

Construct Reinforced Concrete Wall - NSTX-U Test Cell

Statement of Work: NSTXU_1-8-1-1-4_SOW_101

REVISION 0

July 30, 2019

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**JOB ORDER STATEMENT OF WORK
FOR
BASIC ORDERING AGREEMENT (BOA)**

Title: Construct Reinforced Concrete Wall – NSTX-U Test Cell

CAT: A1

Requisition No.: 420832

PREPARED BY: Mark Cropper

APPROVED BY: Tim Stevenson, Responsible Engineer

APPROVED BY: ES&H

APPROVED BY: Quality Assurance

APPROVED BY: Tom Jernigan, Cost Center Approver

APPROVED BY: Les Hill, Project Manager

**PRINCETON PLASMA PHYSICS LABORATORY
P.O. BOX 451
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609-243-2000**

1.0 SCOPE OF WORK

The Subcontractor shall supply all materials, labor, supervision, equipment, and expertise required to remove the existing steam/air/water service station located in D-Site NSTX-U Test Cell. The Subcontractor shall:

- 1.1 PPPL drawings referenced herein will be provided to the Subcontractor under separate cover. The following work scope shall be completed:
- 1.2 Apply LOTO to existing PPPL-applied LOTO to steam/air/water isolation valves.
- 1.3 Install cap/plugs to permanently isolate steam/air/water service to the service station.
- 1.4 Remove all piping/valves/fittings/hangers downstream of the permanent isolation fittings installed in Step 1.2 above.
- 1.5 Perform housekeeping of Work areas.

2.0 ATTACHMENT(S)

Attachment 1 - Deliverables List

Note:

Referenced drawing will be provided to the Subcontractor under separate cover at time of site visit.

3.0 REFERENCE(S)

- 3.1 C/D-SOW-FAC-313 dated February 11, 2019, Rev. 0
- 3.2 PPPL Drawing D-PE213002, Test Cell South-East Door Shield Wall

4.0 GENERAL REQUIREMENTS:

Upon receipt of an appropriate BOA Job Order, Subcontractor agrees to perform the Work required by this Job Order Statement of Work, and any other documents included or referenced therein or elsewhere in this Job Order Statement of Work.

5.0 SPECIAL REQUIREMENTS:

- 5.1 Prior to submitting price quotation for this work, the Subcontractor shall visit the work site to ensure he/she understands the full scope of work and site conditions.
- 5.2 Use of scaffolding shall require inspection from a Competent Person.
- 5.3 Refer to Attachment 2 for additional Technical Requirements.

Attachment 1 - Deliverables List

| # | Physical Deliverables Required | When Deliverable Is Required | Deliverable Received (✓) |
|-------------------------|---|-------------------------------------|---------------------------------|
| 1 | Form and place reinforced concrete wall in accordance with Technical Requirements | Project Completion | |
| 2 | Obtain three (3) 7-day samples (Concrete Shield Wall) | At placement of concrete | |
| 3 | Obtain three (3) 28-day samples (Concrete Shield Wall) | At placement of concrete | |
| 4 | Removal of demolition debris and site cleanup | Project Completion | |
| Exceptions: None | | | |

| # | Document Deliverables Required | When Deliverable Is Required | Deliverable format (paper, electronic etc.) | Storage Location for Deliverable | Deliverable Received (✓) |
|----------|--|-------------------------------------|--|---|---------------------------------|
| 1 | Job-specific Job Hazard Analysis (JHA) | Before start of work | Electronic or paper | Ops Center | |
| 2 | Shield Wall Concrete mix design (including admixtures & aggregate) (see 5.3) | Before start of work | Electronic or paper | Ops Center | |
| 3 | Material certifications – reinforcing steel | Before start of work | Electronic or paper | Ops Center | |
| 4 | Shop Drawings (see 5.3) | Before start of work | Electronic or paper | Ops Center | |
| 5 | Provide 28-day compressive strength lab reports (see 5.3) | Before start of work | Electronic or paper | Ops Center | |
| 6 | Provide 7-day compressive strength lab reports see 5.3) | Before start of work | Electronic or paper | Ops Center | |
| 7 | Provide 28-day compressive strength lab reports (see 5.3) | Before start of work | Electronic or paper | Ops Center | |

Exceptions: None

Princeton Technical Representative: _____

(Sign-off and provide to the Operations Center when job is completed and deliverables are dispositioned and placed/filed in Operations Center (or other Project, Department or Division designated file center)

**Attachment 2 – Technical Requirements
Construct Reinforced Concrete Shield Wall**

1. Materials:

a. Concrete Mix:

- i. The concrete shall be 4,000 psi design compressive strength with a nominal density of 150 lb/ft³.
- ii. The method of determining the 28 day compressive strength shall be in accordance with ASTM C39.
- iii. Slump shall be 2 – 4.
- iv. Water used for mixing of concrete, or for processing concrete aggregates, shall be clean and effectively free from any large amount of acid, alkali, salts, oil, sediment or organic matter.
- v. Cement shall be an established commercial brand of Portland or Portland/Slag Cement 70/30 blend conforming to the following requirements:
 - Portland Cement: ASTM C150 Type I or III Type
 - Slag Cement: ASTM C 989
- vi. Aggregates shall consist of clean, hard, strong, durable and inert materials. Aggregates shall not contain any substance which could strain or mark the concrete surface.
- vii. Aggregate shall conform to the requirements of ASTM C33. The size of aggregates shall be No. 4 to ¾”.
- viii. Admixtures conforming to ASTM C 494 may be added to the concrete mix to minimize shrinkage cracking and increasing the workability. Only one brand of admixture for each type required shall be used on the project. Admixtures containing chlorides shall not be used. All admixtures shall be added to the concrete mix in liquid form by means of an appropriate dispensing device.
- ix. An air-entraining agent admixture conforming to ASTM C260 shall be used.

b. Reinforcing:

- i. All reinforcing steel shall conform to ASTM A615, Grade 60.
- ii. All bar detailing and accessories shall conform to typical details in the latest American Concrete Institute (ACI) Standard 315 Detailing Manual except as otherwise shown on drawing D-PE213002.
- iii. Reinforcing steel shall be cut and bent to the tolerances specified in ACI-315. All bars shall be sent cold and to the recommended radius as specified in the CRSI Manual of Standard Practices Splices of reinforcement shall be in accordance with ACI-318, Section 12.

- iv. A concrete bonding adhesive conforming to ASTM C1059 Type II shall be applied at surfaces where new concrete is placed to existing concrete.
- v. Reinforcement is to be furnished in full lengths as indicated on the plans. Except where shown on the plans, splicing bars will be not permitted unless noted on the approved Subcontractor's Shop Drawings.

2. Work Execution

- a. Formwork shall be clean, mortartight and of sufficient rigidity to prevent distortion caused by the pressure of the concrete and other loads incidental to construction operations. Forms are to be set and maintained true to line.
- b. Steel reinforcement is to be firmly held during the placing and setting of concrete. Bars, except those to be placed in vertical mats, are to be tied at every intersection where the spacing is more than 12 inches in any direction.
- c. Bars are to be placed so that the concrete cover as indicated on the plans will be maintained within a tolerance of 0 to +1/2 inch in the finally cast concrete.
- d. **HOLD POINTS:** PPPL shall inspect and verify the following prior to placement of concrete in formwork:
 - Formwork dimensional requirements.
 - Reinforcing steel – material certifications.
 - Reinforcing steel – configuration.
 - Concrete design – verify on delivery ticket(s).
 - 28-day compressive strength test laboratory results (Roof Shield Blocks).
 - Bonding agent per ASTM C 881 Type V has been applied as indicated on the subcontract drawings.
 - Slump (2 – 4).

Note:

It is expected that two (2) or more trucks will be required to deliver the concrete. If the concrete provided in all trucks is from the same batch (as verified on the delivery tickets), only one set of 7-day and 28-day test cylinders will be required.

- e. Obtain three test cylinders as follows for each concrete batch:
 - i. Three (3) 7-day test cylinders
 - ii. Three (3) 28-day test cylinders
- f. Placing Concrete
 - i. Concrete is to be thoroughly consolidated during, and immediately following, placement.
 - ii. Consolidation is to be accomplished by mechanical vibration. Internal place vibrators are to be approved by PPPL and are not to be applied to the reinforcement or formwork.

- iii. Vibrators are to be inserted vertically, at points uniformly spaced, and shall be of sufficient duration and intensity to consolidate concrete thoroughly around reinforcing steel and into corners and angles of forms.
 - iv. Vibrators are not to be pulled through the concrete, used to transport concrete in the forms, or operated for more than 15 seconds in any one location as this will cause segregation.
 - v. Vibration is to be supplemented by spading if necessary to ensure smooth surfaces and dense concrete along form surfaces and in corners and locations not accessible to vibrators.
 - vi. After completion of consolidation, top surfaces shall be floated, any laitance removed, and straight-edged with upper surface finished with a hard trowel.
- g. Curing and Formwork Removal
- i. Concrete shall be cured by applying a liquid-membrane forming compound conforming to ASTM C-109, ponding or misting with water, covering with waterproof paper, polyethylene film, or by using a combination of burlap and polyethylene film.
 - ii. After covering, the concrete shall not be disturbed for at least 24 hours.
 - iii. Subcontractor shall inspect newly-placed wall daily for the first seven (7) days after placement to verify exposed surfaces are covered with the liquid membrane or water.
 - iv. Strip formwork seven (7) days after placement.