelboards and load centers. Remove abandoned panelboards and load centers.

3.2 INSTALLATION

A. Install panelboards in accordance with NEMA PB 1.1.

B. Install panelboards plumb.

C. Install recessed panelboards flush with wall finishes.

D. Installation shall be in accordance with NEC, as shown on the drawings, and as specified.

E. Locate panelboards so that the present and future conduits can be conveniently connected. Coordinate the sizes of the cabinets with designated closet space.

F. Tighten connectors and terminals, including screws and bolts, in accordance with equipment manufacturer's published torque-tightening values for equipment connectors.

G. Fasten enclosures firmly to walls and structural surfaces, ensuring that they are permanently and mechanically anchored.

H. Install a typewritten schedule of circuits in each. Schedules shall be typed on the panel directory cards and installed in the appropriate panelboards, incorporating all applicable contract changes pertaining to that schedule. Include the room numbers and items served on the cards.

I. Mount top of panelboard at 6'- 6". If panelboard length is longer than standard, then mount panelboard so that maximum height of the top circuit breaker above finished floor shall not exceed 1980 mm (78 inches). For panelboards, which are too high, mount panelboard so that the bottom of the cabinets will not be less than 150 mm (6 inches) above the finished floor.

J. For panelboards located in the areas accessible to the public, paint the exposed surfaces of the trims, doors, and boxes with finishes to match surrounding surfaces after the panelboards have been installed.

K. Circuit numbers indicated on the drawings are shown for the purpose of clarifying the grouping of outlets. The actual number assigned to the circuit in the panelboard shall suit the bussing and branch circuiting of the panel. Provide owner as-built drawings showing the actual circuit numbers being used for each device on each brand circuit.

L. Panelboards shall be installed complete with connectors and associated hardware for all circuit breakers and circuit breaker spaces listed in the panelboard schedule.

M. When connecting equipment to existing panelboards, the new and existing circuit breakers shall be identified. A new circuit directory card shall be provided.

N. Provide equipment grounding connections for panelboard enclosures as indicated.

O. Prior to energization, check panelboards for electrical continuity of circuits and for short-circuits.

P. Install filler plates for unused spaces in panelboards.

Q. Install engraved plastic nameplates in accordance with Section 26 05 53.

R. Install spare conduits out of each recessed panelboard to accessible location above ceiling. Minimum spare conduits: 5 empty ¾ inch Identify each as SPARE.

S. Ground and bond panelboard enclosure according to Section 26 05 26. Connect equipment ground bars of panels in accordance with NFPA 70.

3.3 FIELD QUALITY CONTROL

A. Divisions 00 and 01 - Field inspecting, testing, adjusting, and balancing.

B. Inspect and test in accordance with NETA ATS.

3.4 ADJUSTING

A. Divisions 00 and 01 - Requirements for starting and adjusting.

B. Measure steady state load currents at each panelboard feeder; rearrange circuits in panelboard to balance phase loads to within 20 percent of each other. Maintain proper phasing for multi-wire branch circuits.

C. Adjust operating mechanisms for free mechanical movement.

D. Touch-up scratched or marred surfaces to match original finishes.

END OF SECTION

PART 1 GENERAL

1.1 SUMMARY

A. Section includes wall switches; wall dimmers; receptacles; multioutlet assembly; and device plates and decorative box covers.

B. Related Sections:

1. Section 26053 - Raceway and Boxes for Electrical Systems: Outlet boxes for wiring devices.

1.2 REFERENCES

A. National Electrical Manufacturers Association:

NEMA WD 1	General Requirements for Wiring Devices
NEMA WD 6	Wiring Devices-Dimensional Requirements

B. National Fire Protection Association (NFPA):

70	National Electrical Code (NEC)

C. Underwriter’s Laboratories, Inc. (UL):

UL-5	Surface Metal Raceways and Fittings
UL-20	General-Use Snap Switches
UL-231	Power Outlets
UL-467	Grounding and Bonding Equipment
UL-498	Attachment Plugs and Receptacles
UL-943	Ground-Fault Circuit Interrupters

1.3 SUBMITTALS

A. Divisions 00 and 01 - Submittal Procedures: Submittal procedures.

B. Product Data: Submit manufacturer's catalog information showing dimensions, colors, and configurations.

1.4 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years experience.

PART 2 PRODUCTS

2.1 WALL SWITCHES

A. Manufacturers:

1. Pass & Seymour.
2. Cooper.
3. Hubbell.
4. Leviton.
5. Substitutions: Not permitted.

B. Toggle switches shall be totally enclosed tumbler type with bodies of phenolic compound. Toggle handles shall be ivory in color unless otherwise specified. The rocker type switch is not acceptable and will not be approved.

1. Shall be single unit toggle, butt contact, quiet AC type, heavy-duty general-purpose use with an integral self grounding mounting strap with break-off plasters ears and provisions for back wiring with separate metal wiring clamps and side wiring with captively held binding screws.
2. Shall be color coded for current rating, listed by Underwriters Laboratories, Inc., and meet the requirements of NEMA WD 1, Heavy-Duty and UL 20.
3. Ratings: 20 amperes at 120/277 volts AC.
    a. The switches shall be mounted on the striker plate side of doors.
    b. Incorporate barriers between switches with multigang outlet boxes where required by the NEC.
    c. Switches connected to isolated type electrical power systems shall be double pole.
    d. All toggle switches shall be of the same manufacturer.

2.2 RECEPTACLES

A. Manufacturers:

1. Pass & Seymour.
2. Cooper.
3. Hubbell.
4. Leviton.
5. Substitutions: Not permitted.

B. General: All receptacles shall be listed by Underwriters Laboratories, Inc.

1. Mounting straps shall be plated steel, with break-off plaster ears and shall include a self-grounding feature. Terminal screws shall be brass, brass plated or a copper alloy metal.

2. Receptacles shall have provisions for back wiring with separate metal clamp type terminals (four min.) and side wiring from four captively held binding screws.

C. Duplex receptacles shall be single phase, 20 Ampere, 120 Volts, 2-pole, 3-wire, and conform to the NEMA 5-20R configuration in NEMA WD 6. The duplex type shall have break-off feature for two-circuit operation. The ungrounded pole of each receptacle shall be provided with a separate terminal.

1. Bodies shall be ivory in color unless otherwise noted. All receptacles shall be unswitched.

D. Receptacles; 20, 30 and 50 ampere, 250 volts: Shall be complete with appropriate cord grip plug. Devices shall meet UL 231.

E. Weatherproof Receptacles: Shall consist of a duplex receptacle, mounted in box with a gasketed, weatherproof, clear plastic cover over receptacle. The weatherproof integrity shall not be affected when heavy duty specification or hospital grade attachment plug caps are inserted.

2.3 WALL PLATES

A. Wall plates for switches and receptacles shall be smooth nylon for finished areas. Oversize plates are not acceptable.

B. Nylon plates shall match color of device unless otherwise specified.

C. Standard NEMA design, so that products of different manufacturers will be interchangeable. Dimensions for openings in wall plates shall be accordance with NEMA WD1.

D. For receptacles or switches mounted adjacent to each other, wall plates shall be common for each group of receptacles or switches.

E. Wall plates for data, telephone or other communication outlets shall be as specified in the associated specification.

F. Dymo Labels, showing panel and circuit, shall be attached to each wall plate.

PART 3 EXECUTION

3.1 EXAMINATION

A. Divisions 00 and 01 - Administrative Requirements: Coordination and project conditions.

B. Verify outlet boxes are installed at proper height.

C. Verify wall openings are neatly cut and completely covered by wall plates.

D. Verify branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.

3.2 PREPARATION

A. Clean debris from outlet boxes.

3.3 EXISTING WORK

A. Disconnect and remove abandoned wiring devices.

B. Modify installation to maintain access to existing wiring devices to remain active.

C. Clean and repair existing wiring devices to remain or to be reinstalled.

3.4 INSTALLATION

A. Installation shall be in accordance with the NEC and NECA's "Standard of Installation", and in accordance with standard industry practices.

B. Install devices in clean boxes, free from dirt and debris.

C. Install wall plates after painting.

D. Wall plates shall not project out from wall.

E. Install a No.12 green ground wire from device grounding terminal to grounding bus in panelboard.

F. Install devices plumb and level.

G. Install switches with OFF position down.

H. Install wall dimmers to achieve full rating specified and indicated after derating for ganging as instructed by manufacturer.

I. Do not share neutral conductor on load side of dimmers.

J. Install receptacles with grounding pole on top if healthcare; bottom if commercial or industrial.

K. Connect wiring device grounding terminal to outlet box with green bonding jumper and branch circuit equipment grounding conductor.

L. Connect wiring devices by wrapping solid conductor around screw terminal. Install stranded conductor for branch circuits 10 AWG and smaller. When stranded conductors are used in lieu of solid, use crimp on fork terminals for device terminations. Do not place bare stranded conductors directly under device screws.

M. Use jumbo size plates for outlets installed in masonry walls.

N. Install galvanized steel plates on outlet boxes and junction boxes in unfinished areas, above accessible ceilings, and on surface mounted outlets in unfinished locations.

3.5 INTERFACE WITH OTHER PRODUCTS

A. Coordinate locations of outlet boxes provided under Section 26 05 33 to obtain mounting heights as indicated on drawings.

B. Install convenience receptacle 6 inches above back splash of counter unless otherwise noted or shown differently on architectural plans.

3.6 FIELD QUALITY CONTROL

A. Divisions 00 and 01 - Field inspecting, testing, adjusting, and balancing.

B. Inspect each wiring device for defects.

C. Operate each wall switch with circuit energized and verify proper operation.

D. Verify each receptacle device is energized.

E. Test each receptacle device for proper polarity.

F. Test each GFCI receptacle device for proper operation.

3.7 ADJUSTING

A. Divisions 00 and 01 - Testing, adjusting, and balancing.

B. Adjust devices and wall plates to be flush and level.

3.8 CLEANING

A. Divisions 00 and 01 - Execution and Closeout Requirements: Final cleaning.

B. Clean exposed surfaces to remove splatters and restore finish.

END OF SECTION

PART 1 GENERAL

1.1 SUMMARY

A. Section includes fusible and nonfusible switches.

1.2 REFERENCES

A. National Electrical Manufacturers Association:

1. NEMA FU 1 - Low Voltage Cartridge Fuses.
2. NEMA KS 1 - Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum).
3. ICS 1-00 – Industrial Control and Systems General Requirements.
4. ICS 1.1-03 – Safety Guidelines for the Application, Installation and Maintenance of Solid State Control.
5. ICS 2-00 – Industrial Control and Systems, Controllers, Contractors and Overload Relays Rated 600 Volts DC.
6. ICS 6-01 – Industrial Control and Systems Enclosures.
7. ICS 7-00 – Industrial Control and Systems Adjustable-Speed Drives
8. ICS 7.1-00 – Safety Standards for Construction and Guide for Selection, Installation and Operation of Adjustable-Speed Drive Systems.

B. International Electrical Testing Association:

1. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.

C. National Fire Protection Association (NFPA):

70	National Electrical Code (NEC)

D. Underwriters Laboratories, Inc (UL):

98	Enclosed and Dead-Front Switches
198C	High-Interrupting-Capacity Fuses, Current Limiting Types
198E	Class R Fuses
977	Fused Power-Circuit Devices
508	Industrial Control Equipment

1.3 SUBMITTALS

A. Divisions 00 and 01 - Submittal Procedures: Submittal procedures.

B. Product Data: Submit switch ratings and enclosure dimensions.

1.4 CLOSEOUT SUBMITTALS

A. Divisions 00 and 01 - Execution and Closeout Requirements: Closeout procedures.

B. Project Record Documents: Record actual locations of enclosed switches and ratings of installed fuses.

1.5 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years experience.

PART 2 PRODUCTS

2.1 FUSIBLE SWITCH ASSEMBLIES

A. Manufacturers:

1. Square D.
2. Cutler-Hammer.
3. G.E.
4. Substitutions: Not Permitted.

B. Product Description: Enclosed load interrupter knife switch.

C. Fuse clips: Designed to accommodate NEMA FU 1, Class R fuses.

D. Enclosure: NEMA KS 1, to meet conditions. Fabricate enclosure from steel finished with manufacturer's standard gray. Stainless steel if marine application.

1. Interior Dry Locations: Type 1.
2. Exterior Locations: Type 3R.

E. Furnish switches with entirely copper current carrying parts.

F. Shall be quick-make, quick-break type in accordance with UL 98, NEMA KS 1 and NEC.

G. Shall have a minimum duty rating, NEMA Heavy Duty (HD) classification for voltage required.

H. Shall be horsepower rated.

I. Shall have the following features:

1. Switch mechanism shall be the quick-make, quick-break type.

2. Copper blades, visible in the OFF position.
3. An arc chute for each pole.
4. External operating handle shall indicate ON and OFF position and shall have lock-open padlocking provisions.
5. Mechanical interlock shall permit opening of the door only when the switch is in the OFF position, defeatable by a special tool to permit inspection.
6. Fuse holders for the sizes and types of fuses specified.
7. Solid neutral for each switch being installed in a circuit which includes a neutral conductor.
8. Ground Lugs: One for each ground conductor.
9. Handle lockable in OFF position.
10. Entirely copper current carrying parts.

2.2 NONFUSIBLE SWITCH ASSEMBLIES

A. Shall be same as fusible switch assembly (2.1 above) except it shall not accept fuse.

2.3 SWITCH RATINGS

A. Switch Rating: Horsepower rated for AC or DC as indicated on Drawings.

B. Short Circuit Current Rating: UL listed for 10,000 rms symmetrical amperes minimum without fuses. 200,000 rms symmetrical amperes when used with or protected by Class R or Class J fuses (30-600 ampere switches employing appropriate fuse rejection schemes). 200,000 rms symmetrical amperes when used with or protected by Class L fuses (800-1200 ampere.

2.4 MOTOR STARTERS, GENERAL

A. Shall have the following features:
   1. Separately enclosed unless part of another assembly.
   2. Circuit breakers and safety switches within the motor controller enclosures shall have external operating handles with lock-open padlocking provisions and shall indicate the ON and OFF positions.
   3. Motor control circuits:
      a. Shall operate at not more than 120 Volts.
      b. Shall be grounded except as follows:
         1. Where isolated control circuits are shown.
         2. Where manufacturers of equipment assemblies recommend that the control circuits be isolated.

c. Incorporate a separate, heavy duty, control transformer within each motor controller enclosure to provide the control voltage for each motor operating over 120 Volts.

d. Incorporate over current protection for both primary and secondary windings of the control power transformers in accordance with the NEC.

4. Overload current protective devices:

a. Overload relay thermal.

b. One for each pole.

c. Manual reset on the door or each motor controller enclosure.

d. Correctly sized for the associated motor's rated full load current.

e. Check every motor controller after installation and verify that correct sizes of protective devices have been installed.

f. Deliver four copies of a summarized list to the owner, which indicates and adequately identifies every motor controller installed. Include the catalog numbers for the correct sizes of protective devices for the motor controllers.

5. Hand-Off-Automatic (H-O-A) switch is required unless specifically stated on the drawings as not required for a particular starter. H-O-A switch is not required for manual motor starters.

6. Incorporate into each control circuit a 120 Volt, solid state time delay relay (ON delay), minimum adjustable range from 0.3 to 10 minutes, with transient protection. Time delay relay is not required where H-O-A switch is not required.

7. Include 2 NO and 2 NC auxiliary contacts, pilot lights, pushbuttons and other devices and accessories as required.

8. Enclosures:

a. Shall be the NEMA types shown on the drawings for the motor controllers.

b. Shall be the NEMA types which are the most suitable for the environmental conditions where the motor controllers are being installed.

c. Doors mechanically interlocked to prevent opening unless the breaker or switch within the enclosure is open. Provision for padlock must be provided.

d. Enclosures shall be primed and finish coated at the factory with the manufacturer's prime coat and standard finish.

B. Motor controllers incorporated with equipment assemblies shall also be designed for the specific requirements of the assemblies.

C. For motor controllers being installed in existing motor control centers or panelboards, coordinate with the existing centers or panelboards.

D. Additional requirements for specific motor controllers, as indicated in other sections, shall also apply.

E. Provide a disconnecting means or safety switch near and within sight of each motor. Provide all wiring and conduit required to facilitate a complete and code complied installation.

2.5 MANUAL MOTOR STARTERS

A. Shall be in accordance with applicable requirements of 2.4 above.

B. Manual motor starters.

1. Starters shall be AC, general-purpose Class A, manually operated type with full voltage controller for induction motors, rated in horsepower.

2. Units shall include overload protection, red pilot light, NO auxiliary contact and toggle operator.

C. Fractional horsepower manual motor starters.

1. Starters shall be AC, general-purpose Class A, manually operated type with full voltage controller for fractional horsepower induction motors.

2. Units shall include thermal overload protection, red pilot light and toggle operator.

D. Motor starting switches.

1. Starters shall be AC, general-purpose Class A, manually operated type with full voltage controller for fractional horsepower induction motors.

2. Units shall include thermal overload protection, red pilot light and toggle operator.

2.6 MAGNETIC MOTOR STARTERS

A. Shall be in accordance with applicable requirements of 2.4 above.

B. Starters shall be AC, general-purpose, Class A magnetic controllers for induction motors rated in horsepower. Minimum size 0.

C. Where combination motor starters are used, combine starter with protective or disconnect device in a common enclosure.

D. Provide phase loss protection for each starter serving motors 10 h.p. or larger with contacts to de-energize the starter upon loss of any phase.

E. Combination magnetic, full voltage starters for three phase motors shall be three pole horsepower rated, magnetically operated switches with four auxiliary contacts.

PART 3 EXECUTION

3.1 EXISTING WORK

A. Disconnect and remove abandoned enclosed switches.

B. Maintain access to existing enclosed switches and other installations remaining active and requiring access. Modify installation or provide access panel.

C. Clean and repair existing enclosed switches to remain or to be reinstalled.

3.2 INSTALLATION

A. Install disconnect switches in accordance with the NEC.

B. Install enclosed switches plumb. Provide supports in accordance with Section 26 05 29.

C. Height: 5 feet to operating handle.

D. Install fuses for fusible disconnect switches.

E. Install engraved plastic nameplates in accordance with Section 26 05 53.

F. Apply adhesive tag on inside door of each fused switch indicating NEMA fuse class and size installed.

G. Install motor control equipment in accordance with manufacturer's recommendations, the NEC, NEMA and as shown on the drawings.

H. Install Variable Speed Motor Controllers in accordance with manufacturer's recommendations, the NEC, as shown on the drawings and in accordance with NEMA ICS 7.1.C.

I. Furnish and install heater elements in motor starters to match the installed motor characteristics.

J. Ensure proper direction of rotation of each motor.

K. Two weeks prior to the final inspection, provide one complete set of spare fuses (including heater elements) for each starter/controller installed on this project.

L. Motor starters or any other electrical equipment located in smoke or fire rated walls shall be mounted on Unistrut channels. Channels shall be supported from floor and structure above the ceiling. There shall be no penetrations of the fire rated assembly pursuant to the equipment installation.

M. Unless otherwise indicated, motor starters shown on the drawing shall be furnished and installed under this Section. The full load current and starting characteristics of each motor shall be verified for proper selection of motor over load devices.

N. Furnish and install all steel shapes, etc, necessary for a support of all motor starters.

O. Tighten connectors and terminals, including screws and bolts, in accordance with equipment manufacturer's published torque tightening values for equipment connectors.

3.3 IDENTIFICATION SIGNS

A. Install nameplate identification signs on each disconnect switch to identify the equipment controlled.

B. Nameplates shall be laminated black phenolic resin with a white core, with engraved lettering, a minimum of 6 mm (1/4 inch) high. Secure nameplates with screws.

3.4 FIELD QUALITY CONTROL

A. Division 00 and 01 - Field inspecting, testing, adjusting, and balancing.

B. Inspect and test in accordance with NETA ATS, except Section 4.

C. Perform inspections and tests listed in NETA ATS, Section 7.5.

END OF SECTION

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions Divisions 00 and 01 Specification sections, apply to work of this Section.

B. The Section is Division 26 Basic Electrical Materials and Methods section, and is a part of each Division 26 section making reference to electrical surge suppression specified herein.

1.2 DESCRIPTION OF WORK

A. The work required under this division shall include all materials, labor, and auxiliaries required to furnish and install complete surge suppression for the protection of building electrical and electronics systems from the effects of line-induced transient voltage surge and lightning discharge, as indicated on drawings or specified in this section.

B. Types of surge suppression specified in this section include the following:

1. Distribution and branch circuit panels.
2. Fire alarm control panel.

1.3 QUALITY ASSURANCE

A. All surge suppression devices shall be manufactured by a company normally engaged in the design, development, and manufacture of such devices for electrical and electronics systems equipment.

B. The surge suppressor manufacturer shall offer technical assistance through support by a factory representative and local stocking distributor.

C. Submittals: Surge suppression submittal shall include:

1. Manufacturer’s performance data on each suppressor type.
2. Dimensioned drawing of each suppressor type.

D. Equipment Certification: Items shall be listed by Underwriters’ Laboratories, shall bear the UL seal, and be marked in accordance with referenced standard.

E. Surge suppression devices shall be installed and located in accordance with requirements of all applicable National Fire Protection Association (NFPA) Codes.

1.4 WARRANTY

A. All surge suppression devices shall be warranted to be free from defects in materials and workmanship under normal use in accordance with the instructions provided for a period of five (5) years.

B. Any suppressor which shows evidence of failure or incorrect operating during the warranty period shall be repaired or replaced by the manufacturer and installer.

1.5 CODES AND STANDARDS

A. The following standards and publications are referenced in various parts of this specification and shall apply:

UL 1449, 3rd Edition	Standard for Safety, Transient Voltage Surge Suppressors.
ANSI/IEEE C62.41 (IEEE 587)	Guide for Surge Voltages in Low-Voltage AC Power Circuits.
ANSI/IEEE C62.33	Standard Test Specifications for Varistor Surge Protection Devices.
ANSI/IEEE C62.45	IEEE Guide for Surge Testing for Equipment Connected to Low-Voltage AC Power Circuits.

1.6 REQUIRED SUPPRESSORS

A. Provide surge suppression for the equipment described herein:

1. On distribution and branch circuit panels as shown in the project drawings.
2. On 120 volt power connections for the fire alarm control panel.
3. On all equipment identified in the project drawings.

PART 2 PRODUCTS

2.1 SUPPRESSORS

A. The surge suppressor manufacturer shall offer a complete line of surge suppression products to support the required suppressors listed in Part 1.

B. The service entrance surge suppressors shall be designed with replaceable modules for purposes of in-service replacement. The unit suppressor shall be designed with redundant back-up surge protection in the event of a module failure.

C. Module status indicators shall be provided to indicate individual module status. When a module has failed, the module LED status indicator shall indicate said failure.

D. Unit status indicators shall be provided to indicate the status of the complete unit suppressor. The LED status indicators shall be located on the hinged front cover to redundantly indicate module or unit failure. The unit suppressor shall include alarm contacts (one N.O. and one N.C.) for remote annunciation of unit status.

E. Suppressors shall be designed for the specific type and voltage of electrical service and shall provide clamping action for both normal (L-N) and common (L-N-G) mode protection.

F. Service entrance suppressors shall utilize normal and common modes of protection - each phase line to neutral, each phase line to ground and neutral to ground.

G. Distribution and branch circuit panel suppressors shall utilize protection of each phase line to ground and neutral to ground (if neutral conductor present).

H. Suppressors shall be of a hybrid design and include circuitry with tight, wave-tracking clamping characteristics.

I. Suppressors shall be designed to withstand a maximum continuous operating voltage of not less than 115% of nominal RMS line voltage.

J. Suppressors shall utilize internal safety fusing or a UL/IEEE approved method to disconnect the suppressor from the electrical source if the method to disconnect the suppressor from the electrical source if the suppressor fails. The suppressor shall he internally protected from fault current damage as a result of a suppressor failure.

K. Each suppressor shall have an internal disconnect switch when not connected to a separate circuit breaker or fused disconnect switch which is dedicated specifically for the suppressor.

L. Suppressors shall be failsafe, shall allow no follow-through current, shall have repeated surge capability, shall be solid state, shall be self-restoring, and shall be fully automatic.

M. Suppressors shall be UL 1449, 3rd Edition listed and shall be approved for the location in which they are installed.

N. Suppressors shall have an operating temperature range of -40°C to +85°C.

2.2 SUPRESSOR MANUFACTURER AND PART NUMBERS

A. Shall be as shown on drawings or equivalent.

PART 3 EXECUTION

3.1 INSTALLATION OF SUPPRESSORS:

A. Suppressors shall be installed as close as practical to the electric panel or electronic equipment to be protected, consistent with available space. Suppressors shall be close nippled to the device being protected in a position near the point of connections, which will minimize lead length between the suppressor connects. Suppressor leads shall not extend beyond the suppressor manufacturer's recommended maximum lead length without specific approval of the engineer.

B. Suppressors shall be installed in a neat, workmanlike manner. Lead dress shall be as short and as straight as possible and be consistent with recommended industry practices for the system on which these devices are installed.

C. Supplementary grounding and bonding connections required between the bonding bus or ground plane for each equipment cluster and other locations as indicated herein shall be accomplished using #6 AWG core copper conductor and approved connections, unless otherwise noted. Referenced to a common earth ground.

D. Suppressors shall be installed in a manner that allows simple replacement within short periods of downtime.

E. Service entrance and panel type suppressors shall be installed with a means of disconnecting the suppressor. If no dedicated circuit breaker is included in panel, manufacturer shall provide an integral fused disconnect.

F. The surge suppression equipment shall be UL listed and installed per the NEC and the manufacturer's specifications.

END OF SECTION

PART 1 GENERAL

1.1 SUMMARY

A. Section includes interior luminaires, lamps, ballasts, and accessories.

B. Related Sections:

1. Section 26052.6 - Grounding and Bonding for Electrical Systems.
2. Section 26053 - Raceway and Boxes for Electrical Systems.

1.2 REFERENCES - LATEST EDITIONS OF:

A. American National Standards Institute:

ANSI C82.1	American National Standard for Lamp Ballast-Line Frequency Fluorescent Lamp Ballast.
ANSI C82.4	American National Standard for Ballasts-for High-Intensity-Discharge and Low-Pressure Sodium Lamps (Multiple-Supply Type)

B. National Fire Protection Association (NFPA):

70	National Electrical Code (NEC)
101	Life Safety Code

C. National Electrical Manufacturer's Association (NEMA):

C82.1	Ballasts for Fluorescent Lamps – Specifications
C82.2	Method of Measurement of Fluorescent Lamp Ballasts

D. Underwriters Laboratories, Inc. (UL):

496	Edison-Base Lampholders
542	Lampholders, Starters, and Starter Holders for Fluorescent Lamps
844	Electric Lighting Fixtures for Use in Hazardous (Classified) Locations
924	Emergency Lighting and Power Equipment
935	Fluorescent-Lamp Ballasts
1029	High-Intensity-Discharge Lamp Ballasts
1598	Luminaires

1.3 SUBMITTALS

A. Divisions 00 and 01 - Submittal Procedures: Submittal procedures.

B. Shop Drawings: Indicate dimensions and components for each luminaire not standard product of manufacturer.

C. Product Data: Submit dimensions, ratings, and performance data.

D. Samples: When requested, submit two color chips 3 x 3 inch in size illustrating luminaire finish color where indicated in luminaire schedule.

E. Product Data: Submit manufacturer's product data and installation instructions on each type building lighting fixture, lamp type and ballast.

F. Shop Drawings: Submit fixture shop drawings in booklet form, with separate sheet for each fixture assembled in "luminaire type" alphabetical or numerical order, with proposed fixture and accessories clearly indicated on each sheet. Submit details indicating compatibility with ceiling grid system.

1. Sufficient information, clearly presented, shall be included to determine compliance with drawings and specifications.

2. Include electrical ratings, dimensions, mounting details, materials, required clearances, terminations, wiring and connection diagrams, photometric data, ballasts, lenses, louvers, lamps, and controls.

1.4 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years experience.

PART 2 PRODUCTS

2.1 INTERIOR LUMINAIRES

A. Product Description: Complete interior luminaire assemblies, with features, options, and accessories as scheduled.

B. Refer to Divisions 00 and 01 - Product Requirements for product options. Substitutions are not permitted.

C. Shall be in accordance with NFPA 70, UL 1598 and shall be as shown on drawings and as specified.

D. Sheet Metal:

1. Shall be formed to prevent warping and sagging. Housing, trim and lens frame shall be true, straight (unless intentionally curved) and parallel to each other as designed.

2. Wireways and fittings shall be free of burrs and sharp edges and shall accommodate internal and branch circuit wiring without damage to the wiring.

3. Where lighting fixtures are detailed with minimum 20 gauge housing, minimum 22 gauge housings will be acceptable provided they have strengthening embossed rib and break formations, which give the equivalent rigidity of a 20 gauge housing.

4. When installed, any exposed fixture housing surface, trim frame, door frame and lens frame shall be free of light leaks; lens doors shall close in a light tight manner.

5. Hinged door closure frames shall operate smoothly without binding when the fixture is in the installed position, and latches shall function easily by finger action without the use of tools.

E. Ballasts shall be serviceable while the fixture is in its normally installed position, and shall not be mounted to removable reflectors or wireway covers unless so specified.

F. Lamp Sockets:

1. Fluorescent: Lampholder contacts shall be the biting edge type or phosphorous-bronze with silver flash contact surface type and shall conform to the applicable requirements of UL 542. Contacts for recessed double contact Lampholders and for slimline Lampholders shall be silver plated. Lampholders for bi-pin lamps, with the exception of those for “U” type lamps, shall be of the telescoping compression type, or of the single slot entry type requiring a one-quarter turn of the lamp after insertion.

G. Fluorescent fixtures with louvers or light transmitting panels shall have hinges, latches and safety catches to facilitate safe, convenient cleaning and relamping. Vapor tight fixtures shall have pressure clamping devices in lieu of the latches.

H. Mechanical Safety: Lighting fixture closures (lens doors, trim frame, hinged housings, etc.) shall be retained in a secure manner by captive hinges or fasteners such that they cannot be accidentally dislodged during normal operation or routine maintenance.

I. Metal Finishes:

1. The manufacturer shall apply his standard finish (unless otherwise specified) over a corrosion resistant primer, after cleaning to free the metal surfaces of rust, grease, dirt and other deposits. Edges of pre-finished sheet metal exposed during forming, stamping or shearing processes shall be finished in a similar corrosion resistant manner to match the adjacent surface (s). Fixture finish shall be free of stains or evidence of rusting, blistering, or flaking. All metal parts shall be painted after fabrication.

2. Interior light reflecting finishes shall be white with not less than 85 percent reflectance, except where otherwise shown on the drawing.

3. Exterior finishes shall be as shown on the drawings.

J. Provide all lighting fixtures with a specific means for grounding their metallic wireways and housings to an equipment grounding conductor.

K. Light Transmitting Components for Fluorescent Fixtures:

1. Lenses: Plastic lenses where specified for enclosed prismatic fluorescent lighting fixtures shall be acrylic and have minimum overall thickness including prism of 0.125 inches.
2. Unless otherwise specified, lenses, diffusers and louvers shall be retained firmly in a metal frame by clips or clamping ring in such a manner as to allow expansion and contraction of the lens without distortion or cracking.

L. Lighting Fixtures in Hazardous Areas: Fixtures shall be suitable for installation in flammable atmospheres (Class and Group) as defined in NFPA 70 and shall comply with UL 844.

M. Compact fluorescent fixtures shall be manufactured specifically for compact fluorescent lamps with ballasts integral to the fixture. Assemblies designed to retrofit incandescent fixtures are prohibited except when specifically indicated for renovation of existing fixtures. Fixtures shall be designed for lamps as specified.

2.2 FLUORESCENT BALLASTS

A. Ballasts (Electronic):

1. Ballasts for fluorescent lamps shall be high frequency electronic for use with Octic type (265mA) lamps. The total harmonic distortion (%THD) shall be less than 10%. The power factor shall be .95 or higher.
2. Electronic ballasts for fluorescent lamps shall be General Electric (Magnetek), Osram Sylvania Quicktronic, Advance, or Lutron.
3. All ballasts shall be individually fused on the line side of the ballast.
4. All ballasts shall bear the ETL/CBM and UL labels.
5. Shop drawings shall be submitted for ballast types.
6. Instant start ballasts shall be used with non-occupancy sensor controlled luminaries; programmed rapid start ballasts shall be used for occupancy sensor controlled luminaries.

2.3 LAMPS

A. Manufacturers:

1. Sylvania.
2. Phillips.
3. G.E.
4. Substitutions: Not Permitted.

B. Lamps: Fluorescent lamps shall have a minimum 85 CRI, 2950 initial lumens, 4100K, otherwise, all lamps shall be ‘TCLP’ compliant. T-8, U-shaped lamps shall have 6” spacing between ends. Shop drawings shall be submitted for all lamp types.

2.4 CONTROLS

A. Controls shall be electronic switching and dimming panels, wall stations, photocells, occupancy sensors, etc, as shown on drawings. Provide and install complete and operable lighting control system as shown on drawings.

PART 3 EXECUTION

3.1 EXISTING WORK

A. Install lighting fixtures at locations and heights as indicated, in accordance with fixture manufacturer's written instructions, applicable requirements of NEC, NECA's "Standard of Installation", NEMA standards, and with recognized industry practices to ensure that lighting fixtures fulfill requirements.

B. Clean and repair existing interior luminaires to remain or to be reinstalled.

3.2 INSTALLATION

A. Installation shall be in accordance with NEC

B. Install suspended luminaires using pendants supported from swivel hangers. Install pendant length required to suspend luminaire at indicated height.

C. Support luminaires larger than 2 x 4 foot size independent of ceiling framing.

D. Locate recessed ceiling luminaires as indicated on Drawings.

E. Install surface mounted luminaires plumb and adjust to align with building lines and with each other. Secure to prevent movement.

F. Install recessed luminaires to permit removal from below.

G. Install recessed luminaires using accessories and firestopping materials to meet regulatory requirements for fire rating.

H. Install clips to secure recessed grid-supported luminaires in place.

I. Install wall-mounted luminaires at height as indicated on Drawings.

J. Install accessories furnished with each luminaire.

K. Connect luminaires to branch circuit outlets provided under Section 26 05 33 using flexible conduit.

L. Make wiring connections to branch circuit using building wire with insulation suitable for temperature conditions within luminaire.

M. Install specified lamps in each luminaire.

N. Interface with air handling accessories furnished and installed by Division 15.

O. Ground and bond interior luminaires in accordance with Section 26 05 26.

P. Examination: Examine areas and conditions under which lighting fixtures are to be installed and substrate for supporting lighting fixtures, including architectural elevations and sections. Notify owner in writing of condition detrimental to installation of fixtures or completion of work. Do not proceed with work until unsatisfactory conditions have been corrected in a manner acceptable to installer.

Q. Align, mount and level the lighting fixtures uniformly.

R. Provide fixtures and/or fixture outlet boxes with hangers to properly support fixture weight. Submit design of hangers, method of fastening, other than indicated or specified herein, for review by owner.

S. Install flush-mounted fixtures properly to eliminate light leakage between fixture frame and finished surface.

T. Provide plaster frames for recessed fixtures installed in other than suspended grid type acoustical ceiling systems. Brace frames temporarily to prevent distortion during handling.

U. Fasten fixtures securely to indicate structural supports and ensure that pendant fixtures are plumb and level.

V. Lay-in fixtures shall have T-bar clips installed.

W. Tighten connectors and terminals, including screws and bolts, in accordance with equipment manufacturer's published torque tightening values for equipment connectors.

X. Support surface mounted fixtures greater than two feet (2') in length at a point in addition to the outlet box fixture stud.

Y. Avoid interference with and provide clearance for equipment. Where the indicated locations for the lighting fixtures conflict with the locations for equipment, change the locations for the lighting fixtures by the minimum distances necessary as approved by the owner.

Z. For suspended lighting fixtures, the mounting heights shall provide the clearances between the bottoms of the fixtures and the finished floors as shown on the drawings.

AA. Wall mounted fluorescent light fixtures shall be attached to the studs in the walls. Attachment to gypsum board only is not acceptable.

BB. Lighting Fixture Supports:

1. Shall provide support for all of the fixtures. Supports may be anchored to channels of the ceiling construction, to the structural slab or to structural members within a partition, or above a suspended ceiling.

2. Shall maintain the fixture positions after cleaning and relamping.
3. Shall support the lighting fixtures without causing the ceiling or partition to deflect.
4. Hardware for recessed fluorescent fixtures:
    a. Where the suspended ceiling system is supported at the four corners of the fixture opening, hardware devices shall clamp the fixture to the ceiling system structural members, or plaster frame at not less than four points in such a manner as to resist spreading of the support members and safely lock the fixture into the ceiling system.
    b. Where the suspended ceiling system is not supported at the four corners of the fixture opening, hardware devices shall independently support the fixture from the building structure at four points.
5. Hardware for surface mounting fluorescent fixtures to suspended ceilings:
    a. In addition to being secured to any require outlet box, fixtures shall be bolted to a grid ceiling system at four points spaced near the corners of each fixture. The bolts shall be not less than 6 mm (1/4 inch) secured to channel members attached to and spanning the tops of the ceiling structural grid members. Non-turning studs may be attached to the ceiling structural grid members or spanning channels by special clips designed for the purpose, provided they lock into place and require simple tools for removal.
    b. In addition to being secured to any required outlet box, fixtures shall be bolted to a plaster ceiling at four points spaced near the corners of each fixture. Pre-positioned 6 mm (1/4 inch) studs or threaded plaster inserts secured to ceiling structural members shall be used to bolt the fixtures to the ceiling. In lieu of the above, 6 mm (1/4 inch) toggle bolts may be used on new or existing ceiling provided the plaster and lath can safely support the fixtures without sagging or cracking.

CC. Furnish and install the specified lamps for all lighting fixtures installed and all existing lighting fixtures reinstalled under this project.

DD. Coordinate between the electrical and ceiling trades to ascertain that approved lighting fixtures are furnished in the proper sizes and installed with the proper devices (hangers, clips, trim frames, flanges), to match the ceiling system being installed.

EE. At completion of project, relamp all fixtures which have failed/burned-out lamps. Clean all fixtures, lenses, diffusers and louvers that have accumulated dust/dirt during construction.

FF. Protect installed fixtures for damage during remainder of construction period.

GG. Install lighting control system and components as shown on drawings. System shall be a complete and operable system including all cabling, components, conduits, panels, devices, controls, etc. required. Basis of design is Lutron. Equivalent products and manufacturers are acceptable but must be shown in all aspects to be equivalent. Include manufacturer commissioning, testing, start up, and owner training equivalent to Lutron’s standard for alternate products. Manufacturer shall have authorized service within 4 hours of project location.

3.3 FIELD QUALITY CONTROL

A. Divisions 00 and 01 - Field inspecting, testing, adjusting, and balancing.

B. Operate each luminaire after installation and connection. Inspect for proper connection and operation.

3.4 ADJUSTING

A. Divisions 00 and 01 - Execution and Closeout Requirements: Testing, adjusting, and balancing.

B. Aim and adjust luminaries.

3.5 CLEANING

A. Divisions 00 and 01 - Execution and Closeout Requirements: Final cleaning.

B. Remove dirt and debris from enclosures.

C. Clean photometric control surfaces as recommended by manufacturer.

D. Clean finishes and touch up damage.

3.6 PROTECTION OF FINISHED WORK

A. Divisions 00 and 01 - Execution and Closeout Requirements: Protecting finished work.

B. Relamp luminaires having failed lamps at Substantial Completion.

END OF SECTION

PART 1 GENERAL

1.1 DESCRIPTION

A. This section specifies the furnishing, installation, and connection of exterior luminaries, controls, poles and supports.

1.2 RELATED WORK

A. Section 26050, COMMON WORK RESULTS FOR ELECTRICAL: General electrical requirements and items that are common to more than one section of Division 16.

B. Section 26053, IDENTIFICATION FOR ELECTRICAL SYSTEMS: Conduits, fittings, and boxes for raceway systems.

C. Section 26051, LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES: Low voltage power and lighting wiring.

D. Section 26052.6, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS: Requirements for personnel safety and to provide a low impedance path for possible ground fault currents.

1.3 SUBMITTALS

A. Submit in accordance with Section 26 05 00, COMMON WORK RESULTS FOR ELECTRICAL.

B. Shop Drawings:

1. Sufficient information, clearly presented, shall be included to determine compliance with drawings and specifications.

2. Include electrical ratings, dimensions, mounting, details, materials, required clearances, termination, wiring and connection diagrams, photometric data, ballasts, poles, luminaries, lamps and controls.

1.4 APPLICABLE PUBLICATIONS

A. Publications listed below (including amendments, addenda, revisions, supplements and errata) form a part of this specification to the extent referenced. Publications are referenced in the text by the basic designation only.

B. American Society for Testing and Materials (ASTM):

A123/A123M	Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
A153/A153M	Zinc Coating (Hot-Dip) on Iron and Steel Hardware - AASHTO.:M232

C. American Concrete Institute (ACI):

318	Building Concrete Code Requirements for Structural Concrete

D. American National Standards Institute (ANSI):

C81.61	Electrical Lamp Bases

E. Illuminating Engineering Society of North America (IESNA):

HB-9	Lighting Handbook

F. National Electrical Manufacturers Association (NEMA):

C82.4	Ballasts for High-Intensity-Discharge and Low-Pressure Sodium Lamps (Multiple-Supply Type)
ICS 2	Industrial Control and Systems Controllers, Contactors and Overload Relays Rated 600 Volts
ICS 6	Industrial Control and Systems Enclosures

G. National Fire Protection Association (NFPA):

70	National Electrical Code (NEC)

H. Underwriters Laboratories, Inc. (UL):

496	Edison-Base Lamp Holders
1029	High-Intensity-Discharge Lamp Ballasts
1598	Luminaires

PART 2 PRODUCTS

2.1 FOUNDATIONS FOR POLES

A. Foundations shall be cast-in-place concrete.

B. Foundations shall support the effective projected area of the specified pole, arm(s), and luminaire(s) under wind conditions as required by the latest edition of the Florida Building Code.

C. Rub-finish and round all above-grade concrete edges to approximately 6 mm (1/4 inch) radius.

D. Anchor bolt assemblies and reinforcing of concrete foundations shall be as shown on the drawings and meet ACI 318. Anchor bolts shall be in a welded cage or properly positioned by the tie wire to stirrups.

E. Prior to concrete pour, install a copperclad steel ground rod, not less than 19 mm (3/4 inch) diameter by 3000 mm (10 feet) long, below each foundation. Drive the rod vertically under the foundation so not less 1800 mm (six feet) of rod is in contact with the earth. Remainder of rod may be in the concrete pour. Where rock or layered rock is present, drill a hole not less than 50 mm (two inches) in diameter and 1800 mm (six feet) deep, backfill with tamped fine sand and drive the rod into the hole. Bond the rod to the pole with not less than number 6 AWG bare copper wires. The method of bonding shall be approved for the purpose.

F. See drawings for additional requirements.

2.2 LAMPS

A. Install the proper lamps in every luminaire installed and every luminaire relocated or reinstalled.

B. Lamps to be general-service, outdoor lighting types.

C. Metal-Halide Lamps:

70 Watt	NEMA C78.1381.
175 Watt	NEMA C78.1377.
250 Watt	NEMA C78.1378.
400 Watt	NEMA C78.1375.
1000 Watt	NEMA C78.1376
1500 Watt	NEMA C78.1379

2.3 HIGH INTENSITY DISCHARGE BALLASTS

A. Replace ballasts that are defective in all relocated fixtures. For low voltage systems, the ballasts shall be the high efficiency, high power factor, copper-wound constant wattage type and shall meet the requirements of UL 1029 and NEMA C82.4.

1. Ballasts shall operate the discharge lamp of the type, wattage, and voltage shown on the drawings.
2. Ballasts shall have individual overcurrent protection (inline fuse holder) as recommended by the ballast manufacturer.
3. Ballasts shall be capable of providing reliable starting of the lamps at minus 30 degrees C.
4. Ballasts shall have restrike protection

B. Locate protective devices for ballasts to be accessible if the devices are not integral with ballasts.

C. Each ballast shall operate not more than one lamp except where otherwise shown on the drawing.

2.4 EXISTING LIGHTING SYSTEMS

A. For modifications or additions to existing lighting systems, the new components shall be compatible with the existing systems.

B. New poles and luminaries shall have approximately the same configurations and dimensions as the existing poles and luminaries except where otherwise shown on the drawings.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install lighting in accordance with the NEC, as shown on the drawings, and in accordance with manufacturer's recommendations..

B. Poles:

1. Provide pole foundations with galvanized steel anchor bolts, threaded at the top end and bent 1.57 rad 90 degrees at the bottom end. Provide galvanized nuts, washers, and ornamental covers for anchor bolts. Thoroughly compact backfill with compacting arranged to prevent pressure between conductor, jacket, or sheath and the end of conduit ell. Adjust poles as necessary to provide a permanent vertical position with the bracket arm in proper position for luminaire location.

2. After the poles have been installed, shimmed and plumbed, grout the spaces between the pole bases and the concrete base with non-shrink concrete grout material. Provide a plastic or copper tube, or not less than 9 mm (3/8 inch) inside diameter, through the grout tight to the top of the concrete base for moisture weeping.

C. Foundation Excavation: Depth shall be as required. Dig holes large enough to permit the proper use of tampers to the full depth of the hole. Place backfill in the hole in 150 mm (6 inch) maximum layers thoroughly tamp. Place surplus earth around the pole in a conical shape and pack tightly to drain water away.

3.2 GROUNDING

A. Ground noncurrent-carrying parts of the equipment including metal poles, luminaries, mounting arms, brackets, and metallic enclosures as specified in Section 26 05 26, Grounding and Bonding for Electrical Systems. Where copper grounding conductor is connected to a metal other than copper, provide specially treated or line connectors suitable and listed for this purpose.

3.3 CONTROLS

1. Controls shall be as shown on drawings.

END OF SECTION