UNIVERSITY OF CALIFORNIA, SANTA BARBARA

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OFFICE OF DESIGN & CONSTRUCTION SERVICES and PHYSICAL FACILITIES

CONTRACTING SERVICES
Building 439
Santa Barbara, California 93106-1030
Telephone (805) 893-3356
Fax (805) 893-8592

SENT VIA:
- ☐ FAX ON THIS DATE
- ☐ HAND DELIVERY ON THIS DATE
- ☒ FEDERAL EXPRESS ON THIS DATE
- ☐ UNITED PARCEL SERVICE ON THIS DATE

HOLDERS OF PLANS AND SPECIFICATIONS:

Valentine Lab Renovation, CNSI Building 266, Room 2404
Project No. FM080264SR/987703
Addendum No. One

September 26, 2008

Enclosed is **ADDENDUM NO. One** to the Construction Documents on the above-captioned project.

Bid date has been changed from 2:30PM on Thursday, October 2, 2008 to **Tuesday, October 7, 2008 at 2:30PM** to be held at:

CONTRACTING SERVICES
Facilities Management, Bldg. 439,
Door #E, Reception Counter
University of California, Santa Barbara
Santa Barbara, CA 93106-1030.

Late arrivals shall be disqualified. Please allow time for unforeseen traffic delays, securing a parking permit and potential parking problems.

Anna Galanis
Director, Contracting Services

ADDENDUM NUMBER ONE

to the

Construction Documents
September 26, 2008

GENERAL

The following changes, additions or deletions shall be made to the following document(s) as Indicated; all other conditions shall remain the same.

I. ADVERTISEMENT FOR BIDS RE-BID

Item No.

1. Second page, sentence beginning with "Bid Deadline", **Change** to read in it's entirety: " Bid Deadline: Sealed bids must be received on or before 2:30 P.M. on Tuesday, October 7, 2008. Sealed Bids will be received only at Contracting Services, Facilities Management, Building #439, Door #E, Reception Counter, University of California, Santa Barbara, Santa Barbara, California, 93106-1030."

II SUPPLEMENTARY INSTRUCTIONS TO BIDDERS

Item No.

1. Number 4, **Change** to read in it's entirety: " Bids will be received on or before the Bid Deadline: 2:30 P.M., Tuesday, October 7, 2008 and only at: Contracting Services, Facilities Management, Building #439, Door #E, Reception Counter, University of California, Santa Barbara, Santa Barbara, California, 93106-1030."

III BID FORM

Item No.

1. **Replace** in it's entirety with attached "Revised Bid Form" Revised per Addendum One. Any bid not submitted on the "Revised Bid Form" Revised per Addendum One, will be rejected.

IV SUPPLEMENTARY CONDITIONS

Item No.

1. **Replace** in it's entirety with attached "Revised Supplementary Conditions" Revised per Addendum One, 3 pages.

V SPECIFICATIONS

Item No.

1. Section 13090, AC ELF Magnetic Shielding Systems, **Replace** in it's entirety with attached "Revised Section 13090, AC ELF Magnetic Shielding Systems " Revised per Addendum One, 9 pages.

END OF ADDENDUM NO. ONE

REVISED BID FORM

FOR: Valentine Lab Renovation, CNSI Bldg. 266, Room 2404

FM080264SR/987703

UNIVERSITY OF CALIFORNIA
SANTA BARBARA
SANTA BARBARA, CALIFORNIA

September 2008

BID TO: University of California, Santa Barbara
Facilities Management, Building 439
Door E, Reception Counter
Santa Barbara, CA 93106
(805)893-3298

BID FROM:

_____
(Name of Bidder)

_____
(Address)

_____
(City (State) (Zip)

_____
(Telephone Number)

_____
(Fax Number)

_____
(Email Address)

DATE BID SUBMITTED

_____
(Date)

Note: All portions of this Bid Form must be completed and the Bid Form must be signed before the Bid is submitted. Failure to do so may result in the BID being rejected as non-responsive.

1.0 BIDDER'S REPRESENTATIONS

Bidder, represents that a) Bidder and all Subcontractors, regardless of tier, has the appropriate current and active Contractor's licenses required by the State of California and the Bidding Documents; b) it has carefully read and examined the Bidding Documents for the proposed Work on this Project; c) it has examined the site of the proposed Work and all Information Available to Bidders; d) it has become familiar with all the conditions related to the proposed Work, including the availability of labor, materials, and equipment. Bidder hereby offers to furnish all labor, materials, equipment, tools, transportation, and services necessary to complete the proposed Work on this Project in accordance with the Contract Documents for the sums quoted. Bidder further agrees that it will not withdraw its Bid within 60 days after the Bid Deadline, and that, if it is selected as the apparent lowest responsive and responsible Bidder, that it will, within 10 days after receipt of notice of selection, sign and deliver to University the Agreement in triplicate and furnish to University all items required by the Bidding Documents. If awarded the Contract, Bidder agrees to complete the proposed Work within One hunred-twenty (120) calendar days after the date of commencement specified in the Notice to Proceed.

2.0 ADDENDA

Bidder acknowledges that it is Bidder's responsibility to ascertain whether any Addenda have been issued and if so, to obtain copies of such Addenda from University's facility at the appropriate address stated on Page 1 of this Bid Form. Bidder therefore agrees to be bound by all Addenda that has been issued for this Bid.

3.0 NOT USED

4.0 LUMP SUM BASE BID

$ ☐☐ , ☐☐☐ , ☐☐☐ . ☐☐

(Place Figures in appropriate boxes)

5.0 SELECTION OF APPARENT LOW BIDDER

Refer to the Instructions to Bidders for selection of apparent low bidder.

6.0 UNIT PRICES NOT USED

7.0 DAILY RATE OF COMPENSATION FOR COMPENSABLE DELAYS (Used As Basis For Award)

Bidder shall determine and provide below the daily rate of compensation for any Compensable Delay caused by University at any time during the performance of the Work:

$ ☐☐ , ☐☐☐ . ☐☐ x 5 MULTIPLIER

(Place Amount in Figures in appropriate boxes)

University will perform the extension of the daily rate times the multiplier.

The daily rate shown above will be the total amount of Contractor entitlement for each day of Compensable Delay caused by University at any time during the performance of the Work and shall constitute payment in full for all delay costs, direct or indirect (including, without limitation, compensation for all extended home office overhead and extended general conditions), of the Contractor and all subcontractors, suppliers, persons, and entities under or claiming through Contractor on the Project. The number of days of Compensable Delay shown as a "multiplier" above is not intended as an estimate of the number of days of Compensable Delay anticipated by the University. The University will pay the daily rate of compensation only for the actual number of days of Compensable Delay, as defined in the General Conditions; the actual number of days of Compensable Delay may be greater or lesser than the "multiplier" shown above.

8.0 ALTERNATES NOT USED

9.0 LIST OF SUBCONTRACTORS

Bidder will use Subcontractors for the Work:

Yes _____

If yes, provide in the spaces below (a) the name and the location of the place of business of each subcontractor who will perform work or labor or render service to the prime contractor in or about the construction of the work or improvement, or a subcontractor licensed by the state of California who, under subcontract to the prime contractor, specifically fabricates and installs a portion of the work or improvement according to detailed drawings contained in the plans and specifications, in an amount in excess of 1/2 of 1 percent of the prime contractor's total bid, (b) the portion of the work which will be done by each subcontractor. The prime contractor shall list only one subcontractor for each such portion as is defined by the prime contractor in its bid.

	SUBCONTRACTOR		
Portion of the Work	Name	License No.	Location (City)

(Note: Add additional pages if required.)

10.0 NOT USED

11.0 BIDDER INFORMATION

TYPE OF ORGANIZATION:

_____
(Corporation, Partnership, Individual, Joint Venture, etc.)

- IF A CORPORATION, THE CORPORATION IS ORGANIZED UNDER THE LAWS OF THE STATE OF _____
_____.

  NAME OF PRESIDENT OF THE CORPORATION:

  _____
  (Insert Name)

  NAME OF SECRETARY OF THE CORPORATION:

  _____
  (Insert Name)

- IF A PARTNERSHIP, NAMES OF ALL GENERAL PARTNERS:

  _____
  (Insert Names)

  _____

CALIFORNIA CONTRACTORS LICENSE(S):

_____	_____	_____
(Classification)	(License Number)	(Expiration Date)

(For Joint Venture, list Joint Venture's license and licenses for all Joint Venture partners.)

EMPLOYER IDENTIFICATION NUMBER (EIN):

_____

12.0 REQUIRED COMPLETED ATTACHMENTS

The following documents are submitted with and made a condition of this Bid:

Bid Security in the form of _____
(Bid Bond or Certified Check)

13.0 DECLARATION

I, _____, hereby declare that I am
(Printed Name)

the _____ of _____
(Title) (Name of Bidder)

submitting this Bid Form; that I am duly authorized to execute this Bid Form on behalf of Bidder; and that all information set forth in this Bid Form and all attachments hereto are, to the best of my knowledge, true, accurate, and complete as of its submission date.

I declare, under penalty of perjury, that the foregoing is true and correct and that this declaration was

executed at: _____
(Name of City if within a City, otherwise Name of County)

in the State of _____,

on _____
(Date)

_____
(Signature)

BID BOND

KNOW ALL PERSONS BY THESE PRESENTS:

That we, _____,

as Principal, and _____, as Surety, are held and firmly bound unto THE REGENTS OF THE UNIVERSITY OF CALIFORNIA, hereinafter called THE REGENTS, in the sum of ten percent (10%) of the Lump Sum Base Bid amount for payment of which in lawful money of the United States, well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors, and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THE ABOVE OBLIGATION IS SUCH THAT, WHEREAS, Principal has submitted a Bid for the work described as follows:

Valentine Lab Renovation, CNSI Bldg. 266, Room 2404, FM080264SR/987703

NOW, THEREFORE, if Principal shall not withdraw said Bid within the time period specified after the Bid Deadline, as defined in the Bidding Documents, or within sixty (60) days after the Bid Deadline if no time period be specified, and, if selected as the apparent lowest responsible Bidder, Principal shall, within the time period specified in the Bidding Documents, do the following:

(1) Enter into a written agreement, in the prescribed form, in accordance with the Bid.
(2) File two bonds with THE REGENTS, one to guarantee faithful performance and the other to guarantee payment for labor and materials, as required by the Bidding Documents.
(3) Furnish certificates of insurance and all other items as required by the Bidding Documents.

In the event of the withdrawal of said Bid within the time period specified, or within sixty (60) days if no time period be specified, or the disqualification of said Bid due to failure of Principal to enter into such agreement and furnish such bonds, certificates of insurance, and all other items as required by the Bidding Documents, if Principal shall pay to THE REGENTS an amount equal to the difference, not to exceed the amount hereof, between the amount specified in said Bid and such larger amount for which THE REGENTS procure the required work covered by said Bid, if the latter be in excess of the former, then this obligation shall be null and void, otherwise to remain in full force and effect.

In the event suit is brought upon this bond by THE REGENTS, Surety shall pay reasonable attorneys' fees and costs incurred by THE REGENTS in such suit.

IN WITNESS WHEREOF, we have hereunto set our hands this _____ day of _____, 20

Principal	Surety
_____	_____
By:_____	By:_____
Title:_____	Title:_____
	Address for Notices:
	_____
	_____
	_____

NOTE: Notary acknowledgement for Surety and Surety's Power of Attorney must be attached.

REVISED SUPPLEMENTARY CONDITIONS

1. 2.1 "INFORMATION AND SERVICES PROVIDED BY UNIVERSITY," revise paragraph 2.1.3 to read as follows:

   "Contractor will be furnished, free of charge, 3 copies of the Contract Documents for execution of the Work."

2. NOT USED

3. 7.3 "CHANGE ORDER PROCEDURES" revise 2nd sentence of paragraph 7.3.2.7 to read as follows:

   "Such rental charges shall be at rates, as approved by University Representative, not exceeding competitive rates obtainable from unrelated third parties in the area in which the Work is performed."

4. 7.3 "CHANGE ORDER PROCEDURES" revise paragraph 7.3.9.2.1 to read as follows:

   ".1 An error or omission in the Contract Documents which does not result in any Extra Work for which Contractor is compensated pursuant to Subparagraph 7.3.5; or . . "

5. 7.3 "CHANGE ORDER PROCEDURES" revise paragraph 7.3.9.2.2 to read as follows:

   ".2 University's decision to change the scope of the Work, where such decision is not the result of any default or misconduct of Contractor, and where the change in the scope of the Work does not result in any Extra Work for which Contractor is compensated pursuant to Subparagraph 7.3.5; or . . . "

6. 8.3 "DELAY" add paragraph 8.3.2 to read as follows:

   "8.3.2 Unscheduled Power Outages:

   a. The University may be subject to power outages during the performance of the contract. The Contractor should plan its schedule accordingly and take such other steps as it deems necessary to provide temporary power should outages occur. Any plan to provide temporary power shall be coordinated with and approved, in advance, by the University's Representative.

   b. The Contractor agrees to bear the risk of any delays to the completion of the Work, or increase costs, attributable to such power outages."

7. MODIFICATION OF ARTICLE 8 – CONTRACT TIME

Rainy weather in excess of the following number of days will be granted a Contract Time extension pursuant to Article 8.4 of the General Conditions:

January - 7 days	July - 1 day
February 8 days	August - 1 day
March - 6 days	September - 1 day
April - 3 days	October - 2 days
May - 2 days	November - 3 days
June - 1 day	December - 6 days

8. 8.4 "ADJUSTMENT OF THE CONTRACT TIME FOR DELAY", add the following to 8.4.1.6.9

.3 the Contractor must have employed all reasonable rain mitigation measures to enable the Work to continue on the day; and
.4 all other conditions of Article 8 must be met.

9. 8.5 "COMPENSATION FOR DELAY" add paragraph 8.5.3 to read as follows:

"8.5.3 Contractor shall not be entitled to receive any compensation for delay for Contract Time extensions resulting from Extra Work. Where Contract Time extensions result from or are granted in change orders which authorize Extra Work, payment by University to Contractor in consideration of any such Extra Work, payment by University to Contractor in consideration of any such Extra Work, pursuant to Subparagraph 7.3.5, shall constitute compensation in full for delay, interruption or disruption resulting from or arising out of any such Extra Work."

10. 8.5 "COMPENSATION FOR DELAY" add paragraph 8.5.4 to read as follows:

"8.5.4 Compensation Delay damages, if any, will be paid to Contractor by University as part of the final payment."

11. MODIFICATION OF GENERAL CONDITIONS, ARTICLE 11 – INSURANCE AND BONDS

Contractor shall furnish and maintain insurance in the amounts below.

The insurance required by 11.1.2.1 and 11.1.2.2 shall be (i) issued by companies with a Best rating of A- or better, and a financial classification of VIII or better (or an equivalent rating by Standard & Poor or Moody's) or (ii) guaranteed, under terms consented to by the University (such consent to not be unreasonably withheld), by companies with a Best rating of A- or better, and a financial classification of VIII or better (or an equivalent rating by Standard & Poor or Moody's). Such insurance shall be written for not less than the following:

		Minimum Requirement
11.1.2.1	Commercial Form General Liability Insurance-Limits of Liability	
	Each Occurrence-Combined Single Limit for Bodily Injury and Property	$1,000,000.00
	Products-Completed Operations Aggregate	$1,000,000.00
	Personal and Advertising Injury	$1,000,000.00
	General Aggregate	$2,000,000.00
11.1.2.2	Business Automobile Liability Insurance-Limits of Liability	
	Each Accident-Combined Single Limit for Bodily Injury and Property Damage	$1,000,000.00

Insurance required by Paragraph 11.1.2.3 shall be issued by companies (i) that have a Best rating of B+ or better, and a financial classification of VIII or better (or an equivalent rating by Standard & Poor or Moody's); or (ii) that are acceptable to the University. Such insurance shall be written for not less than the following:

11.1.2.3 WORKER'S COMPENSATION AND EMPLOYER'S LIABILITY –

(as required by Federal and State of California law).

SECTION 13090

AC ELF MAGNETIC SHIELDING SYSTEMS

PART 1 – GENERAL

1.01 SUMMARY

Contractor shall field measure environmental rooms and shall design a shielding system that will limit ELF radiation to values equal to, or lower than, those described in Paragraph 1.3. The drawings, details and elevations developed are a proposed design which the University believes meets the mitigation requirements. The Contractor is specifically alerted to the DESIGN/BUILD nature of this portion of the work, and shall include in the work of this Section all field verifications, engineering time, drafting and documentation, and other costs which may be required to develop, detail, and document the design specifically to be used, in addition to the hard construction costs to implement the design. It is the responsibility of the Contractor to demonstrate, to the satisfaction of the University representative, that the proposed design will provide the mitigation required.

A. The contractor shall fabricate and install a dual-substrate AC ELF (extremely low frequency) Magnetic Shielding System within the newly constructed rooms 2404 A &B, Valentine Lab. The Room 2404 Valentine Lab shield is comprised of four layers: The outermost layer, installed upon the shared west wall of the lab, is to be composed of 1/8"-thick low-carbon steel plates. The second layer, also to be installed upon the shared west wall of the lab, is to be composed of ¼"-thick welded aluminum plate. The third layer, to be installed upon the shared west wall of the lab and the floor, is to be composed of five (5) layers of 0.025"-thick silicon-iron sheet and coupled at the base of the wall. The final layer, a six-sided shielding system to be installed within the Valentine Lab, is to be composed of ¼"-thick welded aluminum plate (installed on the floor, wall, and ceiling). The aluminum plates in this shielding system must be welded at all seams to ensure electrical conductivity between all plates.

B. The work to be performed under this Section consists of all design, labor, materials, appliances and equipment necessary in performing all operations in connection with the furnishing and installation of the Room 2404 Valentine Lab Shielding System, and as specified herein.

1.02 REFERENCES

A. American Society for Testing and Materials (ASTM):

1. ASTM B209 & ASTM B221-96 "Standard Specification for Aluminum and Aluminum-Alloy Shield and Plate"
2. ASTM B221 "Standard Specification for Aluminum and Aluminum-Alloy Bar, Rod and Wire"

3. ASTM B308 "Standard Specification for Aluminum-Alloy 6061-T6 Standard Structural Profile".
4. ASTM A518 "Standard Specification for Corrosion-Resistant High-Silicon Iron Castings"
5. ASTM A1011 "Standard Specification for Low-Carbon Steel Plate"

B. Federal Specifications (FS):

1. FS QQ-A-250/1 "Aluminum and Aluminum Alloy Plate and Sheet, General Specs" for Aluminum Association Grade 1100.
2. FS QQ-A-225/8D and FS QQ-A-200/16 "Aluminum and Aluminum Alloy Plate and Sheet, General Specs" for Aluminum Association Grade 6061

C. International Electrical & Electronics Engineers (IEEE) Standards.

1. "IEEE Standard Procedures for Measurement of Power Frequency Electric and Magnetic Fields from AC Power Lines", IEEE Standard No. 644-1994"

D. National Council on Radiation Protection and Measurement (NCRP)

1. NCRP Report No. 86 Biological Effects and Exposure Criteria for Radiofrequency Electromagnetic Fields (1986) and Section 8 of the June 13, 1995, NCRO draft report of NCRP Scientific Committee 89-3 on Extremely Low Frequency Electric and Magnetic Fields.

E. American Conference of Governmental Industrial Hygienists (ACGHI)

1. "Threshold Limit Values for Chemical Substances and Physical Agents - 1999",Cincinnati, Ohio

1.03 SYSTEM DESCRIPTION

A. Design Requirements:

1. Guaranteed AC ELF Magnetic Shielding Performance Objective: 0.1 mG and less at 60 Hz Br resultant root-means-square (rms) within the shielded Room 2404 Valentine lab, measured 1-meter from the shielded floor over 95% of the shielded area.
2. After the AC ELF Magnetic Shielding System has been completely installed as specified in this Section, the final performance testing must comply with Shielding Performance Objectives stated in Item 1 above. All EMF testing shall be performed by a qualified EMF Consultant with at least 5 years of ELF magnetic field testing experience.
3. Thickness/grade of all welded aluminum plates shall be ¼" inch and AA1100-H14.
4. Thickness/grade of all silicon-iron sheet shall be 0.025" inch per layer and M-36 with C3 surface insulation coating.
5. Thickness/grade of all low-carbon steel plates shall be 1/8" inch and SAE 1006/1008.

1.04 SUBMITTALS

A. General: Submit the following in accordance with Division 1 and these specifications.

B. Review drawings and specifications, than confirm room dimensions, fabrication instructions, and material requirements in writing.

C. Product Data & Literature:

1. Submit for review and describe properties of items to be used to fabricate AC ELF magnetic shielding system. Include the following.

   a. Aluminum AA1100-H14 4-foot and 5-foot wide plates by ¼-inch thick conforming to QQ-A-250/1 and ASTM B-209.
   b. Concrete expansion anchors, split bolts, high-powered shots/pins, self-tapping drywall screws and other mounting hardware to secure aluminum plate & silicon-iron sheet to walls, floor and ceiling.
   c. Silicon-Iron C3 GA-24 Grade M-36 fully processed non-oriented silicon-iron steel coil 3.5' wide.
   d. Low-Carbon Steel Plate SAE Grade 1006/1008 pickled and oiled 4-foot by 10-foot plates by 1/8"-inch thick.
   e. Shop Drawings:

2. Submit for review and show drawing details of items to be used to fabricate AC ELF Magnetic Shielding System.
3. Shop drawings to include wall, ceiling and floor shield layout (one for each room) with detailed information on all components to be used in the shielding system. Including but not limited to structural anchoring, material, components and attaching accessories.

D. Samples:

1. Verification: Submit for action and review. Furnish a small 6-inch by 6-inch square sample of the AA1100-H14 aluminum plate, a 6-inch by 6-inch square sample of the SAE 1006/1008 low-carbon steel plate and a 6-inch by 6-inch square sample of the M-36 silicon-iron sheet to be used in the construction of the Room 2404 Valentine Lab AC ELF Magnetic Shielding System. The aluminum, low-carbon steel and silicon-iron sheet are required for verification of stock and grade. Also, submit samples of anchors, screws and bolts used to secure silicon-iron sheet, low-carbon steel and aluminum plates.

E. Closeout Submittals: Submit the following to the University representative.

1. Record documents in accordance with Division 1.

1.05 QUALITY ASSURANCE

A. Qualifications:

1. Contractor: Contractor is responsible for quality control of the work and specified AC ELF Shielding as per 1.03 system description.

   a. EMF/EMI shielding designer: A qualified EMF/EMI shielding designer who can provide documentation of successful design of EMR/EMI shielding with a minimum of 5 previous years

   b. Fabricator & Installer: A qualified EMF/EMI shielding installer who can provide documentation of successful installation of EMR/EMI shielding with a minimum of 5 previous years.

B. Regulatory Requirements: Comply with all applicable requirements of the laws, codes, ordinances and regulations. Obtain necessary approvals and/or permits from all authorities having jurisdiction.

C. Single Source Responsibility: Obtain materials from a single manufacturer for each different product required.

D. Pre-Installation Meetings: Contractor to conduct meetings at site prior to start of work and coordinate work.

E. Contractor Responsibility:

1. Correctness between drawings and actual physical dimensions of the floors, walls and ceiling to be shielded including constructed extensions and surface walls.
2. Material quantities necessary to completely cover the walls, floors and ceilings surfaces with aluminum plates as specified in the drawings.
3. Accurate substrate fabrication procedures (cutting and joint preparation) according to the final shop and fabrication drawings submitted for review.
4. Precise installation of the aluminum plates, and continuous GMAW seam welding of all the plates to ensure and guarantee proper shielding performance.
5. All construction means, methods, techniques, sequences and procedures of shield construction; and, the coordination of this work.

1.06 DELIVERY, STORAGE, AND HANDLING

A. General: Upon material delivery carefully unload AA1100-H14 aluminum plates, SAE 1006/1008 low-carbon steel plate, M-36 silicon-iron steel sheet rolls and all other items – DO NOT bend or damage aluminum plates and silicon-iron steel rolls. All aluminum plates and must be flat, plumb and without damage. Stack aluminum plates and I-beams in securable location and store all shielding materials in a protected dry location off ground. Coordinate with university representative at least five working days before delivery for lay down and storage locations.

B. Do not bend or damage AA1100-H14 aluminum plates and AA6061-T6 aluminum angles and 4" extruded aluminum I-Beams during installation, as precise joint spacing is required.

C. Steel plates must be flat (no bends), square and clean, as precise joint spacing is required.

1.07 PROJECT CONDITIONS OR SITE CONDITIONS

A. Environmental Requirements: Proceed with the Work in accordance with manufacturer's requirements and instructions and any agreements or restrictions indicated by the University representative.

PART 2 – PRODUCTS

2.01 SUPPLIERS OF ALUMINUM SHIELDING MATERIALS

A. Suppliers: Subject to compliance with requirements, provide the following.

1. Ryerson, Inc., (see www.ryerson.com)
2. Phoenix Metals (see www.**phoenixmetals**.net)
3. National Materials Company (see www.nmlp.com)
4. Or equal local and regional metal suppliers.

2.02 MATERIALS

A. Aluminum Plates: Aluminum Association AA1100-H14 4-foot & 5-foot wide by ¼-inch thick aluminum plates in lengths as required and indicated.

B. Extruded Aluminum Angle: Aluminum Association AA6061-T6 3"x3" extruded angle in lengths and AA6061-T6 4-inch extruded aluminum I-Beams as required and indicated.

C. Silicon-Iron Sheet: American Standards for Testing and Materials (ASTM) A518 grade M-36. Sheet shall be 3 ½'-wide with at least 1,200 feet long of material required.

D. Low-Carbon Steel Plates: SAE 1006/1008 4-foot by 1/8-inch thick low-carbon steel plates in lengths as required and indicated.

E. Accessories:

1. Accessories and Fasteners: Provide the manufacturer's standard concrete anchors, stainless flat-head screws, drive anchors, corrosion-resistant adhesive.

2.03 FABRICATION

A. AC ELF Magnetic Shielded Room installation:

1. Measure the area of the ceiling, floor and each wall for the total number of square feet required for each area to be covered with the aluminum plate. Measure, cut and install the aluminum plates as required as specified. Use Gas Metal Arc Weld (GMAW) with 3/64-inch 4043 aluminum filler wire using 100% Argon Gas for welding along the seams of the AA1100-H14 ¼-inch thick 4-foot & 5-foot wide aluminum plates (continuous seam weld). Use AC continuous current shield arch

welding (SMAW) with E6011 filler electrodes (1/8" by 14") for welding the low-carbon steel plates. No joint preparation is necessary.

2. Completely fabricate and mark all aluminum ceiling plates before installation at site to simplify installation.

PART 3 – EXECUTION

3.01 EXAMINATION

A. Site Verification of Conditions: Examine and correct conditions of area to receive the Work prior to installation. Make sure floor is level, smooth, and clean before applying silicon-steel sheets.

3.02 PREPARATION

A. Field Measurements: Take field measurements prior to preparation of shop drawings and fabrication where possible to ensure proper fitting of the work.

3.03 INSTALLATION

A. General: Install Dual-Substrate AC ELF Magnetic Shielding System in accordance with the document fabrication and Installation, submittals, applicable industry standards, and governing regulatory requirements.

B. Valentine Lab Room 2404 AC ELF shared wall magnetic shielding system requires eight (8) low-carbon steel ASTM 1006/1008 4' x 10' x ¼"-thickness. Each plate should be flat (no bends), square and clean. Do not bend plate – must be flat and square.

1. Place steel plate on wall, and anchor using Hilti shots and bolts. Cover entire wall with this process. Important: This is the 1st layer of the Room 2404 common wall shielding system.
2. Leave a minimal separation distance along all plate seams, as this is critical to minimize warping and plate buckling during seam bonding. Secure separated low-carbon steel plates with drive anchors before bonding. Hilti stainless-steel shots and bolts may be used to anchor low-carbon steel plate to wall. The front of all studs shall be taped with corrosion-resistant adhesive to avoid dissimilar metallic contact.
3. Steel plates must have partial penetrating 1" welds at the four corners and midpoints along common plate joints to ensure eddy current circulation and electrical conductivity between all plates. Only use AC continuous current shield arch welding (SMAW) with E6011 (F3) filler electrodes (1/8" x 14") for welding the low-carbon steel plates. No joint preparation is necessary. Cut/Trim with non-ferrous blade and circular saw (7 ¼" TENRYU) blade to cut all low-carbon steel plate.

C. Valentine Lab Room 2404 AC ELF shared wall magnetic shielding system requires six (6) aluminum plates. Aluminum plate AA-1100-H14 is to be used, mill-finished and non-heat treatable. Plates are to be rolled and strain hardened to H14 Temper. Plates shall be ¼"-thick, flat (no bends), square and clean. Each plate weighs 178 lbs. for a total weight of 1,068 lbs. Do not bend or damage plates – must be flat and square.

1. Place aluminum plates on wall, leaving a minimal separation distance along all plate seams. A slight separation distance is critical to minimize warping and plate buckling during seam bonding. Secure separated aluminum plates with drive anchors before bonding. Hilti stainless-steel shots and bolts may be used to anchor aluminum plate to wall. The front of all studs shall be taped with corrosion-resistant adhesive to avoid dissimilar metallic contact.
2. All plates must be bonded along common plate joints to ensure eddy current circulation and electrical conductivity between all aluminum plates. Use a 100% Argon (Ar) for shielding gas and AA4043 aluminum filler wire with 3/64" diameter. No joint preparation is necessary. Cut/Trim with non-ferrous blade and circular saw (7 ¼" TENRYU Alumi-Cut-18560 D) blade to cut all aluminum material.

D. AC ELF magnetic floor/wall shields require twelve-hundred (1200 ft.) linear feet of Silicon-Iron M-36 coiled sheet. M-36 (designated C5) is to be used, heat-treated (process #98299), with width of 3 feet (may vary). Coiled sheet to be 0.025"-thick, flat (no bends), square and clean. Coil weighs 3,600 lbs. Other than when directed, do not bend plate – must be flat and square.

1. Uncoil silicon-iron sheet and install on floor parallel with Room 2404 shared wall. Cut to fit, each sheet must be seam to seam (no overlapping) to adjacent sheets. Cover entire floor with this process, until shared wall is reached – Important: right angle bend last floor sheet to couple with wall sheet. Stagger seams with each layer – seam should be middle of preceding layer. Wall to be covered by similar process. Repeat this process by five (5) layers.
2. If needed, wall sheets may be anchored for ease of install with flathead anchors. Take care not to expose excess of the head, as wall sheets will not be contiguous.
3. Important Note: Silicon-Iron sheet is not to be welded or electrically bonded in any way. The only acceptable anchoring method is flat-head screws on wall sheet for ease of install.

E. AC ELF Magnetic six-sided shielding system requires thirty-four (34) aluminum plates. Aluminum Plate AA1100-H14 is to be used, mill-finished and non-heat treatable. Plates are to be rolled and strain-hardened to H14 temper. Plates shall be ¼"-thick, flat (no bends), square and clean. Eighteen (18) plates, 4' x 8' x ¼"-thick, each weighing 118 lbs. and sixteen (16) plates, 5' x 10' x ¼"-thick, each weighing 178 lbs. are to be used, for a total weight of 4,972 lbs. Do not bend or damage plates – must be flat and square.

1. Place aluminum plates on floor upon the five layers of silicon-iron sheet, leaving a minimal separation distance along all plate seams. A slight separation distance is critical to minimize warping and plate buckling during seam bonding. Secure separated aluminum plates with drive anchors before bonding.
2. The same method shall be used for each wall of the AC ELF magnetic shielding system. Hilti stainless-steel shots and bolts may be used to anchor aluminum plate through silicon-iron to wall. The front of all studs shall be taped with corrosion-resistant adhesive to avoid dissimilar metallic contact.
3. All plates must be bonded along common plate joints to ensure eddy current circulation and electrical conductivity between all aluminum plates. Use a 100% Argon (Ar) for shielding gas and AA4043 aluminum filler wire with 3/64" diameter. No joint preparation is necessary. Cut/Trim with non-ferrous blade and circular saw (7 ¼" TENRYU Alumi-Cut-18560 D) blade to cut all aluminum material.

4. For ceiling install, begin by installing 4" extruded aluminum I-beams. Use 3" extruded aluminum angles to support aluminum I-beams, cut in 6" sections. This should be done on aluminum plate walls and covered beams to support ceiling plates around shielded perimeter walls. Cut ceiling plates to allow for drive anchors (ceiling plate support). Carefully install ceiling plates by bonding to aluminum walls and beam angles, and securing with drive anchors.
5. Aluminum ceiling plates must have continuous bonding between all common plate joints to ensure eddy current circulation and electrical conductivity between all aluminum ceiling plates. Use a 100% Argon (Ar) for shielding gas and AA4043 aluminum filler wire with 3/64" diameter. No joint preparation is necessary. Cut/Trim with non-ferrous blade and circular saw (7 ¼" TENRYU Alumi-Cut-18560 D) blade to cut all aluminum material.

3.04 FIELD QUALITY CONTROL

A. Site Test: contractor shall perform the following activities at the University representative direction. Work not meeting specified requirements, including shielding performance problems due to excessive ground/net and zero-sequence currents on the feeders, transformers and switchgears, shall be corrected at no cost to the University by the Contractor.

1. Testing: After the AC ELF magnetic shielding has been installed and the building fully-operational and loaded to the excepted level, magnetic flux density readings will be recorded, by a qualified EMF Consultant with five years of EMF engineering experience, to verify the shielding performance objective. University Representative shall be present during all testing.

    a. Testing will be performed in accordance with requirements stated in "IEEE Standard Procedures for Measurement of Power Frequency Electric and Magnetic Fields from AC Power Lines", IEEE Standard No. 644-1994. AC ELF magnetic flux density data shall be recorded at the site with a calibrated FieldStar 1000 gaussmeter (provide calibration certificate) and survey wheel. Record AC ELF magnetic flux density data 1-meter above the floor at 1-ft intervals and at floor level with 1-ft intervals along the perimeter and inside contour (mapped) data in all rooms.
    b. Use the calculated load multiplier to estimate worst-case emission levels during peak summer loads. Verify AC ELF magnetic shield complies with Shielding Performance Objective: 0.1 mG and less Br resultant root-means-square (rms) measured 1-meter from the shielded areas.
    c. The installer shall repair or replace defective work, including other work affected thereby and conduct additional testing to the satisfaction of the EMF Consultant, at no additional expense to the University.

3.05 CLEANING

A. At the end of each workday, remove unused materials, debris and containers from the site.

3.06 PROTECTION

B. Protect the Work so it will not deteriorate or be damaged. Remove protection at time of Substantial Completion.

END OF SECTION