Pacific Northwest
NATIONAL LABORATORY
Proudly Operated by Battelle Since 1965

Invitation for Bid
233058
Table of Contents

Pacific Northwest
NATIONAL LABORATORY
Proudly Operated by Battelle Since 1965

Invitation For Bid
233058

Battelle Memorial Institute (Battelle) in connection with Battelle's Operation and Maintenance of the U.S. Department of Energy's Pacific Northwest National Laboratory (PNNL) at Richland, Washington under Contract number DE-AC05-76RL01830 is pleased to invite offers for the **HPCS-4 Power & Cooling** located in **Richland, WA.** under this Invitation For Bid (IFB).

IFB Number:	**233058**
Title:	**HPSC-4 Power & Cooling**
Location:	3335 Innovation Blvd., Richland, WA. 99352
Issue Date:	01/31/2013
Closing Date:	02/22/2013 11 a.m. BSF Room 2011(Mendel)
NAICS Code:	**236220**
Restriction:	None
Contract Type:	Firm Fixed Price
Basis of Award:	Sealed Bid, lowest price, most responsive and responsible bidder.
Contractor Qualification Requirements:	Contractors ***MUST*** be registered and ***approved*** on the Battelle Acquisition Supplier Portal (ASP) at; **https://ebs.pnnl.gov** ***prior*** to bidding this project.
Price Range:	Between $500,000 and $1,000,000
Duration /Completion:	Project Substantial Completion by ***06/14/2013***, Project closed out by ***08/30/2013***.
Pre-bid Meeting / Job Walk:	If you are a General Contractor intending to provide a bid for this project, a ***MANDATORY*** pre-proposal walk-down will be held; **Thursday, 02/07/2013, 1:00 p.m., @ EMSL Room 1075.** *You MUST be badged to enter these facilities (EMSL). Please contact the Contract Specialist if you need a badge, or you will not be able to attend.*
Contract Specialist:	**Name:** Garrett V. Hyatt **Office Phone:** (509) 371-7591 **Mobile Phone:** (509) 420-3051 **Email Address:** garrett.hyatt@pnnl.gov

1. SYNOPSIS

A. Installation of the HPCS-4 power and cooling infrastructure generally consists of the following work/modifications and is depicted on the project drawings:

1. Remove/reinstall raised flooring system.
2. Install new partition wall/door to create new computer room 1109.
3. Remove/reinstall existing suspended acoustical ceiling system.
4. Remove/salvage existing Liebert Cooling Air Handlers (CAH)
5. Remove CAH support stands, piping and electrical conduit/wiring connections back to pan-el boards in room 1119.
6. Remove existing HVAC ductwork/air diffusers (above ceiling) and modify existing.
7. Remove/dispose of existing light fixtures and install new fixtures.
8. Remove existing smoke/heat detectors and fire alarm wiring/conduit.

9. Install new chilled water piping system.
10. Excavate/backfill for new electrical duct banks.
11. Extend underground conduit/duct banks from room 1145 to exterior of room 1129.
12. Install conduit and wiring from exterior of room 1129 to new room 1109.
13. Install new distribution panel boards in room 1109
14. Connect electrical power to Power Distribution Units (PDU). (PDU's provided by computer vendor.)
15. Reconnect raised floor grounding grid system.
16. Install fire alarm in room 1109
17. Label/identification of equipment per PNNL nomenclature including Arc Flash labels.
18. Cooling system testing/verification.

2. INQUIRIES & SUBMISSION OF BIDS

2.1. All inquiries shall be submitted in writing by mail or email.

2.2. Bids shall be received on or before the due date at the following address:

Battelle Memorial Institute, Pacific Northwest Division
Attention: Garrett V. Hyatt
902 Battelle Boulevard, Mail Stop: J2-05
Richland, Washington 99352

2.3. Bids and modifications shall be submitted in sealed envelopes or packages.

2.4. Bids shall contain the following completed documents:

- Solicitation, Offer & Award Form
- Representations & Certifications
- Statement of Labor Harmony, ***Davis-Bacon Reporting Applies***
- Certificate of Liability Insurance
- Copy of Bidder's Washington State Contractor's License
- Bid Bond

2.5. Failure to submit **all** of the above required documents with your bid shall cause your bid to be determined non-responsive.

3. COMMUNICATIONS

3.1. **Submission of Bids**.

3.1.1. Bids shall be received on or before the due date at the following Battelle address:

Battelle Memorial Institute, Pacific Northwest Division
Attention: Garrett V. Hyatt (RE: IFB Number: 233058)
902 Battelle Boulevard, Mail Stop: J2-05
Richland, Washington 99352

Or,

Sealed Bids may be hand delivered to the public bid opening, to be held on the closing date, 02/22/2013, at 11 a.m. in the BSF Building / Conference Room No. 2011 (Mendel) located at 3300 Stevens Dr., Richland, WA, 99352.

3.1.2. Bids and bid modifications shall be submitted in sealed envelopes or packages.

3.1.3. Telegraphic, Facsimile, and Electronic bids will NOT be accepted.

Inquiries: All inquiries, whether by phone, fax, or written shall be addressed to:

Battelle Memorial Institute, Pacific Northwest Division
Attention: Garrett V. Hyatt (RE: IFB Number: 233058)
902 Battelle Boulevard, Mail Stop: J2-05
Richland, Washington 99352

Phone Numbers, Fax Number, and Email Address for the Contract Specialist are on Page 1.

3.2. **Requests for Clarification / Interpretation:** If the Bidder finds discrepancies, omissions, or is in doubt as to the true meaning of any part of the contract documents, *Bidder MUST submit a WRITTEN request* for clarification or interpretation using Request for Information (RFI) form at http://www.pnl.gov/contracts/documents/construction.asp and address it to the Contract Specialist listed on Page 1, *no later than **2 p.m. PST; 02/19/2013***. Submittals *may not be considered if submitted after this time*.

Regards,

Garrett V. Hyatt
Sr. Contract Specialist

Table of Contents

1. NAICS Classification: 236220

NAICS is the abbreviation for “North American Industry Classification System”. NAICS was developed by the U.S., Canada, and Mexico in a joint effort to provide new comparability in statistics about business activity across North America. NAICS assigns codes to all economic activity within twenty broad sectors and is accepted and used by the Small Business Association (SBA) in determining size standards where eligibility as a small business is a factor or a consideration.

2. Commencement, Prosecution, and Completion of Work [Adapted from FAR 52.211-10 (Apr 1984)]

The Contractor shall be required to (a) commence Work under this Contract within **Five (5) calendar days** after the date the Contractor receives the Notice to Proceed, (b) prosecute the Work diligently, and (c) complete the entire Work ready for use not later than ***06/15/2013***. It is anticipated that the successful offeror will receive the Award on or around ***02/28/2013.***

3. Bid Guarantee [Adapted from FAR 52.228-1 (Sept 1996)]

(a) Failure to furnish a bid guarantee in the proper form and amount, by the time set for opening of bids, may be cause for rejection of the bid.
(b) The Bidder shall furnish a bid guarantee in the form of a firm commitment, *e.g.,* bid bond supported by good and sufficient surety or sureties acceptable to Battelle, postal money order, certified check, cashier's check, or irrevocable letter of credit. Battelle will return bid guarantees, other than bid bonds—
(a) To unsuccessful Bidders as soon as practicable after the opening of bids; and
(b) To the successful Bidder upon execution of Contractual documents and bonds (including any necessary coinsurance or reinsurance agreements), as required by the bid as accepted.
(c) The amount of the bid guarantee shall be **20% percent of the bid price or $3,000,000**, whichever is less.
(d) If the successful Bidder, upon acceptance of its bid by Battelle within the period specified for acceptance, fails to execute all Contractual documents or furnish executed bond(s) within 10 days after receipt of the forms by the Bidder, Battelle may terminate the Contract for default.
(e) In the event the Contract is terminated for default, the Bidder is liable for any cost of acquiring the Work that exceeds the amount of its bid, and the bid guarantee is available to offset the difference.

4. Contractor Prequalification — Construction

(a) Contractors must meet Battelle's minimum qualification requirements to be eligible to Contract with Battelle directly as a Prime Contractor, or participate as a Subcontractor to a Prime Contractor performing Work on-site. Battelle's Prime Contractor and Subcontractor qualification requirements are posted on our Acquisition website at https://ebs.pnnl.gov. Any required supporting documents should be attached electronically and submitted with the completed Qualification Statements. Contractors will be notified by email of the acceptability of their qualifications.

(b) Bids will be solicited and accepted from pre-qualified sources ONLY.

(c) Prior to performing any awarded Contract Work on-site, each Subcontractor to the Prime Contractor must be accepted as meeting Battelle's qualification requirements.

5. Amendments to Invitations for Bids [Adapted from FAR 52.214-3 (Dec 1989)]

(a) If this solicitation is amended, then all terms and conditions which are not modified remain unchanged.

(b) Bidders shall acknowledge receipt of any amendment to this solicitation by

(1) signing and returning the amendment,

(2) identifying the amendment number and date in the space provided for this purpose on the form for submitting a bid,

(3) letter or telegram, or

(4) facsimile, if facsimile bids are authorized in the solicitation. Battelle must receive the acknowledgment by the time and at the place specified for receipt of bids.

6. False Statements in Bids [Adapted from 52.214-4 (Apr 1984)]

Bidders must provide full, accurate, and complete information as required by this solicitation and its attachments. The penalty for making false statements in bids is prescribed in 18 U.S.C. 1001.

7. Submission of Bids [Adapted from FAR 52.214-5 (Mar 1997)]

(a) Bids and bid modifications shall be submitted in sealed envelopes or packages (unless submitted by electronic means)—

(1) Addressed to the office specified in the solicitation; and

(2) Showing the time and date specified for receipt, the solicitation number, and the name and address of the Bidder.

(b) Bidders using commercial carrier services shall ensure that the bid is addressed and marked on the outermost envelope or wrapper as prescribed in paragraphs (a)(1) and (2) of this provision when delivered to the office specified in the solicitation.

(c) Telegraphic bids will not be considered unless authorized by the solicitation; however, bids may be modified or withdrawn by written or telegraphic notice.

(d) Facsimile bids, modifications, or withdrawals, will not be considered unless authorized by the solicitation.

(e) Bids submitted by electronic commerce shall be considered only if the electronic commerce method was specifically stipulated or permitted by the solicitation.

8. Explanation to Prospective Bidders [Adapted from FAR 52.214-6 (Apr 1984)]

Any prospective Bidder desiring an explanation or interpretation of the solicitation, drawings, specifications, etc., must request it in writing soon enough to allow a reply to reach all prospective Bidders before the submission of their bids. Oral explanations or instructions given before the award of a Contract will not be binding. Any information given a prospective Bidder concerning a solicitation will be furnished promptly to all other prospective Bidders as an amendment to the solicitation, if that information is necessary in submitting bids or if the lack of it would be prejudicial to other prospective Bidders.

9. Late Submissions, Modifications, and Withdrawals of Bids [Adapted from FAR 52.214-7 (Nov 1999)]

(a) Bidders are responsible for submitting bids, and any modifications or withdrawals, so as to reach the Battelle office designated in the invitation for bids (IFB) by the time specified in the IFB. If no time is specified in the IFB, the time for receipt is 10:00 a.m., local time, for the designated Battelle office on the date that bids are due.

(b)(1) Any bid, modification, or withdrawal received at the Battelle office designated in the IFB after the exact time specified for receipt of bids is “late” and will not be considered unless it is received before award is made, the Contract Specialist determines that accepting the late bid would not unduly delay the acquisition; and—

(i) If it was transmitted through an electronic commerce method authorized by the IFB, it was received at the initial point of entry to the Battelle infrastructure not later than 5:00 p.m. one Working day prior to the date specified for receipt of bids; or

(ii) There is acceptable evidence to establish that it was received at the Battelle installation designated for receipt of bids and was under Battelle’s control prior to the time set for receipt of bids.

(2) However, a late modification of an otherwise successful bid that makes its terms more favorable to Battelle will be considered at any time it is received and may be accepted.

(c) Acceptable evidence to establish the time of receipt at the Battelle installation includes the time/date stamp of that installation on the bid wrapper, other documentary evidence of receipt maintained by the installation, or oral testimony or statements of Battelle personnel.

(d) If an emergency or unanticipated event interrupts normal Battelle processes so that bids cannot be received at the Battelle office designated for receipt of bids by the exact time specified in the IFB and urgent Battelle requirements preclude amendment of the IFB, the time specified for receipt of bids will be deemed to be extended to the same time of day specified in the solicitation on the first Work day on which normal Battelle processes resume.

(e) Bids may be withdrawn by written notice received at any time before the exact time set for receipt of bids. If the IFB authorizes facsimile bids, bids may be withdrawn via facsimile received at any time before the exact time set for receipt of bids, subject to the conditions specified in the Instruction to Bidders entitled "Facsimile Bids." A bid may be withdrawn in person by a Bidder or its authorized representative if, before the exact time set for receipt of bids, the identity of the person requesting withdrawal is established and the person signs a receipt for the bid.

10. Period for Acceptance of Bids **[Adapted from FAR 52.214-15 (Apr 1984)]**

In compliance with the solicitation, the Bidder agrees, if this bid is accepted within ***90*** **calendar days** from the date specified in the solicitation for receipt of bids, to furnish any or all items upon which prices are bid at the price set opposite each item, delivered at the designated point(s), within the time specified in the Schedule.

11. Preparation of Bids—Construction **[Adapted from FAR 52.214-18 (Apr 1984)]**

(a) **Bids must be—**

(1) Submitted on the forms furnished by Battelle or on copies of those forms, and

(2) Manually signed. The person signing a bid must initial each erasure or change appearing on any bid form.

(b) The bid form may require Bidders to submit bid prices for one or more items on various bases, including—

(1) Lump sum bidding;

(2) Alternate prices;

(3) Units of construction; or

(4) Any combination of paragraphs (b)(1) through (b)(3) of this provision.

(c) If the solicitation requires bidding on all items, failure to do so will disqualify the bid. If bidding on all items is not required, Bidders should insert the words "no bid" in the space provided for any item on which no price is submitted.

(d) Alternate bids will not be considered unless this solicitation authorizes their submission.

(e) **Additional Proposal Requirements—**

(1) **Bid Guarantee:** *– Is Required.*

(2) **Representations and Certifications:** Bidder shall complete and submit company representations and certifications.

(3) **Insurance:** Bidder shall submit verification of possession of the insurance coverage listed in the General Provisions.

(4) **Permits and Licenses:** Bidder shall submit the Certificate of License number, which grants them the authority to Work as a Contractor in the State, County and/or Municipality where the Work is to be performed. If Bidder does not have such license or certificate, a copy of the application for it must be submitted with an estimate of time required to obtain it.

(5) **Labor Harmony:** Bidder shall submit a Plan for harmonizing labor on the Battelle Work Site – *Davis Bacon Applies*.

12. Contract Award—Sealed Bidding—Construction [Adapted from FAR 52.214-19 (Aug 1996)]

(a) Battelle will evaluate bids in response to this solicitation without discussions and will award a Contract to the responsible Bidder whose bid, conforming to the solicitation, will be most advantageous to Battelle, considering only price and the price-related factors specified elsewhere in the solicitation.

(b) Battelle may reject any or all bids, and waive informalities or minor irregularities in bids received.

(c) Battelle may accept any item or combination of items, unless doing so is precluded by a restrictive limitation in the solicitation or the bid.

(d) Battelle may reject a bid as non-responsive if the prices bid are materially unbalanced between line items or sub-line items. A bid is materially unbalanced when it is based on prices significantly less than cost for some Work and prices which are significantly overstated in relation to cost for other Work, and if there is a reasonable doubt that the bid will result in the lowest overall cost to Battelle even though it may be the low evaluated bid, or if it is so unbalanced as to be tantamount to allowing an advance payment.

13. Pricing Conditions [Adapted from FAR 52.214-34 & 35 (Apr 1991)]

(a) Offers submitted in response to this solicitation shall be in the English language. Offers received in other than English shall be rejected.

(b) Offers submitted in response to this solicitation shall be in terms of U.S. dollars. Offers received in other than U.S. dollars shall be rejected.

(c) All pricing must be firm for the duration of this Contract.

(d) The quoted price(s) must include all costs to for materials, labor, equipment, testing and any and all items of expense, fees, taxes, duties, overhead and profit for full and complete performance of the Work.

14. Site Investigation and Conditions Affecting the Work [Adapted from FAR 52.236-3 (Apr 1984)]

(a) The Contractor must take steps reasonably necessary to ascertain the nature and location of the Work, and to investigate and satisfy itself as to the general and local conditions which can affect the Work or its cost, including but not limited to—

(1) Conditions bearing upon transportation, disposal, handling, and storage of materials;
(2) The availability of labor, water, electric power, and roads;
(3) Uncertainties of weather, river stages, tides, or similar physical conditions at the site;
(4) The conformation and conditions of the ground; and
(5) The character of equipment and facilities needed preliminary to and during Work performance.

The Contractor must also satisfy itself as to the character, quality, and quantity of surface and subsurface materials or obstacles to be encountered insofar as this information is reasonably ascertainable from an inspection of the site, including all exploratory Work done by Battelle, as well as from the drawings and specifications made a part of this Contract. Any failure of the Contractor to take the actions described and acknowledged in this paragraph will not relieve the Contractor from responsibility for estimating properly the difficulty and cost of successfully performing the Work, or for proceeding to successfully perform the Work without additional expense to Battelle.

(b) Battelle assumes no responsibility for any conclusions or interpretations made by the Contractor based on the information made available by Battelle. Nor does Battelle assume responsibility for any understanding reached or representation made concerning conditions which can affect the Work by any of its officers or agents before the execution of this Contract, unless that understanding or representation is expressly stated in this Contract.

15. Flow-down of Contract Clauses

(a) Any Contract resulting from this solicitation, by and between Battelle and Contractor (including all subcontractors and suppliers), for services in connection with Battelle's Management, Operation and Maintenance of the U.S. Department of Energy's Pacific Northwest Laboratory (PNNL) at Richland, Washington, under Contract DE-AC05-76RLO1830 is subject to the terms and conditions of the General Provisions set forth in this solicitation. Contractor shall flow-down all terms and conditions in this solicitation in all its lower-tier subcontracts and supplier purchase orders. Clauses made inapplicable by the value, stated conditions, or type of Contract are self-deleting.

(b) The Contractor and its subcontractors at any tier are required to submit a fully executed SF 1413, Statement and Acknowledgment, upon award of each subcontract involving labor to acknowledge that the following clauses of the Contract have been included:

(1) Contract Work Hours and Safety Standards Act – Overtime Compensation – Construction
(2) Davis-Bacon Act
(3) Withholding of Funds
(4) Payrolls and Basic Records
(5) Apprentices and Trainees
(6) Compliance with Copeland Act Requirements
(7) Subcontracts (Labor Standards)
(8) Contract Termination – Debarment
(9) Disputes Concerning Labor Standards
(10) Certification of Eligibility

16. PNNL Contractor Environmental Safety and Health (CESH) Documents

CESH documents, including the CESH Manual, the Hoisting and Rigging Manual and miscellaneous CESH forms can be accessed online at http://www.pnl.gov/contracts/esh-procedures/.

Pacific Northwest
NATIONAL LABORATORY
Proudly Operated by Battelle Since 1965

REPRESENTATIONS AND CERTIFICATIONS

For the Pacific Northwest National Laboratory
Operated by Battelle Memorial Institute

Battelle Memorial Institute has executed and is engaged in the performance of Prime Contract DE-AC05-76RL01830 with the United States Department of Energy (DOE), for the management, operation, and maintenance of the Pacific Northwest National Laboratory (PNNL) in Richland, Washington. The following representations and certifications must be completed, and this form must be signed and returned with the Offeror's proposal.

Taxpayer Identification *(cl. 405 - Oct 1998)*

A. Definitions

"*Common Parent,*" as used in this solicitation provision, means that corporation entity owns or controls an affiliated group of corporation that files its Federal income tax returns on a consolidated basis, and of which the offeror is a member.

"*Taxpayer Identification Number (TIN),*" as used in this provision, means the number required by the Internal Revenue Service (IRS) to be used by the offeror in reporting income tax and other returns. The TIN may be either a Social Security Number or an Employee Identification Number.

B. All offerors must submit the information required in Paragraphs D through F of this provision to comply with debt collection requirements of 31 U.S.C. 7701(c) and 3325(d), reporting requirements of 26 U.S.C. 6041, 6041A, and 6050M and implementing regulations issued by the IRS. If the resulting contract is subject to the reporting requirements described in Federal Acquisition Regulation (FAR) 4.904, the failure or refusal by the offeror to furnish the information may result in a 31 percent reduction of payments otherwise due under the contract.

C. The TIN may be used by the Government to collect and report on any delinquent amounts arising out of the offeror's relationship with the government (31 U.S.C. 7701(c)(3)). If the resulting contract is subject to the payment reporting requirements described in FAR 4.904, the TIN provided hereunder may be matched with IRS records to verify the accuracy of the offeror's TIN.

D. *Taxpayer Identification Number (TIN)*

- ☐ TIN: _____
- ☐ TIN has been applied for.
- ☐ TIN is not required because _____
- ☐ Offeror is a nonresident alien, foreign corporation, or foreign partnership that does not have income effectively connected with the conduct of trade or business in the United States and does not have an office or place of business or a fiscal paying agent in the United States.
- ☐ Offeror is an agency or instrumentality of a foreign government
- ☐ Offeror is an agency or instrumentality of a Federal Government
- ☐ Other. State basis. _____

E. *Type of Organization*

- ☐ Sole proprietorship
- ☐ Partnership
- ☐ Corporate entity (not tax-exempt)
- ☐ Corporate entity (tax-exempt)
- ☐ Government entity (Federal, State, or local)
- ☐ Foreign government
- ☐ International organization per 26 CFR 1.6049-4
- ☐ Other _____

F. *Common Parent*

- ☐ Offeror is not owned or controlled by a common parent as defined in paragraph (a) of this provision.
- ☐ Name and TIN of common parent: Name _____ TIN _____
- ☐ Offeror, its parent company, or subsidiaries, is/has been owned or controlled by a foreign entity. If so, provide the following information:

  Name of Parent Company _____

  Main Office Address _____

  _____

G. *Other*

☐ Foreign organization is headquarter in _____ (country)

☐ Company ☐ is, ☐ is not publicly traded

Small Business Program Representations *(cl. 407 - Oct 2011)*

(Applicable if any performance will be inside the United States or its outlying areas.)

A. 1. The North American Industry Classification System (NAICS) code for this acquisition is _____.

2. The small business size standard is _____.

3. The small business size standard for a concern which submits an offer in its own name, other than on a construction or service contract, but which proposes to furnish a product which it did not itself manufacture, is 500 employees.

B. *Representations.*

1. The offeror represents as part of its offer that it ☐ is, ☐ is not a small business concern.

(Complete 2-8 below, as applicable, only if the offeror represented itself as a small business concern in paragraph B.1. of this provision.)

2. The offeror represents, for general statistical purposes, that it ☐ is, ☐ is not, a small disadvantaged business concern as defined in 13 CFR 124.1002. *(If so, also complete the Small Disadvantaged Business Status representation, below.)*

3. The offeror represents as part of its offer that it ☐ is, ☐ is not a women-owned small business concern.

4. [*Complete only if the offeror represented itself as a women-owned small business concern in Paragraph B.3. of this provision.*] Women-owned small business (WOSB) concern eligible under the WOSB Program.

The offeror represents as part of its offer that—

a. It ☐ is, ☐ is not a WOSB concern eligible under the WOSB Program, has provided all the required documents to the WOSB Repository, and no change in circumstances or adverse decisions have been issued that affects its eligibility; and

b. It ☐ is, ☐ is not a joint venture that complies with the requirements of 13 CFR part 127, and the representation in Paragraph B.4.a. of this provision is accurate in reference to the WOSB concern or concerns that are participating in the joint venture. [*The offeror shall enter the name or names of the WOSB concern or concerns that are participating in the joint venture:*

_____.] *Each WOSB concern participating in the joint venture shall submit a separate signed copy of the WOSB representation.*

5. [*Complete only if the offeror represented itself as a women-owned small business concern eligible under the WOSB Program in Paragraph B.4. of this provision.*] Economically disadvantaged women-owned small business (EDWOSB) concern. The offeror represents as part of its offer that—

a. It ☐ is, ☐ is not an EDWOSB concern eligible under the WOSB Program, has provided all the required documents to the WOSB Repository, and no change in circumstances or adverse decisions have been issued that affects its eligibility; and

b. It ☐ is, ☐ is not a joint venture that complies with the requirements of 13 CFR part 127, and the representation in Paragraph B.5.a. of this provision is accurate in reference to the EDWOSB concern or concerns that are participating in the joint venture. [*The offeror shall enter the name or names of the EDWOSB concern or concerns that are participating in the joint venture:*

_____.] *Each EDWOSB concern participating in the joint venture shall submit a separate signed copy of the EDWOSB representation.*

6. The offeror represents as part of its offer that it ☐ is, ☐ is not a veteran-owned small business concern.

7. The offeror represents as part of its offer that it ☐ is, ☐ is not a service-disabled veteran-owned small business concern.

8. The offeror represents, as part of its offer, that—

a. It ☐ is, ☐ is not a HUBZone small business concern listed, on the date of this representation, on the List of Qualified HUBZone Small Business Concerns maintained by the Small Business Administration, and no material change in ownership and control, principal office, or HUBZone employee percentage have occurred since it was in accordance with 13 CFR part 126; and

b. It ☐ is, ☐ is not a HUBZone joint venture that complies with the requirements of 13 CFR part 126, and the representation in paragraph B.6.a. of this provision is accurate for the HUBZone small business concern that are participating in the HUBZone joint venture.

[*The offeror shall enter the name or names of the HUBZone small business concern or concerns that are participating in the joint venture*: _____]

Each HUBZone small business concern participating in the joint venture shall submit a separate signed copy of the HUBZone representation.

C. *Definitions*. As used in this provision ...

"Economically disadvantaged women-owned small business (EDWOSB) concern" means a small business concern that is at least 51 percent directly and unconditionally owned by, and the management and daily business operations of which are controlled by, one or more women who are citizens of the United States and who are economically disadvantaged in accordance with 13 CFR part 127. It automatically qualifies as a women-owned small business concern eligible under the WOSB Program.

"Service-disabled veteran-owned small business concern"—

1. Means a small business concern (a) Not less than 51 percent of which is owned by one or more service-disabled veterans or, in the case of any publicly owned business, not less than 51 percent of the stock of which is owned by one or more service-disabled veterans; and (b) The management and daily business operations of which are controlled by one or more service-disabled veterans or, in the case of a service-disabled veteran with permanent and severe disability, the spouse or permanent caregiver of such veteran.
2. Service-disabled veteran means a veteran, as defined in 38 U.S.C. 101(2), with a disability that is service-connected, as defined in 38 U.S.C. 101(16).

"Small business concern" means a concern, including its affiliates, that is independently owned and operated, not dominant in the field of operation in which it is bidding on Government contracts, and qualified as a small business under the criteria in 13 CFR part 121 and the size standard in Paragraph A of this provision.

"Veteran-owned small business concern" means a small business concern—

1. Not less than 51 percent of which is owned by one or more veterans (as defined at 38 U.S.C. 101(2)) or, in the case of any publicly owned business, not less than 51 percent of the stock of which is owned by one or more veterans; and
2. The management and daily business operations of which are controlled by one or more veterans.

"Women-owned small business concern" means a small business concern—

1. That is at least 51 percent owned by one or more women; or, in the case of any publicly owned business, at least 51 percent of the stock of which is owned by one or more women; and
2. Whose management and daily business operations are controlled by one or more women.

D. *Notice*.

1. If this solicitation is for supplies and has been set aside, in whole or in part, for small business concerns, then the clause in this solicitation providing notice of the set-aside contains restrictions on the source of the end items to be furnished.
2. Under 15 U.S.C. 645(d), any person who misrepresents a firm's status as a small, HUBZone small, small disadvantaged, or women-owned small business concern in order to obtain a contract to be awarded under the preference programs established pursuant to section 8(a), 8(d), 9, or 15 of the Small Business Act or any other provision of Federal law that specifically references section 8(d) for a definition of program eligibility, shall— (i) Be punished by imposition of fine, imprisonment, or both; (ii) Be subject to administrative remedies, including suspension and debarment; and (iii) Be ineligible for participation in programs conducted under the authority of the Act.

Alaska Native Corporation or Indian Tribe Representation *(cl. 407A - Feb 2011)*

In accordance with FAR 52.219-9(d)(1)(i), subcontracts awarded to an Alaska Native Corporation (ANC) or Indian tribe may be counted towards subcontracting goals for small business and small disadvantaged business concerns regardless of the size or Small Business Administration certification of the ANC or Indian tribe. As defined by FAR 52.219-9(b), the offeror represents that it –

☐ is ☐ is not an Alaska Native Corporation

☐ is ☐ is not an Indian tribe

Organizational Conflicts of Interest Disclosure—Advisory and Assistance Services *(cl. 411 - June 1997)*

A. Organizational conflict of interest means that because of other activities or relationships with other persons, a person is unable or potentially unable to render impartial assistance or advice to the Government, or the person's objectivity in performing the contract work is or might be otherwise impaired, or a person has an unfair competitive advantage.

B. An offeror notified that it is the apparent successful offeror shall provide the statement described in Paragraph C of this provision. For purposes of this provision, "apparent successful offeror" means the proposer selected for final negotiations or, where individual contracts are negotiated with all firms in the competitive range, it means all such firms.

C. The statement must contain the following:

1. A statement of any past (within the past twelve months), present, or currently planned financial, contractual, organizational, or other interests relating to the performance of the statement of work. For contractual interests, such statement must include the name, address, telephone number of the client or client(s), a description of the services rendered to the previous client(s), and the name of a responsible officer or employee of the offeror who is knowledgeable about the services rendered to each client, if, in the 12 months preceding the date of the statement, services were rendered to the Government or any other client (including a foreign government or person) respecting the same subject matter of the instant solicitation, or directly relating to such subject matter. The agency and contract number under which the services were rendered must also be included, if applicable. For financial interests, the statement must include the nature and extent of the interest and any entity or entities involved in the financial relationship. For these and any other interests enough such information must be provided to allow a meaningful evaluation of the potential effect of the interest on the performance of the statement of work.

2. A statement that no actual or potential conflict of interest or unfair competitive advantage exists with respect to the advisory and assistance services to be provided in connection with the instant contract or that any actual or potential conflict of interest or unfair competitive advantage that does or may exist with respect to the contract in question has been communicated as part of the statement required by Paragraph B of this provision.

D. Failure of the offeror to provide the required statement may result in the offeror being determined ineligible for award. Misrepresentation or failure to report any fact may result in the assessment of penalties associated with false statements or such other provisions provided for by law or regulation.

Employment Eligibility Verification *(cl. 421 - Oct 2011)*

(Applicable to proposals exceeding $3,000)

Offeror represents that—

☐ E-Verify is not applicable based on paragraph (e) of FAR 52.222-54 Employment Eligibility Verification.

☐ it is ☐ it is not currently enrolled in E-Verify.

☐ if not currently enrolled, it will enroll in E-Verify within 30 calendar days of subcontract award.

☐ it will include FAR 52.222-54 in applicable lower-tier subcontracts.

Affirmative Action Compliance *(cl. 409 - Apr 1984)*

The offeror represents that it –

☐ has developed and has on file,

☐ has not developed and does not have on file, at each establishment, affirmative action programs required by the rules and regulations of the Secretary of Labor (41 CFR 60-1 and 60-2); or

☐ has not previously had contracts subject to the written affirmative action programs requirement of the rules and regulations of the Secretary of Labor.

Compliance with Veterans' Employment Reporting Requirements *(cl. 420 - Sep 2010)*

By submission of its offer, the offeror represents that, if it is subject to the reporting requirements of 38 U.S.C. 4212(d) (*i.e.*, if it has any contract containing Federal Acquisition Regulation clause 52.222-37, Employment Reports on Veterans), it has submitted the most recent VETS-100A Report required by that clause.

Previous Contracts and Compliance Reports *(cl. 408 - Feb 1999)*

Offeror represents that it—

☐ has ☐ has not participated in a previous contract or subcontract subject the Equal Opportunity clause of this solicitation;

☐ Has ☐ has not filed all required compliance reports; and

Representations indicating submission of required compliance reports, signed by proposed subcontractors, will be obtained before subcontract awards.

Representation of Limited Rights Data and Restricted Computer Software *(cl. 415 - Dec 2007)*

A. This solicitation sets forth the Government's known delivery requirements for data (as defined in the clause at FAR 52.227-14, Rights in Data—General). Any resulting contract may also provide the Government the option to order additional data under the Additional Data Requirements clause at FAR 52.227-16, if included in the contract. Any data delivered under the resulting contract will be subject to the Rights in Data—General clause at FAR 52.227-14 included in this contract. Under the latter clause, a Contractor may withhold from delivery data that qualify as limited rights data or restricted computer software, and deliver form, fit, and function data instead. The latter clause also may be used with its Alternates II and/or III to obtain delivery of limited rights data or restricted computer software, marked with limited rights or restricted rights notices, as appropriate. In addition, use of Alternate V with this latter clause provides the Government the right to inspect such data at the Contractor's facility.

B. By completing the remainder of this paragraph, the offeror represents that it has reviewed the requirements for the delivery of technical data or computer software and states [*offeror check appropriate block*]—

☐ None of the data proposed for fulfilling the data delivery requirements qualifies as limited rights data or restricted computer software; or

☐ Data proposed for fulfilling the data delivery requirements qualify as limited rights data or restricted computer software and are identified as follows:

_____

_____

C. Any identification of limited rights data or restricted computer software in the offeror's response is not determinative of the status of the data should a contract be awarded to the offeror.

Royalty Payment Certification *(cl. 414 - Jan 1986)*

In order that the U.S. Department of Energy may be informed regarding royalty payments to be made by a contractor in connection with any acquisition, construction, or operation where the amount of the royalty payment is reflected in the contract price, or is to be reimbursed by Battelle, check one of the following:

☐ The Contract price includes no amount representing the payment of royalty by the Offeror directly to others in connection with the performance of the contract.

☐ The Contract price includes an amount for royalty payment expected to be made in connection with the proposed award set forth below:

1. the amount of each payment,
2. the names of the licensor, and
3. either the patent numbers involved or such other information as will permit identification of the patents and patent applications and the basis on which royalties will be paid.

Buy American Act Certificate *(cl. 410 - Feb 2009)*

A. The offeror certifies that each end product, except those listed in Paragraph B of this provision, is a domestic end product and that for other than COTS items, the offeror has considered components of unknown origin to have been mined, produced, or manufactured outside the United States. The offeror shall list as foreign end products those end products manufactured in the United States that do not qualify as domestic end products, *i.e.*, an end product that is not a COTS item and does not meet the component test in Paragraph 2 of the definition of "domestic end product." The terms "commercially available off-the-shelf (COTS) item," "component," "domestic end product," "end product," "foreign end product," and "United States" are defined in the clause of this solicitation entitled "Buy American Act—Supplies."

B. Foreign End Products:

Line Item No.	Country of Origin

C. Offers will be evaluated in accordance with the policies and procedures of Part 25 of the Federal Acquisition Regulation.

Technical Data Certification *(cl. 413 - Jan 1986)*

The offeror certifies that it has not delivered or is not obligated to deliver to Battelle or to the Government under any contract or subcontract the same or substantially the same technical data included in its offer, except as set forth below:

☐ None

☐ Contract No. (and Subcontract No., if applicable), Agency name and place of delivery

Certification Regarding Responsibility Matters *(cl. 419 - April 2010)*

A. The Offeror certifies, to the best of its knowledge and belief, that—

1. The Offeror and/or any of its Principals—

☐ are ☐ are not presently debarred, suspended, proposed for debarment, or declared ineligible for the award of contracts by any Federal agency;

☐ have ☐ have not within a three-year period preceding this offer, been convicted of or had a civil judgment rendered against them for: commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, state, or local) contract or subcontract; violation of Federal or state antitrust statutes relating to the submission of offers; or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, tax evasion, violating Federal criminal tax laws, or receiving stolen property;

☐ are ☐ are not presently indicted for, or otherwise criminally or civilly charged by a governmental entity with, commission of any of the offenses enumerated in Paragraph A.1.a.ii. of this provision;

☐ have ☐ have not within a three-year period preceding this offer, been notified of any delinquent Federal taxes in an amount that exceeds $3,000 for which the liability remains unsatisfied.

a. Federal taxes are considered delinquent if both of the following criteria apply:

i. *The tax liability is finally determined*. The liability is finally determined if it has been assessed. A liability is not finally determined if there is a pending administrative or judicial challenge. In the case of a judicial challenge to the liability, the liability is not finally determined until all judicial appeal rights have been exhausted.

ii. *The taxpayer is delinquent in making payment*. A taxpayer is delinquent if the taxpayer has failed to pay the tax liability when full payment was due and required. A taxpayer is not delinquent in cases where enforced collection action is precluded.

b. *Examples*.

- The taxpayer has received a statutory notice of deficiency, under I.R.C. § 6212, which entitles the taxpayer to seek Tax Court review of a proposed tax deficiency. This is not a delinquent tax because it is not a final tax liability. Should the taxpayer seek Tax Court review, this will not be a final tax liability until the taxpayer has exercised all judicial appeal rights.
- The IRS has filed a notice of Federal tax lien with respect to an assessed tax liability, and the taxpayer has been issued a notice under I.R.C. § 6320 entitling the taxpayer to request a hearing with the IRS Office of Appeals contesting the lien filing, and to further appeal to the Tax Court if the IRS determines to sustain the lien filing. In the course of the hearing, the taxpayer is entitled to contest the underlying tax liability because the taxpayer has had no prior opportunity to contest the liability. This is not a delinquent tax because it is not a final tax liability. Should the taxpayer seek tax court review, this will not be a final tax liability until the taxpayer has exercised all judicial appeal rights.
- The taxpayer has entered into an installment agreement pursuant to I.R.C. § 6159. The taxpayer is making timely payments and is in full compliance with the agreement terms. The taxpayer is not delinquent because the taxpayer is not currently required to make full payment.
- The taxpayer has filed for bankruptcy protection. The taxpayer is not delinquent because enforced collection action is stayed under 11 U.S.C. 362 (the Bankruptcy Code).

c. The Offeror ☐ has, ☐ has not, within a three-year period preceding this offer, had one or more contracts terminated for default by any Federal agency.

2. "Principal," for the purposes of this certification, means an officer, director, owner, partner, or a person having primary management or supervisory responsibilities within a business entity (*e.g.*, general manager; plant manager; head of a subsidiary, division, or business segment; and similar positions).

This Certification Concerns a Matter Within the Jurisdiction of an Agency of the United States and the Making of a False, Fictitious, or Fraudulent Certification May Render the Maker Subject to Prosecution Under Section 1001, Title 18, United States Code.

B. The Offeror shall provide immediate written notice to the Battelle Contracts Representative if, at any time prior to contract award, the Offeror learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances.

C. A certification that any of the items in Paragraph A of this provision exists will not necessarily result in withholding of an award under this solicitation. However, the certification will be considered in connection with a determination of the Offeror's responsibility. Failure of the Offeror to furnish a certification or provide such additional information as requested by the Battelle Contracts Representative may render the Offeror nonresponsible.

D. Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render, in good faith, the certification required by Paragraph A of this provision. The knowledge and information of an Offeror is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

E. The certification in Paragraph A of this provision is a material representation of fact upon which reliance was placed when making award. If it is later determined that the Offeror knowingly rendered an erroneous certification, in addition to other remedies available to Battelle, the Battelle Contracts Representative may terminate the contract resulting from this solicitation for default.

Patent Rights Representation *(cl. 417 - Jan 1986)*

Offeror represents that it—

☐ is	☐ is not	A small business as defined at section 2 of Pub. L. 85-536 (15 USC 632) and the implementing regulations of the Administrator of the Small Business Administration, 13 CFR Part 121.
☐ is	☐ is not	An organization of the type described in section 501(c)(3) of the Internal Revenue Code (26 USC 501(c)(3)) and exempt from taxation under section 501(a) of the Internal Revenue Code (26 USC 501(a)).
☐ is	☐ is not	A nonprofit scientific or educational organization qualified under a State nonprofit organization statute.
☐ is	☐ is not	A U.S. domestic university or other U.S. institution of higher education.

Certification and Disclosure Regarding Payments to Influence Certain Federal Transactions *(cl. 404 - Sep 2007)*

(Applicable to proposals exceeding $100,000)

A. *Definitions.* As used in this provision—"Lobbying contact" has the meaning provided at 2 U.S.C. 1602(8). The terms "agency," "influencing or attempting to influence," "officer or employee of an agency," "person," "reasonable compensation," and "regularly employed" are defined in the FAR clause of this solicitation entitled "Limitation on Payments to Influence Certain Federal Transactions" (52.203-12).

B. *Prohibition*. The prohibition and exceptions contained in the FAR clause of this solicitation entitled "Limitation on Payments to Influence Certain Federal Transactions" (52.203-12) are hereby incorporated by reference in this provision.

C. *Certification*. The offeror, by signing its offer, hereby certifies to the best of its knowledge and belief that no Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress on its behalf in connection with the awarding of this contract.

D. *Disclosure*. If any registrants under the Lobbying Disclosure Act of 1995 have made a lobbying contact on behalf of the offeror with respect to this contract, the offeror shall complete and submit, with its offer, OMB Standard Form LLL, Disclosure of Lobbying Activities, to provide the name of the registrants. The offeror need not report regularly employed officers or employees of the offeror to whom payments of reasonable compensation were made.

E. *Penalty*. Submission of this certification and disclosure is a prerequisite for making or entering into this contract imposed by 31 U.S.C. 1352.Any person who makes an expenditure prohibited under this provision or who fails to file or amend the disclosure required to be filed or amended by this provision, shall be subject to a civil penalty of not less than $10,000, and not more than $100,000, for each such failure.

Code of Business Ethics and Conduct *(cl. 406 - Oct 2011)*

By submission of this offer, the offeror certifies that it conducts its business fairly, impartially, and in an ethical and proper manner. The offeror also certifies that it maintains a Code of Business Ethics and Conduct and adheres to its terms. The offeror agrees, in consideration of the opportunity to propose on this requirement, that the offeror shall immediately report all unethical or improper conduct by the offeror or Buyer's agents in connection with this solicitation or the resulting contract to the U.S. Department of Energy, Office of Inspector General, and the Battelle Contracts Representative.

Cost Accounting Standards Notices and Certification *(cl. 416 - Oct 2011)*

Note: This notice does not apply to small businesses or foreign governments. This notice is in three parts, identified by Roman numerals I through III.

Offerors shall examine each part and provide the requested information in order to determine Cost Accounting Standards (CAS) requirements applicable to any resultant contract.

If the offeror is an educational institution, Part II does not apply unless the contemplated contract will be subject to full or modified CAS coverage pursuant to 48 CFR 9903.201-2(c)(5) or 9903.201-2(c)(6), respectively.

I. DISCLOSURE STATEMENT—COST ACCOUNTING PRACTICES AND CERTIFICATION

A. Any contract in excess of $700,000 resulting from this solicitation will be subject to the requirements of the Cost Accounting Standards Board (48 CFR Chapter 99), except for those contracts which are exempt as specified in 48 CFR 9903.201-1.

B. Any offeror submitting a proposal which, if accepted, will result in a contract subject to the requirements of 48 CFR Chapter 99 must, as a condition of contracting, submit a Disclosure Statement as required by 48 CFR 9903.202. When required, the Disclosure Statement must be submitted as a part of the offeror's proposal under this solicitation unless the offeror has already submitted a Disclosure Statement disclosing the practices used in connection with the pricing of this proposal. If an applicable Disclosure Statement has already been submitted, the offeror may satisfy the requirement for submission by providing the information requested in paragraph (c) of Part I of this provision.

Caution: In the absence of specific regulations or agreement, a practice disclosed in a Disclosure Statement shall not, by virtue of such disclosure, be deemed to be a proper, approved, or agreed-to practice for pricing proposals or accumulating and reporting contract performance cost data.

C. Check the appropriate box below:

☐ 1. *Certificate of Concurrent Submission of Disclosure Statement.* The offeror hereby certifies that, as a part of the offer, copies of the Disclosure Statement have been submitted as follows:

a. Original and one copy to the cognizant Administrative Contracting Officer (ACO) or cognizant Federal agency official authorized to act in that capacity (Federal official), as applicable; and

b. One copy to the cognizant Federal auditor.

(Disclosure must be on Form No. CASB DS-1 or CASB DS-2, as applicable. Forms may be obtained from the cognizant ACO or Federal official and/or from the loose-leaf version of the Federal Acquisition Regulation.)

Date of Disclosure Statement: _____

Name and Address of Cognizant ACO or Federal Official Where Filed: _____

The offeror further certifies that the practices used in estimating costs in pricing this proposal are consistent with the cost accounting practices disclosed in the Disclosure Statement.

☐ 2. *Certificate of Previously Submitted Disclosure Statement.* The offeror hereby certifies that the required Disclosure Statement was filed as follows:

Date of Disclosure Statement: _____

Name and Address of Cognizant ACO or Federal Official Where Filed: _____

The offeror further certifies that the practices used in estimating costs in pricing this proposal are consistent with the cost accounting practices disclosed in the applicable Disclosure Statement.

☐ 3. *Certificate of Monetary Exemption.* The offeror hereby certifies that the offeror, together with all divisions, subsidiaries, and affiliates under common control, did not receive net awards of negotiated prime contracts and subcontracts subject to CAS totaling $50 million or more in the cost accounting period immediately preceding the period in which this proposal was submitted. The offeror further certifies that if such status changes before an award resulting from this proposal, the offeror will advise the Contracting Officer immediately.

☐ 4. *Certificate of Interim Exemption.* The offeror hereby certifies that (i) the offeror first exceeded the monetary exemption for disclosure, as defined in (3) of this subsection, in the cost accounting period immediately preceding the period in which this offer was submitted and (ii) in accordance with 48 CFR 9903.202-1, the offeror is not yet required to submit a Disclosure Statement. The offeror further certifies that if an award resulting from this proposal has not been made within 90 days after the end of that period, the offeror will immediately submit a revised certificate to the Contracting Officer, in the form specified under Paragraph C.1. or C.2. of Part I of this provision, as appropriate, to verify submission of a completed Disclosure Statement.

☐ 5. *Certificate of Disclosure Statement Due Date by Educational Institution.* If the offeror is an educational institution that, under the transition provisions of 48 CFR 9903.202-1(f), is or will be required to submit a Disclosure Statement after receipt of this award, the offeror hereby certifies that (check one and complete):

☐ A Disclosure Statement Filing Due Date of _____ has been established with the cognizant Federal agency.

☐ The Disclosure Statement will be submitted within the 6-month period ending _____ months after receipt of this award.

Caution: Offerors currently required to disclose because they were awarded a CAS-covered prime contract or subcontract of $50 million or more in the current cost accounting period may not claim this exemption (4). Further, the exemption applies only in connection with proposals submitted before expiration of the 90-day period following the cost accounting period in which the monetary exemption was exceeded.

II. COST ACCOUNTING STANDARDS—ELIGIBILITY FOR MODIFIED CONTRACT COVERAGE

If the offeror is eligible to use the modified provisions of 48 CFR 9903.201-2(b) and elects to do so, the offeror shall indicate by checking the box below. Checking the box below shall mean that the resultant contract is subject to the Disclosure and Consistency of Cost Accounting Practices clause in lieu of the Cost Accounting Standards clause.

☐ The offeror hereby claims an exemption from the Cost Accounting Standards clause under the provisions of 48 CFR 9903.201-2(b) and certifies that the offeror is eligible for use of the Disclosure and Consistency of Cost Accounting Practices clause because during the cost accounting period immediately preceding the period in which this proposal was submitted, the offeror received less than $50 million in awards of CAS-covered prime contracts and subcontracts. The offeror further certifies that if such status changes before an award resulting from this proposal, the offeror will advise the Contracting Officer immediately.

Caution: An offeror may not claim the above eligibility for modified contract coverage if this proposal is expected to result in the award of a CAS-covered contract of $50 million or more or if, during its current cost accounting period, the offeror has been awarded a single CAS-covered prime contract or subcontract of $50 million or more.

III. ADDITIONAL COST ACCOUNTING STANDARDS APPLICABLE TO EXISTING CONTRACTS

The offeror shall indicate below whether award of the contemplated contract would, in accordance with Paragraph A.3. of the Cost Accounting Standards clause, require a change in established cost accounting practices affecting existing contracts and subcontracts.

☐ Yes ☐ No

SIGNATURE

Note: A person authorized to make legally binding commitments on behalf of the offeror must sign below. Signature constitutes a representation that reasonable and prudent inquiry has been made to ascertain the true and accurate basis of all statements. Statements which a person knows or has reason to know are false, fictitious, or fraudulent may result in criminal or civil penalties, as prescribed in 18 USC 1001 and 31 USC 3802(a)(2). These Representations and Certifications shall remain in effect for a period of one (1) year from the date signed and shall satisfy any subsequent proposal requirements during that one-year period. The Offeror shall notify Battelle of any changes that occur in any of the representation or certifications during that period.

Company Name _____

Signature _____

Signer's Name (Printed) _____

Title _____

Date _____

Pacific Northwest
NATIONAL LABORATORY
Proudly Operated by Battelle Since 1965

Part I – Schedule
IFB 233058 Section A - Contract Form

Solicitation, Offer and Award	Invitation For Bid Number: 233058	Date Issued: 01/31/2013	Page of pages: 1 of 1

1. Description: HPCS-4 Power & Cooling

2. NAICS Code: 236220

3. Contract / Modification Number:

4. This Solicitation has been set aside for Small Business Concerns: YES ☐ NO ☒

5. Solicitation Method:
☒ Invitation for Bid (IFB) - *(Sealed Bid)*
☐ Request for Proposal (RFP) - *(Negotiated)*

6. Type of Contract:
☒ Fixed Price ☐ Labor-Hour / Time-and-Material ☐ Cost Reimbursable ☐ Indefinite Quantity

(a) SOLICITATION

Sealed offers for furnishing the supplies or services in the Schedule will be received at the place specified in box 7, or if hand-carried, delivered to the contact person in box 9 until 2:00 p.m. local time. In sealed bid solicitations "offer" and "offeror" mean "bid" and "bidder." All offers are subject to the terms and conditions in this solicitation.

7. Address Offer to:

Battelle Memorial Institute, Pacific Northwest Division
902 Battelle Boulevard
Attn: Garrett V. Hyatt Mail Stop: J2-05
Richland, Washington 99352

8. Offer Due Date: 02/22/2013

9. For Information Call: Garrett V. Hyatt

Office Phone: (509) 371-7591
Mobile Phone: (509) 420-3051
E-Mail Address: garett.hyatt@pnnl.gov

10. TABLE OF CONTENTS

(b) OFFER *(Completed by Offeror)*

Period for Acceptance of Offers. In compliance with the above, the undersigned agrees, if this offer is accepted within 60 **calendar days** from the date of receipt of offers specified above, to furnish any or all items upon which prices are offered at the price set opposite each item, delivered at the designated point(s), within the time specified.

11. Acknowledgement of Amendments
The offeror acknowledges receipt of Solicitation Amendment Numbers: 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐

12. Company Name and Address:

13. Name and Title of Person Authorized to Sign Offer:
Name: _____
Title: _____

14. Offer Amount: YES ☐ NO ☐
Bid Summary Attached
$

15. Authorized Signature of the Offeror:

16. Offer Date:

(c) AWARD *(Completed by Battelle)*

17. Contract Price:	18. Contract Number:	19. Contract Term:	20. Award Date:
$		Through 08/30/2013	

21. Battelle Authorization: Your offer is hereby accepted as to the items listed above. This award consummates the contract which consists of the following documents: (a) the Battelle Solicitation, (b) your offer, and (c) this award/contract. No further contractual document is necessary.

Garrett V. Hyatt

(Name of Sr. Contract Specialist) *(Signature Authorizing Award)* *(Date)*

Pacific Northwest
NATIONAL LABORATORY
Proudly Operated by Battelle Since 1965

Invitation For Bid #233058 Part I – Schedule Sections B - H

B. SERVICES AND PRICES/COST

1. **BASE BID:** The following Contract Line Item Numbers (CLIN's) shall be individually priced within the Contractor's Lump Sum Price on the Rate sheets provided for bid:

CLIN 1: Total Fixed Price (Rates Sheets A, B, C, D)

C. DESCRIPTION OF THE WORK

1. **GENERAL.** Contractor shall perform all construction services, and provide all material, means and methods, equipment, tools and labor, necessary to complete the Work described in and reasonably inferable from the Contract Documents. The Work generally includes providing labor, materials, equipment, means and methods, to complete the PSF Ground Drainage construction.

2. **SPECIFIC.** The Work includes but is not limited to the specific scope elements listed in Specification (or Statement of Work).

3. **DESIGN DOCUMENTATION – DRAWINGS AND SPECIFICATIONS:**

(a) Drawings: S593062-FMP03-Worksheets
(b) Specification: S593062-FMP03*SPCC03
(a) Other: JPP, WEA

4. **SEQUENCING**: Work Sequencing and Interim Completion Milestones of identified portions of the Work shall be in accordance with the "Work Sequence" requirements of Division 1.

D. PACKAGING AND MARKING

(Reserved)

E. INSPECTION AND ACCEPTANCE

Battelle has the right to inspect and evaluate the Work performed or being performed under the Contract, and the premises where the Work is being performed, at all reasonable times and in a manner that will not unduly delay the Work. If Battelle performs inspection or evaluation on the premises of the Contractor or a Subcontractor, the Contractor shall furnish and shall require Subcontractors to furnish all reasonable facilities and assistance for the safe and convenient performance of these duties.

F. PERIOD OF PERFORMANCE

1. **DATE OF COMMENCEMENT.** The Work shall commence within **five (5)** calendar days of Contractor's receipt of Notice to Proceed (NTP) unless the parties mutually agree otherwise in writing.

2. **CONTRACT COMPLETION.**

(a) Work Sequencing/Interim Milestones. Work Sequencing, Interim Milestones and/or Substantial Completion of identified portions of the Work shall be in accordance with the "Work Sequence" requirements of Division 1.
(b) Final Completion. The Contractor shall complete the entire Work ready for use not later than: **06/14/2013**, closeout by **08/30/2013**.

3. **TIME IS OF THE ESSENCE.** Battelle and Contractor mutually agree that time is of the essence with respect to the dates and times set forth in the Contract Documents.

G. CONTRACT ADMINISTRATION

1. **GENERAL.** The Contractor is solely responsible for strict compliance with all requirements of this Contract. No notice, communication or representation in any form or from any person other than a Battelle Contracts Representative shall be effective to relieve the Contractor of such obligation or to stop Battelle from enforcing the Contract exactly according to its written terms.

2. **CONTRACT AUTHORITY.** Contracting authority in Battelle is by formal delegation to named individuals. Contract authority for this Work has been delegated to:

Name: **Garrett V. Hyatt**
Title: **Contract Specialist**
Phone: **(509) 371-7591**
Cell Phone: **(509) 420-3051**
Email: **garrett.hyatt@pnnl.gov**

Notwithstanding any of the other provisions of the Contract, a named and authorized Battelle Contract Representative shall be the only individual on behalf of Battelle authorized to accept nonconforming Work; waive any requirement of this Contract; or take any action involving a change in the scope, price, terms, or conditions of this Contract.

3. **INTERPRETATION AND INTENT.** The Contract Documents are intended to permit the parties to complete the Work and all obligations required by the Contract Documents within the Contract Time(s) for the Contract Price. The Contract Documents are intended to be complementary and interpreted in harmony so as to avoid conflict, with words and phrases interpreted in a manner consistent with construction and design industry standards. In the event of any inconsistency, conflict, or ambiguity between or among the Contract Documents, the order of precedence shall be in accordance with the General Provisions.

The Contract Documents form the entire agreement between Battelle and Contractor and by incorporation herein are as fully binding on the parties as if repeated herein. No oral

representations or other agreements have been made by the parties except as specifically stated in the Contract Documents.

4. **INVOICING AND PAYMENT**. Submit invoices electronically to ap.invoices@pnl.gov. Invoices may not be submitted more frequently than monthly. Payments can be made electronically by wire (foreign payments) or ACH (domestic payments) by filling out the ACH form at http://www.pnl.gov/contracts/documents/invoices.asp. Failure to comply with electronic processing may result in a delay in payment. Payments Terms are Net 30 from the date received.

5. **TECHNICAL DIRECTION.** The Contractor's progress and compliance with the technical requirements of this Contract will be monitored for Battelle by a Technical Administrator. The Technical Administrator is authorized to receive information, conduct inspections of Work in process and witness Contractor tests. He/she has no authority to: change or waive any provision of this Contract, including but not limited to statements of Work, drawings, specifications and standards, whether attached or incorporated by reference; provide interpretations of any provision or requirement of this Contract; direct, advise, or recommend any particular course of conduct on the part of the Contractor; or create any legally binding commitment on behalf of Battelle. The Technical Administrator for this Work will be:

Name: **Ed Koellermeier**
Title: **Project Manager**
Phone: **(509) 371-6780**
Email: **ed.koellermeier@pnnl.gov**

H. SPECIAL REQUIREMENTS

1. **BID GUARANTEE** **[Adapted from FAR 52.228-1 (Sept 1996)]**

(a) Failure to furnish a bid guarantee in the proper form and amount, by the time set for opening of bids, may be cause for rejection of the bid.
(b) The bidder shall furnish a bid guarantee in the form of a firm commitment, e.g., bid bond supported by good and sufficient surety or sureties acceptable to Battelle, postal money order, certified check, cashier's check, or irrevocable letter of credit. Battelle will return bid guarantees, other than bid bonds—

(1) To unsuccessful bidders as soon as practicable after the opening of bids; and
(2) To the successful bidder upon execution of Contractual documents and bonds (including any necessary coinsurance or reinsurance agreements), as required by the bid as accepted.

(c) The amount of the bid guarantee shall be 20% percent of the bid price or **$3,000,000, whichever is less.**

(d) If the successful bidder, upon acceptance of its bid by Battelle within the period specified for acceptance, fails to execute all Contractual documents or furnish executed bond(s) within 10 days after receipt of the forms by the bidder, Battelle may terminate the Contract for default.

(e) In the event the Contract is terminated for default, the bidder is liable for any cost of acquiring the Work that exceeds the amount of its bid, and the bid guarantee is available to offset the difference.

3. **CONTRACTOR PREQUALIFICATION**

(a) Contractors must meet Battelle's minimum qualification requirements to be eligible to Contract with Battelle directly as a Prime Contractor, or participate as a Subcontractor to a Prime Contractor performing Work on-site. Battelle's Prime Contractor and Subcontractor qualification requirements are posted on our Acquisition website at https://ebs.pnnl.gov/. Any required supporting documents should be attached electronically and submitted with the completed Qualification Statements. Contractors will be notified by email of the acceptability of their qualifications.

(b) Bids will be accepted from pre-qualified Contractors ONLY.

(c) Prior to any Subcontractor(s) performing Work on-site as a lower tier to a Contractor having a Contract with Battelle, the Subcontractor(s) must also be accepted as meeting Battelle's qualification requirements.

******* END OF SECTION *******

Pacific Northwest
NATIONAL LABORATORY
Proudly Operated by Battelle Since 1965

PART I - Schedule

Bid Summary and Rate Sheets

This partial breakdown of key elements of cost and/or price in the Contractors bid is for administrative purposes only, and shall not be construed as intent to negotiate agreements on individual elements in the offer. As indicated in the Instructions to Bidders, award will be made on the basis of price and price related factors only, to the responsible Bidder offering the lowest total priced offer on the complete requirement.

	Bid Element	Price Breakdown	Rate Sheets
1	LABOR	$ -	**A**
2	EQUIPMENT	$ -	**B**
3	MATERIALS	$ -	**C**
4	SUBCONTRACTS	$ -	**D**
5	***BASE AMOUNT*** *(Sum of Lines 1 thru 4)*	$ -	
6	OVERHEAD	$ -	
7	PROFIT	$ -	
8	GENERAL AND ADMINISTRATIVE *(Taxes, Fees, Insurance, etc.)*	$ -	
9	**CLIN 1 - Fixed Price Contract Work** *(Total lines 5 - 8)*	$ -	
10	**CLIN 2 - Unit Price Schedule**	$ -	**E**

Rate Sheets A and B
RATE SHEET 'A' - LABOR

TRADE OR JOB CLASSIFICATION	1			2			(Columns 1+2)
	STRAIGHT TIME			OVERTIME			LABOR COST
	HOURS	RATE	COST	HOURS	RATE	COST	
			$ -			$ -	$ -
			$ -			$ -	$ -
			$ -			$ -	$ -
			$ -			$ -	$ -
			$ -			$ -	$ -
			$ -			$ -	$ -
			$ -			$ -	$ -
			$ -			$ -	$ -
			$ -			$ -	$ -
			$ -			$ -	$ -
			$ -			$ -	$ -
			$ -			$ -	$ -
			$ -			$ -	$ -
			$ -			$ -	$ -
			$ -			$ -	$ -
			$ -			$ -	$ -
			$ -			$ -	$ -
			$ -			$ -	$ -
			$ -			$ -	$ -
			$ -			$ -	$ -
			$ -			$ -	$ -
			$ -			$ -	$ -
			$ -			$ -	$ -
TOTAL Forward to Line 1 LABOR on Bid Summary							$ -

RATE SHEET 'B' - EQUIPMENT

DESCRIPTION (MAKE AND MODEL)	1	2	3	(Columns 1 x 2 x 3)
	DURATION	QTY	RATE	EQUIPMENT PRICE
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
TOTAL Forward to Line 2 EQUIPMENT on Bid Summary =				$ -

RATE SHEET 'C' - MATERIALS

Add Supporting Sheets as Necessary

Key Material Suppliers	Material	Price
		$ -
		$ -
		$ -
		$ -
		$ -
		$ -
		$ -
		$ -
		$ -
		$ -
		$ -
		$ -
		$ -
		$ -
		$ -
		$ -
Balance of Materials		$ -
		$ -
		$ -
		$ -
		$ -
TOTAL Forward to Line 3 MATERIALS on Bid Summary		$ -

RATE SHEET 'D' - SUBCONTRACTORS

Add Supporting Sheets as Necessary

Subcontractor	Description of Work	Price
		$ -
		$ -
		$ -
		$ -
		$ -
		$ -
		$ -
		$ -
		$ -
		$ -
		$ -
		$ -
		$ -
		$ -
		$ -
		$ -
		$ -
		$ -
		$ -
		$ -
		$ -
		$ -
		$ -
		$ -
		$ -
TOTAL Forward to Line 4 SUBCONTRACTORS on Bid Summary		$ -

Rate Sheet 'E' - Unit Price

Instructions: Complete the highlighted boxes requesting unit prices, markups and estimated prices for each CLIN and then transfer the Estimated Prices to the Bid Summary Form. NOTE: The quantities shown are estimates only, and as such are not guaranteed; independent circumstances shall control actual quantities performed. Payment shall be for actual quantities installed and not estimated quantities subject to the Variation in Quantities clause of the Contract General Provisions.

CLIN 2 - UNIT PRICED SCHEDULE

Part 1 - Skilled Craftsman		A (Battelle)		B (Contractor Bid)	A x B
Item	**Job Classification**	**Est. Qty**	**Unit**	**Unit Price**	**Estimate Price**
1	Carpenters		hrs		$ -
2	Cement Masons		hrs		$ -
3	Electrician		hrs		$ -
4	Ironworkers		hrs		$ -
5	Laborers		hrs		$ -
6	Operating Engineers		hrs		$ -
7	Painters		hrs		$ -
8	Pipefitters		hrs		$ -
9	Roofers		hrs		$ -
10	Sheet Metal		hrs		$ -
11	Sprinkler Fitter		hrs		$ -
12	Teamster		hrs		$ -
13	Other		hrs		$ -
				Subtotal Part 1	$ -

NOTE: For purposes of calculating a Unit Price, skilled craftsman rate, the schedule contemplates a blended rate that takes into account all possible combinations of crew sizes and crew mixes, and job classifications the Contractor may encounter in performance of directed Work of a regular straight time basis. The Unit Price rate shall be complete and inclusive of all costs, markups and fees, (including Bonding) required for the supply of a "Skilled Craftsman" on a straight time hourly basis.

Part 2 - Markups	A (Battelle) Est.	B Markup %	C [A x B] (Contractor Bid) Markup $	A + C Estimate Price
Miscellaneous Material & Equipment			$ -	$ -

NOTE: Contractor shall bid a material handling rate to furnish Battelle estimated costs of direct material and equipment to include tax, overhead and profit. The resulting estimated price shall be treated as a firm fixed price against which progress payments can be made as Job Orders are issued.

Total CLIN 2 (Part 1 + 2) Forward to Line 10 on Bid Summary	**$ -**

GENERAL PROVISIONS

Fixed Price Construction Contracts

For the Pacific Northwest National Laboratory
Operated by Battelle Memorial Institute

Battelle Memorial Institute has executed and is engaged in the performance of Prime Contract DE-AC05-76RL01830 with the United States Department of Energy (DOE), for the management, operation, and maintenance of the Pacific Northwest National Laboratory (PNNL) in Richland, Washington. This contract is entered into in furtherance of the performance of the work provided in the Prime Contract, and is subject to the following general provisions:

GENERAL

1. Introduction

A. The construction covered by this Contract shall be furnished subject to the terms and conditions set forth herein.

B. This Contract is the complete and exclusive statement of the terms of the agreement between Contractor and Battelle.

C. No modification of this Contract (including any addition, deletion, or other modification proposed in Contractor's acceptance) shall be binding on Battelle unless agreed to by an authorized Battelle Contracts representative in writing.

D. If any of the clauses included or incorporated into these General Provisions do not apply to the Contract Work, such clauses are considered to be self-deleting.

2. Definitions

As used throughout this Contract, the following terms shall have the meaning set forth below:

A. "Battelle" means Battelle Memorial Institute, in the performance of its prime Contract with The United States of America and includes any duly authorized representative thereof acting within authorized limits.

B. "Contracting Officer" means the Battelle Contracts Representative.

C. "Contractor" means the entity under Contract with Battelle responsible for execution of all construction work described within the Contract documents.

D. "Construction worksite," "Site of the work," and "Site" are equivalent terms for purpose of this Contract and have the meaning given in 10 CFR 851 for Construction worksite as follows:

E. "Construction worksite is the area within the limits necessary to perform the work described in the construction procurement or authorization document. It includes the facility being constructed or renovated along with all necessary staging and storage areas, as well as adjacent areas subject to project hazards."

F. "DOE" means U. S. Department of Energy or any duly authorized representative thereof.

G. "DEAR" means Department of Energy Acquisition Regulation, including all amendments and changes thereto in effect on the date of issuance of this Contract.

H. "FAR" means Federal Acquisition Regulation, including all amendments and changes thereto in effect on the date of issuance of this Contract.

I. "Government" means The United States of America, and shall include Battelle to the extent necessary to enable Battelle to administer this Contract and to perform its obligations under its Government prime Contract.

J. "Subcontract(s)" and "Subcontractor(s)" includes this Contract when used in a FAR or DEAR clause referring to a prime and Subcontractor relationship. Otherwise, it means Contractor's lower tier Subcontract(s) and Subcontractor(s), respectively. The term "Subcontract" includes purchase orders and changes, modifications, or amendments to Subcontracts and purchase orders.

3. Acceptance of Contract Terms and Conditions (cl 302 – October 2008)

The Contractor, by signing this Contract or performing the services and/or delivering the supplies identified herein, agrees to comply with all the terms and conditions and all specifications and other documents that this Contract incorporates by reference or attachment. Battelle hereby objects to any terms and conditions contained in any acknowledgment of this Contract that are different from or in addition to those mentioned in this document. Failure of Battelle to enforce any of the provisions of this Contract shall not be construed as evidence to interpret the requirements of this Contract, nor a waiver of any requirements, nor of the right of Battelle to enforce each and every provision. All rights and obligations shall survive final performance of this Contract.

4. Order of Precedence - Construction

Any inconsistency in this solicitation or Contract shall be resolved by giving precedence in the following order:

A. Contract Agreement (excluding specifications)

B. Representations and other instructions

C. General Provisions

D. Division 1 Administrative Requirements

E. Specifications

F. Drawings

5. Assignment (cl 357 - Jan 2003)

Battelle may assign this Contract to the U.S. Department of Energy (DOE) or a designee of DOE. Upon receipt by the Contractor of written notice that DOE or its designee has been assigned this Contract, Battelle shall be relieved of all responsibility hereunder, and the Contractor shall thereafter look solely to the assignee for performance of Battelle's obligations. The Contractor shall not assign this Contract or any interest therein, nor claims thereunder without the prior written consent of Battelle or Battelle's assignee. Any assignment, by operation of law or otherwise, without prior written consent of Battelle or Battelle's assignee shall be void.

6. Pacific Northwest National Laboratory or Battelle Name (cl 374 – October 2008)

The Contractor agrees not to use Pacific Northwest National Laboratory's or Battelle's name or identifying characteristics for advertising, sales promotion, raising of capital, recommending investments or other publicity purposes that implies endorsement by the Pacific Northwest National Laboratory or Battelle without the prior written consent of Battelle. This clause shall survive the termination or expiration of this contract.

7. Insurance - Construction

A. The Contractor shall, at its sole cost, obtain and maintain in force for the duration of the Contract (including the Guarantee period) insurance of the following types, with limits not less than those set forth below.

B. ***Schedule of Minimum Insurance Types and Amounts***.

1. Workers Compensation Insurance shall be at a minimum as indicated below or per the statutory limits of the State where the work is to be performed, whichever is higher:

   (i) $1,000,000 Minimum per accident;

   (ii) $1,000,000 minimum per employee for bodily injury and disease.

2. General Liability Insurance:

   (i) $2,000,000 general aggregate limit;

   (ii) $1,000,000 per occurrence for bodily injury and property damage;

   (iii) $1,000,000 per occurrence for personal and advertising injury liability;

   (iv) $1,000,000 per occurrence for products / completed operations liability. The products / completed operations liability insurance shall be maintained in full force and effect for not less than three years following completion of Contractor's services.

3. Vehicle Liability Insurance:

   $1,000,000 combined single limit of liability for bodily injury and property damage per occurrence, covering the use of all owned, non-owned, and hired automobiles.

4. Tools and Equipment Insurance (Equipment Floater Insurance)

   Contractor shall carry and maintain Tools and Equipment Insurance during performance of its services under the Contract, covering physical damage to or loss of all major tools and equipment, construction office trailers, and their contents, and vehicles for which Contractor is responsible.

5. Builders Risk Insurance:

   Contractor shall carry and maintain Builder's Risk Insurance covering loss or damage to materials and equipment furnished by Contractor that is incorporated into the completed facility. Contractor shall be responsible for the payment of the applicable deductible (which will not exceed $5,000 per occurrence) for each loss to such materials or equipment which are in the care, custody and control of the Contractor.

C. ***Proof of Insurance***. Before commencing work, the Contractor shall furnish written proof to Battelle that the required insurance has been obtained. The policies evidencing the required insurance shall contain an endorsement to the effect that any cancellation or material change affecting Government or Battelle's interests shall not be effective for such period as the laws of the State in which this Contract is to be performed specify or until 30 days after the insurer or the Contractor gives written notice to Battelle, whichever period is longer.

D. ***Subcontractor's Commercial General Liability Insurance and Vehicle Liability Insurance***. The Contractor shall insert the substance of this clause, including this paragraph, in Subcontracts under this Contract that require work on either a Battelle or Government installation, and shall require Subcontractors to provide and maintain the kinds and minimum amounts of insurance required in the Schedule. The Contractor shall maintain a copy of all Subcontractors' proofs of required insurance, and shall make copies available to Battelle upon request.

E. ***Waiver of Subrogation***. The Contractor hereby releases the Government and Battelle, including their directors and employees, and shall cause Contractor's Insurers to waive their rights of subrogation against such released parties, for losses or claims for bodily injury, property damage or other insured claims arising out of Contractor's performance under the Contract.

F. ***Claims***. In the event that claims in excess of the insured amounts provided are filed by reason of any operations under the services provided by the Contractor, the amount of excess of such claims, or any portion thereof, may be withheld from payment due until such time as the Contractor shall furnish such additional security covering such claims as may be determined by Battelle.

8. Labor Harmony

A. Battelle maintains a neutral position regarding Project Labor Agreements. This Contract Work does not mandate nor preclude participation in a Project Labor Agreement if said participation promotes the economy and efficiency in Federal procurement ascribed by Executive Order titled, "Use of Project Labor Agreements for Federal Construction Projects," dated 2/6/09.

B. In accordance with applicable prior labor agreements, laws, regulations, codes and standards, the Contractor shall furnish labor that can work in harmony with all other elements of labor employed or to be employed on the work. Without limiting the generality of the foregoing, Labor Harmony shall include the provision of labor that will not cause, cause to be threatened or give rise to either directly or indirectly, any work disruption, slowdowns or stoppages by employees of other Contractors, while performing any work or activities incidental thereto.

C. Award of any construction Contract is contingent upon the Contractor having an acceptable Plan for harmonizing labor on the Battelle Work site.

D. The Contractor agrees to insert the substance of this clause, including paragraph (c), in every Subcontract issued in performance of this Contract.

9. Registration, Representations & Certifications

A. All Contractors shall be registered in the governments Central Contractor Registration (CCR) database. Offerors and Contractors may obtain information on registration and annual confirmation requirements via the internet at http://www.ccr.gov or by calling 1-888-227-2423, or 269-961-5757.

1. By submission of an offer, the offeror acknowledges the requirement to be registered in the CCR database prior to award, during performance, and through final payment of any Contract, basic agreement, basic ordering agreement, or blanket purchasing agreement

resulting from this solicitation.

2. Failure to register shall be grounds for rejection of Contractor bids and proposals.

B. The Contractor is responsible for the accuracy and completeness of the data within the CCR database, and for any liability resulting from Battelle's reliance on inaccurate or incomplete data. To remain registered in the CCR database after the initial registration, the Contractor is required to review and update on an annual basis from the date of initial registration or subsequent updates its information in the CCR database to ensure it is current, accurate and complete. Updating information in the CCR does not alter the terms and conditions of this Contract and is not a substitute for a properly executed Contractual document.

C. In addition to registering in CCR, the offeror must also complete an annual representations and certifications electronically via the Online Representations and Certifications Application (ORCA) website at http://orca.bpn.gov. The Contractor is required to review and verify prior to submission of any offer that the representations and certifications currently posted electronically have been entered or updated within the last 12 months, and are current, accurate, complete, and applicable to this solicitation (including the business size standard applicable to the North American Industry Classification Code [NAICS] referenced for this solicitation), as of the date of this offer.

10. Limitations on Subcontracting (FAR 52.219-4, Nov 2011)

A. This clause does not apply to the unrestricted portion of a partial set-aside.

B. *Applicability*. This clause applies only to—

1. Contracts that have been set aside or reserved for small business concerns or 8(a) concerns;

2. Part or parts of a multiple-award contract that have been set aside for small business concerns or 8(a) concerns; and

3. Orders set aside for small business or 8(a) concerns under multiple-award contracts as described in 8.405-5 and 16.505(b)(2)(i)(F).

C. By submission of an offer and execution of a contract, the Offeror/Contractor agrees that in performance of the contract in the case of a contract for—

1. Services (except construction). At least 50 percent of the cost of contract performance incurred for personnel shall be expended for employees of the concern.

2. Supplies (other than procurement from a non-manufacturer of such supplies). The concern shall perform work for at least 50 percent of the cost of manufacturing the supplies, not including the cost of materials.

3. General construction. The concern will perform at least 15 percent of the cost of the contract, not including the cost of materials, with its own employees.

4. Construction by special trade contractors. The concern will perform at least 25 percent of the cost of the contract, not including the cost of materials, with its own employees.

11. Performance and Payment Bonds—Construction (FAR 52.228-15, Oct 2010)

A. *Definitions*. As used in this clause—

"Original contract price" means the award price of the contract; or, for requirements contracts, the price payable for the estimated total quantity; or, for indefinite-quantity contracts, the price payable for the specified minimum quantity. Original contract price does not include the price of any options, except those options exercised at the time of contract award.

B. *Amount of required bonds*. Unless the resulting contract price is $150,000 or less, the successful offeror shall furnish performance and payment bonds to the Contracting Officer as follows:

1. Performance bonds (Standard Form 25). The penal amount of performance bonds at the time of contract award shall be 100 percent of the original contract price.

2. Payment Bonds (Standard Form 25A). The penal amount of payment bonds at the time of contract award shall be 100 percent of the original contract price.

3. Additional bond protection.

(i) The Government may require additional performance and payment bond protection if the contract price is increased. The increase in protection generally will equal 100 percent of the increase in contract price.

(ii) The Government may secure the additional protection by directing the Contractor to increase the penal amount of the existing bond or to obtain an additional bond.

C. *Furnishing executed bonds*. The Contractor shall furnish all executed bonds, including any necessary reinsurance agreements, to the Contracting Officer, within the time period specified in the Bid Guarantee provision of the solicitation, or otherwise specified by the Contracting Officer, but in any event, before starting work.

D. *Surety or other security for bonds*. The bonds shall be in the form of firm commitment, supported by corporate sureties whose names appear on the list contained in Treasury Department Circular 570, individual sureties, or by other acceptable security such as postal money order, certified check, cashier's check, irrevocable letter of credit, or, in accordance with Treasury Department regulations, certain bonds or notes of the United States. Treasury Circular 570 is published in the *Federal Register* or may be obtained from the:

U.S. Department of the Treasury
Financial Management Service
Surety Bond Branch
3700 East West Highway, Room 6F01
Hyattsville, MD 20782.
Or via the internet at
http://www.fms.treas.gov/c570/.

E. *Notice of subcontractor waiver of protection (40 U.S.C. 3133(c))*. Any waiver of the right to sue on the payment bond is void unless it is in writing, signed by the person whose right is waived, and executed after such person has first furnished labor or material for use in the performance of the contract.

12. Federal, State, and Local Taxes (FAR 52.229-3, Apr 2003)

A. As used in this clause—

"After-imposed Federal tax" means any new or increased Federal excise tax or duty, or tax that was exempted or excluded on the contract date, but whose exemption was later revoked or reduced during the contract period on the transactions or property covered by this contract that the Contractor is required to pay or bear as the result of legislative, judicial, or administrative action taking effect after the contract date. It does not include social security tax or other employment taxes.

"After-relieved Federal tax" means any amount of Federal excise tax or duty, except social security or other employment taxes, that would otherwise have been payable on the transactions or property covered by this contract, but which the Contractor is not required to pay or bear, or for which the Contractor obtains a refund or drawback, as the result of legislative, judicial, or administrative action taking effect after the contract date.

"All applicable Federal, State, and local taxes and duties" means all taxes and duties, in effect on the contract date, that the taxing authority is imposing and collecting on the transactions or property covered by this contract.

"Contract date" means the date set for bid opening or, if this is a negotiated contract or a modification, the effective date of this contract or modification.

"Local taxes" includes taxes imposed by a possession or territory of the United States, Puerto Rico, or the Northern Mariana Islands, if the contract is performed wholly or partly in any of those areas.

B. The contract price includes all applicable Federal, State, and local taxes and duties.

C. The contract price shall be increased by the amount of any after-imposed Federal tax, provided the Contractor warrants in writing that no amount for such newly imposed Federal excise tax or duty or rate increase was included in the contract price, as a contingency reserve or otherwise.

D. The contract price shall be decreased by the amount of any after-relieved Federal tax.

E. The contract price shall be decreased by the amount of any Federal excise tax or duty, except social security or other employment taxes, that the Contractor is required to pay or bear, or does not obtain a refund of, through the Contractor's fault, negligence, or failure to follow instructions of the Contracting Officer.

F. No adjustment shall be made in the contract price under this clause unless the amount of the adjustment exceeds $250.

G. The Contractor shall promptly notify the Contracting Officer of all matters relating to any Federal excise tax or duty that reasonably may be expected to result in either an increase or decrease in the contract price and shall take appropriate action as the Contracting Officer directs.

H. The Government shall, without liability, furnish evidence appropriate to establish exemption from any Federal, State, or local tax when the Contractor requests such evidence and a reasonable basis exists to sustain the exemption.

13. Payments – Construction

A. ***Payment of Price.*** Battelle shall pay the Contractor the Contract price as provided in this Contract. Unless otherwise provided in the Contract Schedule, the terms of payment shall be thirty (30) days after receipt of the Contractor's properly submitted invoice.

B. ***Progress Payments***. Battelle shall make progress payments monthly as the work proceeds based on estimates of work accomplished which meets the standards of quality established under the Contract, as approved by Battelle.

1. The Contractor shall furnish a breakdown of the total Contract price showing the amount included therein for each principal category of the work, consistent with the "Schedule of Values", which shall substantiate the payment amount requested in order to provide a basis for determining progress payments, in such detail as requested by Battelle.

2. In the preparation of estimates Battelle may authorize material delivered on the site and preparatory work done to be taken into consideration. Material delivered to the Contractor at locations other than the site will not be approved for progress payments.

3. As part of the request for payment, the Contractor shall submit a report summarizing the month's injuries, illnesses, property damage, fires, "near misses", etc. The summary report should be formatted to include the following items:

   (i) Average number of employees during the month,

   (ii) Total Contractor hours worked on this Contract,

   (iii) Number of sub-tier Contractors,

   (iv) Number of sub-tier Contractor employees by sub-tier Contractor, and

   (v) Total sub-tier Contractor hours (by sub-tier Contractor) worked on this Contract.

4. Submit an electronic invoice in an acceptable format to Battelle at: ap.invoices@pnnl.gov. The electronic invoice shall be integrated with the Contract scheduling requirements and tied to the Contract schedule of values. If electronic transmittal is not possible, submit the invoice and all supporting documentation via mail to:

   Battelle, Pacific Northwest Division
   ATTN: ACCOUNTS PAYABLE
   PO Box 999, MSIN: J1-04
   Richland, WA 99352

C. ***Contractor Certification.*** Along with each request for progress payments, the Contractor shall furnish the following certification, or payment shall not be made:

I hereby certify, to the best of my knowledge and belief, that:

1. The amounts requested are only for performance in accordance with the specifications, terms, and conditions of the Contract;
2. Payments to Subcontractors and suppliers have been made from previous payments received under the Contract, and timely payments will be made from the proceeds of the payment covered by this certification, in accordance with sub-Contract agreements; and
3. This request for progress payments does not include any amounts that the Contractor intends to withhold or retain from a Subcontractor or supplier in accordance with the terms and conditions of the sub-Contract.

D. ***Refund of unearned amounts.*** If the Contractor, after making a certified request for progress payments, discovers that a portion or all of such request constitutes a payment for performance by the Contractor that fails to conform to the specifications, terms, and conditions of this Contract (hereinafter referred to as the "unearned amount"), the Contractor shall:

1. Notify Battelle of such performance deficiency; and
2. Be obligated to pay Battelle an amount (computed by Battelle in the manner provided in 31 U.S.C. 3903 (c) (1)) equal to interest on the unearned amount from the date of receipt of the unearned amount until:

   (i) The date the Contractor notifies Battelle that the performance deficiency has been corrected; or

   (ii) The date the Contractor reduces the amount of any subsequent certified request for progress payments by an amount equal to the unearned amount.

E. ***Retainage.*** In making progress payments, there shall be retained 10 percent of the estimated amount until final completion and acceptance of the Contract work. However, if Battelle finds that satisfactory progress was achieved during any period for which a progress payment is to be made, Battelle may authorize a reduction in retention. When the work is substantially complete, Battelle shall retain from previously withheld funds and future progress payments that amount it considers adequate for protection of Battelle and the Government and shall release to the Contractor all the remaining withheld funds. Also, on completion and acceptance of each separate building, public work, or other division of the Contract, for which the price is stated separately in the Contract, payment shall be made for the completed work without retention of a percentage.

F. ***Title, liability, and reservation of rights.*** All material and work covered by progress payments made shall, at the time of payment, become the sole property of Battelle, but this shall not be construed as:

1. Relieving the Contractor from the sole responsibility for all material and work upon which payments have been made or the restoration of any damaged work; or
2. Waiving the right of Battelle to require the fulfillment of all of the terms of the Contract.

G. ***Reimbursement for bond premiums***. If performance or payment bonds are required under this Contract, Battelle shall pay to the Contractor that portion of the Contract price equal to the total premiums paid by the Contractor to obtain bonds. This payment shall be paid at one time to the Contractor together with the first progress payment otherwise due after the Contractor has:

1. furnished the bonds;
2. furnished evidence of full payment to the surety; and
3. submitted a request for such payment. Payments for bond premiums shall not be made as increments of individual progress payments. The retainage provisions in paragraph (e) of this clause shall not apply to that portion of a progress payment attributable to bond premiums.

H. ***Final payment.*** Upon completion and acceptance of all work, the amount due the Contractor under this Contract shall be paid upon the presentation of a properly executed invoice and after the Contractor shall have furnished Battelle with a release of all claims against Battelle and the Government arising by virtue of this Contract, other than claims in stated amounts that the Contractor has specifically excepted from the operation of the release.

I. ***Limitation because of undefinitized work.*** Notwithstanding any provision of this Contract, progress payments shall not exceed 80 percent on work accomplished on undefinitized Contract actions. A "Contract action" is any action resulting in a Contract, as defined in FAR Subpart 2.1.

14. Suspension of Work (FAR 52.242-14, Apr 1984)

A. The Contracting Officer may order the Contractor, in writing, to suspend, delay, or interrupt all or any part of the work of this contract for the period of time that the Contracting Officer determines appropriate for the convenience of the Government.

B. If the performance of all or any part of the work is, for an unreasonable period of time, suspended, delayed, or interrupted (1) by an act of the Contracting Officer in the administration of this contract, or (2) by the Contracting Officer's failure to act within the time specified in this contract (or within a reasonable time if not specified), an adjustment shall be made for any increase in the cost of performance of this contract (excluding profit) necessarily caused by the unreasonable suspension, delay, or interruption, and the contract modified in writing accordingly. However, no adjustment shall be made under this clause for any suspension, delay, or interruption to the extent that performance would have been so suspended, delayed, or interrupted by any other cause, including the fault or negligence of

the Contractor, or for which an equitable adjustment is provided for or excluded under any other term or condition of this contract.

C. A claim under this clause shall not be allowed—

1. For any costs incurred more than 20 days before the Contractor shall have notified the Contracting Officer in writing of the act or failure to act involved (but this requirement shall not apply as to a claim resulting from a suspension order); and

2. Unless the claim, in an amount stated, is asserted in writing as soon as practicable after the termination of the suspension, delay, or interruption, but not later than the date of final payment under the contract.

15. Stop-Work Order (FAR 52.242-15, Aug 1989)

A. The Contracting Officer may, at any time, by written order to the Contractor, require the Contractor to stop all, or any part, of the work called for by this contract for a period of 90 days after the order is delivered to the Contractor, and for any further period to which the parties may agree. The order shall be specifically identified as a stop-work order issued under this clause. Upon receipt of the order, the Contractor shall immediately comply with its terms and take all reasonable steps to minimize the incurrence of costs allocable to the work covered by the order during the period of work stoppage. Within a period of 90 days after a stop-work is delivered to the Contractor, or within any extension of that period to which the parties shall have agreed, the Contracting Officer shall either—

1. Cancel the stop-work order; or

2. Terminate the work covered by the order as provided in the Default, or the Termination for Convenience of the Government, clause of this contract.

B. If a stop-work order issued under this clause is canceled or the period of the order or any extension thereof expires, the Contractor shall resume work. The Contracting Officer shall make an equitable adjustment in the delivery schedule or contract price, or both, and the contract shall be modified, in writing, accordingly, if—

1. The stop-work order results in an increase in the time required for, or in the Contractor's cost properly allocable to, the performance of any part of this contract; and

2. The Contractor asserts its right to the adjustment within 30 days after the end of the period of work stoppage; provided that, if the Contracting Officer decides the facts justify the action, the Contracting Officer may receive and act upon the claim submitted at any time before final payment under this contract.

C. If a stop-work order is not canceled and the work covered by the order is terminated for the convenience of the Government, the Contracting Officer shall allow reasonable costs resulting from the stop-work order in arriving at the termination settlement.

D. If a stop-work order is not canceled and the work covered by the order is terminated for default, the Contracting Officer shall allow, by equitable adjustment or otherwise, reasonable costs resulting from the stop-work order.

16. Changes (FAR 52.243-4, June 2007)

A. The Contracting Officer may, at any time, without notice to the sureties, if any, by written order designated or indicated to be a change order, make changes in the work within the general scope of the contract, including changes—

1. In the specifications (including drawings and designs);

2. In the method or manner of performance of the work;

3. In the Government-furnished property or services; or

4. Directing acceleration in the performance of the work.

B. Any other written or oral order (which, as used in this paragraph (b), includes direction, instruction, interpretation, or determination) from the Contracting Officer that causes a change shall be treated as a change order under this clause; Provided, that the Contractor gives the Contracting Officer written notice stating—

1. The date, circumstances, and source of the order; and

2. That the Contractor regards the order as a change order.

C. Except as provided in this clause, no order, statement, or conduct of the Contracting Officer shall be treated as a change under this clause or entitle the Contractor to an equitable adjustment.

D. If any change under this clause causes an increase or decrease in the Contractor's cost of, or the time required for, the performance of any part of the work under this contract, whether or not changed by any such order, the Contracting Officer shall make an equitable adjustment and modify the contract in writing. However, except for an adjustment based on defective specifications, no adjustment for any change under paragraph (b) of this clause shall be made for any costs incurred more than 20 days before the Contractor gives written notice as required. In the case of defective specifications for which the Government is responsible, the equitable adjustment shall include any increased cost reasonably incurred by the Contractor in attempting to comply with the defective specifications.

E. The Contractor must assert its right to an adjustment under this clause within 30 days after (1) receipt of a written change order under paragraph (a) of this clause or (2) the furnishing of a written notice under paragraph (b) of this clause, by submitting to the Contracting Officer a written statement describing the general nature and amount of the proposal, unless this period is extended by the Government. The statement of proposal for adjustment may be included in the notice under paragraph (b) of this clause.

F. No proposal by the Contractor for an equitable

adjustment shall be allowed if asserted after final payment under this contract.

17. Pricing of Adjustments - Construction

A. ***General***. When costs are a factor in any determination of a Contract price adjustment pursuant to the "Changes" clause or any other provision of this Contract, such costs shall be in accordance with the Contract cost principles and procedures, in Subpart 31 of the FAR, as supplemented or modified by DEAR Part 931 in effect on the Effective Date of the Contract, except as otherwise provided in this Contract with respect to facilities capital cost of money (CAS 414).

B. ***Requests for Equitable Adjustment***. Contractor shall submit any request for equitable adjustment pursuant the Changes clause within 10 working days after receipt of a notice of a change. The request for equitable adjustment shall include a detailed estimate with supporting calculations and pricing for the change together with any required adjustments in the schedule.

C. ***Net Cost of Change***. For adjustments that either increase or decrease the amount of the Contract Price, the application of markups for overhead and profit shall be on the net change in direct costs for the performance of the changed work.

D. ***Allowable Markups***. Allowable markup percentages on changes will not exceed the following:

1. **Changes < $100,000**. Work performing Contractor's actual overhead rate as established by audit within the last 12 months, not-to-exceed 15 percent on total direct costs, plus a negotiated allowance for profit, not-to-exceed 10 percent;

2. **Changes > $100,000**. Work performing Contractor's actual overhead rate as established by audit within the last 12 months, not-to-exceed 10% on total direct costs, plus a negotiated allowance for profit using the DEAR weighted guideline method, not to exceed 5 percent;

3. **Markups on Lower Tiers**. No more than three mark-ups, one overhead, one profit/fee applied by the Work performing Contractor, and one commission or markup inclusive of overhead and profit by the General Contractor not-to-exceed 10 percent will be allowed regardless of the number of tiers of Subcontractors or the Subcontract instrument (i.e., purchase order, Contract, etc.).

E. ***Premium Adjustments***. Costs of premium adjustments, consequent upon changes ordered, for Payment and Performance Bonds are allowable for the prime Contractor only.

F. ***Consumables***. Consumables shall not be considered on a percentage of cost bases.

G. ***Small Tools***. Consideration for Small tools is allowable at a rate *not to exceed* 3 percent of net labor cost regardless of Contractor assertions of actual cost or independent audit determinations.

H. ***Safety***. Additional costs for safety must be supported as an actual cost necessary for performance of the changed work and will not be allowed as a percentage of net labor costs.

I. ***Equipment***. Rates for rental of Contractor or Subcontractor owned equipment shall be fair and equitable. Actual cost data shall be used when such data can be determined for both ownership and operating costs for each piece of equipment or groups of similar equipment from the Contractor's accounting records. When such costs cannot be so determined, the "Rental Rate Blue Book for Construction Equipment" published by Dataquest, Inc. will be utilized for Contractor equipment in operation or on standby, provided such rental rate is reviewed by Battelle to ensure factors included within the rental rate exclude unallowable or unacceptable costs in accordance with FAR 31.105.

18. Termination for Convenience of the Government (Fixed-Price) (FAR 52.249-2, May 2004)

A. The Government may terminate performance of work under this contract in whole or, from time to time, in part if the Contracting Officer determines that a termination is in the Government's interest. The Contracting Officer shall terminate by delivering to the Contractor a Notice of Termination specifying the extent of termination and the effective date.

B. After receipt of a Notice of Termination, and except as directed by the Contracting Officer, the Contractor shall immediately proceed with the following obligations, regardless of any delay in determining or adjusting any amounts due under this clause:

1. Stop work as specified in the notice.

2. Place no further subcontracts or orders (referred to as subcontracts in this clause) for materials, services, or facilities, except as necessary to complete the continued portion of the contract.

3. Terminate all subcontracts to the extent they relate to the work terminated.

4. Assign to the Government, as directed by the Contracting Officer, all right, title, and interest of the Contractor under the subcontracts terminated, in which case the Government shall have the right to settle or to pay any termination settlement proposal arising out of those terminations.

5. With approval or ratification to the extent required by the Contracting Officer, settle all outstanding liabilities and termination settlement proposals arising from the termination of subcontracts; the approval or ratification will be final for purposes of this clause.

6. As directed by the Contracting Officer, transfer title and deliver to the Government—

   (i) The fabricated or un-fabricated parts, work in process, completed work, supplies, and other material produced or acquired for the work terminated; and

   (ii) The completed or partially completed plans, drawings, information, and other property that, if the contract had been completed, would be required to be furnished to the Government.

7. Complete performance of the work not terminated.

8. Take any action that may be necessary, or that the Contracting Officer may direct, for the protection and preservation of the property related to this contract that is in the possession of the Contractor and in which the Government has or may acquire an interest.

9. Use its best efforts to sell, as directed or authorized by the Contracting Officer, any property of the types referred to in paragraph (b)(6) of this clause; provided, however, that the Contractor (i) is not required to extend credit to any purchaser and (ii) may acquire the property under the conditions prescribed by, and at prices approved by, the Contracting Officer. The proceeds of any transfer or disposition will be applied to reduce any payments to be made by the Government under this contract, credited to the price or cost of the work, or paid in any other manner directed by the Contracting Officer.

C. The Contractor shall submit complete termination inventory schedules no later than 120 days from the effective date of termination, unless extended in writing by the Contracting Officer upon written request of the Contractor within this 120-day period.

D. After expiration of the plant clearance period as defined in Subpart 49.001 of the Federal Acquisition Regulation, the Contractor may submit to the Contracting Officer a list, certified as to quantity and quality, of termination inventory not previously disposed of, excluding items authorized for disposition by the Contracting Officer. The Contractor may request the Government to remove those items or enter into an agreement for their storage. Within 15 days, the Government will accept title to those items and remove them or enter into a storage agreement. The Contracting Officer may verify the list upon removal of the items, or if stored, within 45 days from submission of the list, and shall correct the list, as necessary, before final settlement.

E. After termination, the Contractor shall submit a final termination settlement proposal to the Contracting Officer in the form and with the certification prescribed by the Contracting Officer. The Contractor shall submit the proposal promptly, but no later than 1 year from the effective date of termination, unless extended in writing by the Contracting Officer upon written request of the Contractor within this 1-year period. However, if the Contracting Officer determines that the facts justify it, a termination settlement proposal may be received and acted on after 1 year or any extension. If the Contractor fails to submit the proposal within the time allowed, the Contracting Officer may determine, on the basis of information available, the amount, if any, due the Contractor because of the termination and shall pay the amount determined.

F. Subject to paragraph (e) of this clause, the Contractor and the Contracting Officer may agree upon the whole or any part of the amount to be paid or remaining to be paid because of the termination. The amount may include a reasonable allowance for profit on work done. However, the agreed amount, whether under this paragraph (f) or paragraph (g) of this clause, exclusive of costs shown in paragraph (g)(3) of this clause, may not exceed the total contract price as reduced by (1) the amount of payments previously made and (2) the contract price of work not terminated. The contract shall be modified, and the Contractor paid the agreed amount. Paragraph (g) of this clause shall not limit, restrict, or affect the amount that may be agreed upon to be paid under this paragraph.

G. If the Contractor and Contracting Officer fail to agree on the whole amount to be paid the Contractor because of the termination of work, the Contracting Officer shall pay the Contractor the amounts determined as follows, but without duplication of any amounts agreed upon under paragraph (f) of this clause:

1. For contract work performed before the effective date of termination, the total (without duplication of any items) of—

   (i) The cost of this work;

   (ii) The cost of settling and paying termination settlement proposals under terminated subcontracts that are properly chargeable to the terminated portion of the contract if not included in subdivision (g)(1)(i) of this clause; and

   (iii) A sum, as profit on subdivision (g)(1)(i) of this clause, determined by the Contracting Officer under 49.202 of the Federal Acquisition Regulation, in effect on the date of this contract, to be fair and reasonable; however, if it appears that the Contractor would have sustained a loss on the entire contract had it been completed, the Contracting Officer shall allow no profit under this subdivision (g)(1)(iii) and shall reduce the settlement to reflect the indicated rate of loss.

2. The reasonable costs of settlement of the work terminated, including—

   (i) Accounting, legal, clerical, and other expenses reasonably necessary for the preparation of termination settlement proposals and supporting data;

   (ii) The termination and settlement of subcontracts (excluding the amounts of such settlements); and

   (iii) Storage, transportation, and other costs incurred, reasonably necessary for the preservation, protection, or disposition of the termination inventory.

H. Except for normal spoilage, and except to the extent that the Government expressly assumed the risk of loss, the Contracting Officer shall exclude from the amounts payable to the Contractor under paragraph (g) of this clause, the fair value, as determined by the Contracting Officer, of property that is destroyed, lost, stolen, or damaged so as to become undeliverable to the Government or to a buyer.

I. The cost principles and procedures of Part 31 of the Federal Acquisition Regulation, in effect on the date of this contract, shall govern all costs claimed, agreed to, or determined under this clause.

J. The Contractor shall have the right of appeal, under the Disputes clause, from any determination made by the Contracting Officer under paragraph (e), (g), or

(l) of this clause, except that if the Contractor failed to submit the termination settlement proposal or request for equitable adjustment within the time provided in paragraph (e) or (l), respectively, and failed to request a time extension, there is no right of appeal.

K. In arriving at the amount due the Contractor under this clause, there shall be deducted—

1. All un-liquidated advance or other payments to the Contractor under the terminated portion of this contract;

2. Any claim which the Government has against the Contractor under this contract; and

3. The agreed price for, or the proceeds of sale of, materials, supplies, or other things acquired by the Contractor or sold under the provisions of this clause and not recovered by or credited to the Government.

L. If the termination is partial, the Contractor may file a proposal with the Contracting Officer for an equitable adjustment of the price(s) of the continued portion of the contract. The Contracting Officer shall make any equitable adjustment agreed upon. Any proposal by the Contractor for an equitable adjustment under this clause shall be requested within 90 days from the effective date of termination unless extended in writing by the Contracting Officer.

M. (1) The Government may, under the terms and conditions it prescribes, make partial payments and payments against costs incurred by the Contractor for the terminated portion of the contract, if the Contracting Officer believes the total of these payments will not exceed the amount to which the Contractor will be entitled.

(2) If the total payments exceed the amount finally determined to be due, the Contractor shall repay the excess to the Government upon demand, together with interest computed at the rate established by the Secretary of the Treasury under 50 U.S.C. App. 1215(b)(2). Interest shall be computed for the period from the date the excess payment is received by the Contractor to the date the excess is repaid. Interest shall not be charged on any excess payment due to a reduction in the Contractor's termination settlement proposal because of retention or other disposition of termination inventory until 10 days after the date of the retention or disposition, or a later date determined by the Contracting Officer because of the circumstances.

N. Unless otherwise provided in this contract or by statute, the Contractor shall maintain all records and documents relating to the terminated portion of this contract for 3 years after final settlement. This includes all books and other evidence bearing on the Contractor's costs and expenses under this contract. The Contractor shall make these records and documents available to the Government, at the Contractor's office, at all reasonable times, without any direct charge. If approved by the Contracting Officer, photographs, microphotographs, or other authentic reproductions may be maintained instead of original records and documents.

19. Default (Fixed-Price Construction) (FAR 52.249-10, Apr 1984)

A. If the Contractor refuses or fails to prosecute the work or any separable part, with the diligence that will insure its completion within the time specified in this contract including any extension, or fails to complete the work within this time, the Government may, by written notice to the Contractor, terminate the right to proceed with the work (or the separable part of the work) that has been delayed. In this event, the Government may take over the work and complete it by contract or otherwise, and may take possession of and use any materials, appliances, and plant on the work site necessary for completing the work. The Contractor and its sureties shall be liable for any damage to the Government resulting from the Contractor's refusal or failure to complete the work within the specified time, whether or not the Contractor's right to proceed with the work is terminated. This liability includes any increased costs incurred by the Government in completing the work.

B. The Contractor's right to proceed shall not be terminated nor the Contractor charged with damages under this clause, if—

1. The delay in completing the work arises from unforeseeable causes beyond the control and without the fault or negligence of the Contractor. Examples of such causes include—

(i) Acts of God or of the public enemy,

(ii) Acts of the Government in either its sovereign or contractual capacity,

(iii) Acts of another Contractor in the performance of a contract with the Government,

(iv) Fires,

(v) Floods,

(vi) Epidemics,

(vii) Quarantine restrictions,

(viii) Strikes,

(ix) Freight embargoes,

(x) Unusually severe weather, or

(xi) Delays of subcontractors or suppliers at any tier arising from unforeseeable causes beyond the control and without the fault or negligence of both the Contractor and the subcontractors or suppliers; and

2. The Contractor, within 10 days from the beginning of any delay (unless extended by the Contracting Officer), notifies the Contracting Officer in writing of the causes of delay. The Contracting Officer shall ascertain the facts and the extent of delay. If, in the judgment of the Contracting Officer, the findings of fact warrant such action, the time for completing the work shall be extended. The findings of the Contracting Officer shall be final and conclusive on the parties, but subject to appeal under the Disputes clause.

C. If, after termination of the Contractor's right to proceed, it is determined that the Contractor was not

in default, or that the delay was excusable, the rights and obligations of the parties will be the same as if the termination had been issued for the convenience of the Government.

D. The rights and remedies of the Government in this clause are in addition to any other rights and remedies provided by law or under this contract.

20. Failure to Perform - Construction

A. Subject to the Excusable Delays clause, if the Contractor fails to perform this Contract under its terms, Battelle shall give the Contractor written notice stating the failure. Thereafter, regardless of any other provision of this Contract, the Contractor shall not be entitled to an equitable adjustment under either this Contract or any related Contract, to the extent the equitable adjustment arises from the Contractor's failure to perform or from any reasonable remedial action taken by Battelle based upon the failure.

B. The failure of Battelle to insist, in one or more instances, upon the performance of any term of this Contract is not a waiver of Battelle's right to future performance of such term, and the Contractor's obligation for future performance of such term shall continue in effect.

C. The rights and remedies of Battelle in this clause are in addition to any other rights and remedies provided by law or under this Contract.

21. Excusable Delays (FAR 52.249-14, Apr 1984)

A. Except for defaults of subcontractors at any tier, the Contractor shall not be in default because of any failure to perform this contract under its terms if the failure arises from causes beyond the control and without the fault or negligence of the Contractor. Examples of these causes are (1) acts of God or of the public enemy, (2) acts of the Government in either its sovereign or contractual capacity, (3) fires, (4) floods, (5) epidemics, (6) quarantine restrictions, (7) strikes, (8) freight embargoes, and (9) unusually severe weather. In each instance, the failure to perform must be beyond the control and without the fault or negligence of the Contractor. "Default" includes failure to make progress in the work so as to endanger performance.

B. If the failure to perform is caused by the failure of a subcontractor at any tier to perform or make progress, and if the cause of the failure was beyond the control of both the Contractor and subcontractor, and without the fault or negligence of either, the Contractor shall not be deemed to be in default, unless—

1. The subcontracted supplies or services were obtainable from other sources;

2. The Contracting Officer ordered the Contractor in writing to purchase these supplies or services from the other source; and

3. The Contractor failed to comply reasonably with this order.

C. Upon request of the Contractor, the Contracting Officer shall ascertain the facts and extent of the failure. If the Contracting Officer determines that any failure to perform results from one or more of the causes above, the completion time shall be revised, subject to the rights of the Government under the termination clause of this contract.

22. Disputes (FAR 52.233-1, July 2002)

A. This contract is subject to the Contract Disputes Act of 1978, as amended (41 U.S.C. 601-613).

B. Except as provided in the Act, all disputes arising under or relating to this contract shall be resolved under this clause.

C. "Claim," as used in this clause, means a written demand or written assertion by one of the contracting parties seeking, as a matter of right, the payment of money in a sum certain, the adjustment or interpretation of contract terms, or other relief arising under or relating to this contract. However, a written demand or written assertion by the Contractor seeking the payment of money exceeding $100,000 is not a claim under the Act until certified. A voucher, invoice, or other routine request for payment that is not in dispute when submitted is not a claim under the Act. The submission may be converted to a claim under the Act, by complying with the submission and certification requirements of this clause, if it is disputed either as to liability or amount or is not acted upon in a reasonable time.

D. (1) A claim by the Contractor shall be made in writing and, unless otherwise stated in this contract, submitted within 6 years after accrual of the claim to the Contracting Officer for a written decision. A claim by the Government against the Contractor shall be subject to a written decision by the Contracting Officer.

(2)(i) The Contractor shall provide the certification specified in paragraph (d)(2)(iii) of this clause when submitting any claim exceeding $100,000.

(ii) The certification requirement does not apply to issues in controversy that have not been submitted as all or part of a claim.

(iii) The certification shall state as follows: "I certify that the claim is made in good faith; that the supporting data are accurate and complete to the best of my knowledge and belief; that the amount requested accurately reflects the contract adjustment for which the Contractor believes the Government is liable; and that I am duly authorized to certify the claim on behalf of the Contractor."

(3) The certification may be executed by any person duly authorized to bind the Contractor with respect to the claim.

E. For Contractor claims of $100,000 or less, the Contracting Officer must, if requested in writing by the Contractor, render a decision within 60 days of the request. For Contractor-certified claims over $100,000, the Contracting Officer must, within 60 days, decide the claim or notify the Contractor of the date by which the decision will be made.

F. The Contracting Officer's decision shall be final unless the Contractor appeals or files a suit as provided in the Act.

G. If the claim by the Contractor is submitted to the Contracting Officer or a claim by the Government is presented to the Contractor, the parties, by mutual consent, may agree to use alternative dispute

resolution (ADR). If the Contractor refuses an offer for ADR, the Contractor shall inform the Contracting Officer, in writing, of the Contractor's specific reasons for rejecting the offer.

H. The Government shall pay interest on the amount found due and unpaid from (1) the date that the Contracting Officer receives the claim (certified, if required); or (2) the date that payment otherwise would be due, if that date is later, until the date of payment. With regard to claims having defective certifications, as defined in FAR 33.201, interest shall be paid from the date that the Contracting Officer initially receives the claim. Simple interest on claims shall be paid at the rate, fixed by the Secretary of the Treasury as provided in the Act, which is applicable to the period during which the Contracting Officer receives the claim and then at the rate applicable for each 6-month period as fixed by the Treasury Secretary during the pendency of the claim.

I. The Contractor shall proceed diligently with performance of this contract, pending final resolution of any request for relief, claim, appeal, or action arising under the contract, and comply with any decision of the Contracting Officer.

23. Indemnity (cl. 351C – Aug 2009)

Contractor shall indemnify and save harmless Battelle from and against any and all liabilities and losses for injury (including death) to persons (including but not limited to Contractor's employees) or damage to property to the extent caused by a negligent act or omission or willful misconduct of the Contractor, its agents, or employees that occur during the performance of this contract, including any and all expense, legal or otherwise, incurred in the investigation or defense of any claim.

This indemnification shall not include such injuries to any person or persons or damage to or destruction of any property to the extent caused by the negligence or omission of Battelle or its employees.

In no event shall either Contractor or Battelle be liable for any special, incidental, or consequential damages of any type or nature.

24. Public Release of Information

Information, data, photographs, sketches, and advertising relating to the work under this contract, which Contractor desires to release or publish, shall be submitted to Battelle for approval 60 days prior to the desired release date. As part of the approval request, Contractor shall identify the specific media to be used as well as other pertinent details of the proposed release. All releases, regardless of tier or supplier, must have Battelle's prior approval. Contractor shall include all provisions of this clause, including this sentence, in all lower-tier subcontracts under this contract.

25. Rights to Proposal Data

Except for the technical data contained on those pages of Contractor's proposal, which are specifically identified in this contract with specific reference to this clause and asserted by Contractor as being proprietary data, it is agreed that, as a condition of the award of this contract and notwithstanding the provisions of any notice appearing on the proposal or elsewhere, Battelle and the Government shall have the right to use, duplicate, disclose and have others do so, for any purpose whatsoever, the technical data contained in the proposal upon which this contract is based.

26. Bankruptcy (cl. 318 - Nov 2008)

If the Contractor enters into any proceeding related to bankruptcy, it shall give written notice to the Battelle Contracts Representative via certified mail within five days of initiation of the proceeding. The notification shall include the date on which the proceeding was filed, the identity and location of the court, and a listing of the Battelle purchase orders, contracts, or agreements affected.

MATERIAL REQUIREMENTS AND QUANTITIES

27. Material Requirements (FAR 52.211-5, Aug 2000)

A. *Definitions*.

As used in this clause—

"New" means composed of previously unused components, whether manufactured from virgin material, recovered material in the form of raw material, or materials and by-products generated from, and reused within, an original manufacturing process; *provided* that the supplies meet contract requirements, including but not limited to, performance, reliability, and life expectancy.

"Reconditioned" means restored to the original normal operating condition by readjustments and material replacement.

"Recovered material" means waste materials and by-products recovered or diverted from solid waste, but the term does not include those materials and by-products generated from, and commonly reused within, an original manufacturing process.

"Remanufactured" means factory rebuilt to original specifications.

"Virgin material" means—

1. Previously unused raw material, including previously unused copper, aluminum, lead, zinc, iron, other metal or metal ore; or

2. Any undeveloped resource that is, or with new technology will become, a source of raw materials.

B. Unless this contract otherwise requires virgin material or supplies composed of or manufactured from virgin material, the Contractor shall provide supplies that are new, reconditioned, or remanufactured, as defined in this clause.

C. A proposal to provide unused former Government surplus property shall include a complete description of the material, the quantity, the name of the Government agency from which acquired, and the date of acquisition.

D. A proposal to provide used, reconditioned, or remanufactured supplies shall include a detailed description of such supplies and shall be submitted to the Contracting Officer for approval.

E. Used, reconditioned, or remanufactured supplies, or unused former Government surplus property, may be used in contract performance if the Contractor has proposed the use of such supplies, and the

Contracting Officer has authorized their use.

28. Brand Name or Equal (FAR 52.211-6, Aug 1999)

A. If an item in this solicitation is identified as "brand name or equal," the purchase description reflects the characteristics and level of quality that will satisfy the Government's needs. The salient physical, functional, or performance characteristics that "equal" products must meet are specified in the solicitation.

B. To be considered for award, offers of "equal" products, including "equal" products of the brand name manufacturer, must—

1. Meet the salient physical, functional, or performance characteristic specified in this solicitation;

2. Clearly identify the item by—

(i) Brand name, if any; and

(ii) Make or model number;

3. Include descriptive literature such as illustrations, drawings, or a clear reference to previously furnished descriptive data or information available to the Contracting Officer; and

4. Clearly describe any modifications the offeror plans to make in a product to make it conform to the solicitation requirements. Mark any descriptive material to clearly show the modifications.

C. The Contracting Officer will evaluate "equal" products on the basis of information furnished by the offeror or identified in the offer and reasonably available to the Contracting Officer. The Contracting Officer is not responsible for locating or obtaining any information not identified in the offer.

D. Unless the offeror clearly indicates in its offer that the product being offered is an "equal" product, the offeror shall provide the brand name product referenced in the solicitation.

29. Variation in Estimated Quantity (FAR 52.211-18, Apr 1984)

If the quantity of a unit-priced item in this contract is an estimated quantity and the actual quantity of the unit-priced item varies more than 15 percent above or below the estimated quantity, an equitable adjustment in the contract price shall be made upon demand of either party. The equitable adjustment shall be based upon any increase or decrease in costs due solely to the variation above 115 percent or below 85 percent of the estimated quantity. If the quantity variation is such as to cause an increase in the time necessary for completion, the Contractor may request, in writing, an extension of time, to be received by the Contracting Officer within 10 days from the beginning of the delay, or within such further period as may be granted by the Contracting Officer before the date of final settlement of the contract. Upon the receipt of a written request for an extension, the Contracting Officer shall ascertain the facts and make an adjustment for extending the completion date as, in the judgment of the Contracting Officer, is justified.

ENVIRONMENTAL SAFETY AND HEALTH

30. Environment, Safety, and Health Requirements - Offsite (cl. 3113e – May 2012)

A. In performing work under this contract at its own facilities or any other location that is not a DOE-owned or leased facility, the Contractor shall comply with all applicable federal, state, and local environment, safety, and health laws and regulations. The Contractor shall also perform work safely, in a manner that ensures adequate protection for employees, the public, and the environment, and shall be accountable for the safe performance of work. The Contractor shall exercise a degree of care commensurate with the work and the associated hazards. The Contractor shall ensure that management of environment, safety, and health functions and activities becomes an integral but visible part of the Contractor's work planning and execution processes.

B. The Contractor is responsible for its subcontractors' compliance with the environment, safety, and health requirements of this contract.

31. Environment, Safety, and Health Requirements (10 CFR 851)

Contractor shall refer to the Contract Schedule for any other Environment, Safety, and Health requirements pertaining to 10 CFR 851, and shall comply with such requirements, when performing any work under this contract on property or facilities owned or controlled by Battelle that are identified as PNNL Work Sites or on property or facilities owned or controlled by the United States Department of Energy (DOE), other than PNNL.

32. Notifications and Investigations

A. ***Emergency Notifications***

1. For onsite emergencies (police, fire, rescue, hazmat) call 509-375-2400.

2. For offsite emergencies (police, fire, rescue, hazmat) call 911.

B. ***Event Notification***

The Contractor shall notify the Battelle Construction Manager or Battelle Contracts Representative immediately of any OSHA-recordable injuries/illnesses, any "off-normal occurrences," or Government property damaged that the Contractor determines to have occurred in the course of operations onsite and shall furnish such further information as the Battelle Construction Manager or Battelle Contracts Representative may require. An "off-normal occurrence" is any unplanned or unexpected event, or the discovery of a deficiency in a procedure, plan, or system that has real or potentially undesirable consequences to personnel, equipment, facilities, the environment, and/or programs.

C. ***Accident Investigation***

1. The Contractor shall cooperate in the conduct of accident investigations which result in recordable injury/illness, property damage, fire, radiation event, and fatality.

2. When a Contractor employee is involved in a serious event or accident, the Contractor shall implement the following actions:

A. Secure the event scene from disturbance and

unauthorized entry pending arrival of Battelle Representatives.

B. Keep equipment or articles involved in the event from being operated, moved, or otherwise altered or repaired.

33. Solid Waste Management

A. Solid Waste Management. The Contractor is responsible to manage solid waste in accordance with all applicable Federal, State and local laws. The Contractor shall follow Battelle's Standards Based Management System requirements for accumulation, interim storage and final disposal of the following types of solid waste:

1. Hazardous waste including soil or debris contaminated with hazardous waste.
2. Radioactive contaminated waste, materials and equipment.
3. Materials containing asbestos.
4. Materials containing polychlorinated biphenyls (PCBs).
5. Unused residual construction materials, not the property of Battelle, may be retained by the Contractor for future use or disposal by the Contractor. Such materials must otherwise be managed in accordance with Battelle's SBMS requirements while on Battelle managed property.

B. Environmental Permits / Notifications. The Contractor shall coordinate the preparation of environmental permit applications / notifications with Battelle's ES&H Organization for the purpose of integrating new and existing environmental approvals. The Contractor shall Notify Battelle, prior to commencing construction, in the following circumstances:

1. Clean Air Act Permits.
   (i). Notice of Intent to Remove Asbestos. The Contractor shall contact Battelle before proceeding with work that could disturb asbestos and materials containing asbestos. A representative from Battelle's ES&H organization will assist the Contractor in preparing the Notice of Intent to remove asbestos for submittal to the appropriate regulatory agency.
   (ii). Construction / Demolition activities which could disturb / disperse radioactive contamination (e.g. excavation of contaminated soils or demolition of contaminated structures)
2. Clean Water Act Permits. The Contractor shall notify Battelle prior to commencing construction activities which may require clean water act permits including but not limited to:
   (i). Disturbing greater than one acre of land
   (ii). Construction of ground water wells
   (iii). Discharge of liquid effluent (to ground; or existing sewer systems)
   (iv). Installation of temporary or permanent septic systems
   (v). Placement or installation of above-ground tanks for fuel storage
3. Underground Storage Tanks. The Contractor shall notify Battelle prior to commencing construction activities to install or remove any underground storage tank.

C. Spills and Releases. The Contractor shall manage hazardous substances (as defined by State of Washington regulations, including petroleum) in accordance with regulatory requirements and in a manner that prevents accidental spillage or release to the environment. In the event of a spill or release, the Contractor shall immediately:

1. Notify the Battelle Construction Manager of the spill; and
2. Respond to, control, and remediate any spill or release of hazardous substances or hazardous waste, managing spill residues in accordance with applicable Federal, DOE, State and Local regulations and requirements.

34. Waste Reduction Program (FAR 52.223-12, May 2011)

A. *Definitions*. As used in this clause—

"Recycling" means the series of activities, including collection, separation, and processing, by which products or other materials are recovered from the solid waste stream for use in the form of raw materials in the manufacture of products other than fuel for producing heat or power by combustion.

"Waste prevention" means any change in the design, manufacturing, purchase, or use of materials or products (including packaging) to reduce their amount or toxicity before they are discarded. Waste prevention also refers to the reuse of products or materials.

"Waste reduction" means preventing or decreasing the amount of waste being generated through waste prevention, recycling, or purchasing recycled and environmentally preferable products.

B. Consistent with the requirements of section 3(e) of Executive Order 13423, the Contractor shall establish a program to promote cost-effective waste reduction in all operations and facilities covered by this contract. The Contractor's programs shall comply with applicable Federal, State, and local requirements, specifically including Section 6002 of the Resource Conservation and Recovery Act (42 U.S.C. 6962, *et seq*.) and implementing regulations (40 CFR Part 247).

35. Accident Prevention (FAR 52.236-13 Nov 1991)

A. The Contractor shall provide and maintain work environments and procedures which will—

1. Safeguard the public and Government personnel, property, materials, supplies, and equipment exposed to Contractor operations and activities;
2. Avoid interruptions of Government operations and delays in project completion dates; and
3. Control costs in the performance of this contract.

B. For these purposes on contracts for construction or dismantling, demolition, or removal of improvements,

the Contractor shall—

1. Provide appropriate safety barricades, signs, and signal lights;

2. Comply with the standards issued by the Secretary of Labor at 29 CFR Part 1926 and 29 CFR Part 1910; and

3. Ensure that any additional measures the Contracting Officer determines to be reasonably necessary for the purposes are taken.

C. If this contract is for construction or dismantling, demolition or removal of improvements with any Department of Defense agency or component, the Contractor shall comply with all pertinent provisions of the latest version of U.S. Army Corps of Engineers Safety and Health Requirements Manual, EM 385-1-1, in effect on the date of the solicitation.

D. Whenever the Contracting Officer becomes aware of any noncompliance with these requirements or any condition which poses a serious or imminent danger to the health or safety of the public or Government personnel, the Contracting Officer shall notify the Contractor orally, with written confirmation, and request immediate initiation of corrective action. This notice, when delivered to the Contractor or the Contractor's representative at the work site, shall be deemed sufficient notice of the noncompliance and that corrective action is required. After receiving the notice, the Contractor shall immediately take corrective action. If the Contractor fails or refuses to promptly take corrective action, the Contracting Officer may issue an order stopping all or part of the work until satisfactory corrective action has been taken. The Contractor shall not be entitled to any equitable adjustment of the contract price or extension of the performance schedule on any stop work order issued under this clause.

E. The Contractor shall insert this clause, including this paragraph (e), with appropriate changes in the designation of the parties, in subcontracts.

36. Sustainable Acquisition Requirements (cl. 381 – March 2012)

Battelle is committed to managing its operations in a sustainable manner which promotes the natural environment and protects the health and well-being of its employees and contractor service providers. In the performance of work under this contract, the Contractor shall provide products that comply with Federal law as follows (regardless of any notations on the respective websites):

Recycled Content as designated by the Environmental Protection Agency (EPA) - http://www.epa.gov/epawaste/conserve/tools/cpg/products/index.htm

Biobased Products as designated by the United States Department of Agriculture (USDA) - http://www.biopreferred.gov/ProposedAndFinalItemDesignations.aspx

Energy-Efficient Products such as Energy Star certified and FEMP-designated products - http://www.energystar.gov/index.cfm?c=product_specs.pt_product_specs and http://www1.eere.energy.gov/femp/technologies/eep_purchasingspecs.html

Water-Efficient Products as designated by the EPA for their WaterSense® label program - http://www.epa.gov/watersense/products/index.html

Environmentally preferable and energy efficient electronics, including desktop computers, laptops and monitors, as specified at the Green Electronics Council's Electronic Products Environmental Assessment Tool (EPEAT) registry- http://ww2.epeat.net/searchoptions.aspx)

Non-Ozone Depleting Alternative Products as designated by the EPA - http://www.epa.gov/ozone/snap/index.html

QUALITY ASSURANCE

37. Quality Assurance

The Contractor shall assure that all work (e.g., submittals, products, manufacture, fabrication, installation of products and components, workmanship, inspection, and testing) performed by it or its Subcontractors and suppliers is in compliance with all contract documents (i.e., technical specifications, drawings, and Division 1). Work may include products and services (e.g., welding, nondestructive examination, soldering workmanship, manufacturer of radiation calibration standards, and equipment) that necessitate additional or special Quality Assurance / Quality Control, requirements, including the need for a documented Quality Assurance program. When such requirements are applicable to the Contractor's work, they will be identified specifically in the contract documents. The Contractor shall require, in writing, Subcontractors of all tiers to comply with all applicable contractual requirements.

38. Suspect / Counterfeit Items

A. Battelle's Suspect / Counterfeit Items (S/CI) program responds to the S/CI requirements in the following documents:

1. DOE Order 414.1C, —Quality Assurance Attachment 3, addresses the requirement for the S/CI prevention process and the control of S/CIs;

2. DOE G 414.1-3, —Suspect/Counterfeit Items Guide for Use with 10 CFR 830, Subpart A, Energy/Nuclear Safety Management/Quality Assurance Requirements and DOE O 414.1B, Quality Assurance;

3. DOE Order 231.1A Change 1, —Environment, Safety, and Health Reporting, and DOE Order 221.1, —Reporting Fraud, Waste, and Abuse to the Office of Inspector General addresses reporting requirements for discovery of S/CIs.

B. S/CIs may pose immediate and potential threats to the safety of Battelle, DOE and contractor workers, the public, and the environment. Failure of a safety or mission critical system due to an S/CI could also have security implications at DOE facilities. The most common S/CIs found at Battelle and DOE facilities have been threaded fasteners fraudulently marked as high-strength bolts, and refurbished electrical circuit breakers sold and distributed under false certifications. Falsified documentation has also misled purchasers into accepting S/CIs that do not conform to specified requirements. Forms of misrepresentation include the following:

1. Falsified product sources (counterfeits);

2. Falsified or modified quality records;

3. False marking as to class, type, or grade;

4. Mixing of unmarked with marked materials;

5. False labeling as to qualification or acceptance by testing/certifying organizations; and

6. Used products misrepresented as new products.

C. S/CI Awareness Training Manual developed by DOE-Office of Corporate Safety Analysis (HS-30) that can help to identify and disposition S/CI's discovered at Battelle and DOE facilities can be accessed at the following link http://www.hss.energy.gov/CSA/CSP/sci/SCI_TrainingManual.pdf.

D. The Contractor shall assure that all products delivered on this contract do not contain S/CI parts. If S/CI parts are discovered, notify Battelle for further direction. All discrepant part(s)/product(s) will be replaced at the Contractor's expense.

39. Contractor Inspection Requirements (FAR 52.246-1, Apr 1984)

The Contractor is responsible for performing or having performed all inspections and tests necessary to substantiate that the supplies or services furnished under this contract conform to contract requirements, including any applicable technical requirements for specified manufacturers' parts. This clause takes precedence over any Government inspection and testing required in the contract's specifications, except for specialized inspections or tests specified to be performed solely by the Government.

40. Inspection of Construction (FAR 52.246-12, Aug 1996)

A. *Definition.* "Work" includes, but is not limited to, materials, workmanship, and manufacture and fabrication of components.

B. The Contractor shall maintain an adequate inspection system and perform such inspections as will ensure that the work performed under the contract conforms to contract requirements. The Contractor shall maintain complete inspection records and make them available to the Government. All work shall be conducted under the general direction of the Contracting Officer and is subject to Government inspection and test at all places and at all reasonable times before acceptance to ensure strict compliance with the terms of the contract.

C. Government inspections and tests are for the sole benefit of the Government and do not—

1. Relieve the Contractor of responsibility for providing adequate quality control measures;

2. Relieve the Contractor of responsibility for damage to or loss of the material before acceptance;

3. Constitute or imply acceptance; or

4. Affect the continuing rights of the Government after acceptance of the completed work under paragraph (i) of this section.

D. The presence or absence of a Government inspector does not relieve the Contractor from any contract requirement, nor is the inspector authorized to change any term or condition of the specification without the Contracting Officer's written authorization.

E. The Contractor shall promptly furnish, at no increase in contract price, all facilities, labor, and material reasonably needed for performing such safe and convenient inspections and tests as may be required by the Contracting Officer. The Government may charge to the Contractor any additional cost of inspection or test when work is not ready at the time specified by the Contractor for inspection or test, or when prior rejection makes re-inspection or retest necessary. The Government shall perform all inspections and tests in a manner that will not unnecessarily delay the work. Special, full size, and performance tests shall be performed as described in the contract.

F. The Contractor shall, without charge, replace or correct work found by the Government not to conform to contract requirements, unless in the public interest the Government consents to accept the work with an appropriate adjustment in contract price. The Contractor shall promptly segregate and remove rejected material from the premises.

G. If the Contractor does not promptly replace or correct rejected work, the Government may—

1. By contract or otherwise, replace or correct the work and charge the cost to the Contractor; or

2. Terminate for default the Contractor's right to proceed.

H. If, before acceptance of the entire work, the Government decides to examine already completed work by removing it or tearing it out, the Contractor, on request, shall promptly furnish all necessary facilities, labor, and material. If the work is found to be defective or nonconforming in any material respect due to the fault of the Contractor or its subcontractors, the Contractor shall defray the expenses of the examination and of satisfactory reconstruction. However, if the work is found to meet contract requirements, the Contracting Officer shall make an equitable adjustment for the additional services involved in the examination and reconstruction, including, if completion of the work was thereby delayed, an extension of time.

I. Unless otherwise specified in the contract, the Government shall accept, as promptly as practicable after completion and inspection, all work required by the contract or that portion of the work the Contracting Officer determines can be accepted separately. Acceptance shall be final and conclusive except for latent defects, fraud, gross mistakes amounting to fraud, or the Government's rights under any warranty or guarantee.

41. Responsibility for Supplies (FAR 52.246-16, Apr 1984)

A. Title to supplies furnished under this contract shall pass to the Government upon formal acceptance, regardless of when or where the Government takes physical possession, unless the contract specifically provides for earlier passage of title.

B. Unless the contract specifically provides otherwise,

risk of loss of or damage to supplies shall remain with the Contractor until, and shall pass to the Government upon—

1. Delivery of the supplies to a carrier, if transportation is f.o.b. origin; or

2. Acceptance by the Government or delivery of the supplies to the Government at the destination specified in the contract, whichever is later, if transportation is f.o.b. destination.

C. Paragraph (b) of this clause shall not apply to supplies that so fail to conform to contract requirements as to give a right of rejection. The risk of loss of or damage to such nonconforming supplies remains with the Contractor until cure or acceptance. After cure or acceptance, paragraph (b) of this clause shall apply.

D. Under paragraph (b) of this clause, the Contractor shall not be liable for loss of or damage to supplies caused by the negligence of officers, agents, or employees of the Government acting within the scope of their employment.

42. Warranty of Construction (FAR 52.246-21, Mar 1994)

A. In addition to any other warranties in this contract, the Contractor warrants, except as provided in paragraph (i) of this clause, that work performed under this contract conforms to the contract requirements and is free of any defect in equipment, material, or design furnished, or workmanship performed by the Contractor or any subcontractor or supplier at any tier.

B. This warranty shall continue for a period of 1 year from the date of final acceptance of the work. If the Government takes possession of any part of the work before final acceptance, this warranty shall continue for a period of 1 year from the date the Government takes possession.

C. The Contractor shall remedy at the Contractor's expense any failure to conform, or any defect. In addition, the Contractor shall remedy at the Contractor's expense any damage to Government-owned or controlled real or personal property, when that damage is the result of—

1. The Contractor's failure to conform to contract requirements; or

2. Any defect of equipment, material, workmanship, or design furnished.

D. The Contractor shall restore any work damaged in fulfilling the terms and conditions of this clause. The Contractor's warranty with respect to work repaired or replaced will run for 1 year from the date of repair or replacement.

E. The Contracting Officer shall notify the Contractor, in writing, within a reasonable time after the discovery of any failure, defect, or damage.

F. If the Contractor fails to remedy any failure, defect, or damage within a reasonable time after receipt of notice, the Government shall have the right to replace, repair, or otherwise remedy the failure, defect, or damage at the Contractor's expense.

G. With respect to all warranties, express or implied, from subcontractors, manufacturers, or suppliers for work performed and materials furnished under this contract, the Contractor shall—

A. Obtain all warranties that would be given in normal commercial practice;

B. Require all warranties to be executed, in writing, for the benefit of the Government, if directed by the Contracting Officer; and

C. Enforce all warranties for the benefit of the Government, if directed by the Contracting Officer.

H. In the event the Contractor's warranty under paragraph (b) of this clause has expired, the Government may bring suit at its expense to enforce a subcontractor's, manufacturer's, or supplier's warranty.

I. Unless a defect is caused by the negligence of the Contractor or subcontractor or supplier at any tier, the Contractor shall not be liable for the repair of any defects of material or design furnished by the Government nor for the repair of any damage that results from any defect in Government-furnished material or design.

J. This warranty shall not limit the Government's rights under the Inspection and Acceptance clause of this contract with respect to latent defects, gross mistakes, or fraud.

CONSTRUCTION

43. Site Access Control

A. Contractor shall be responsible for controlling access to the Site and ensuring that all Contractor personnel including Subcontractor personnel, delivery drivers and vendors have received adequate and appropriate security and site orientation. Visible symbols such as hard hat stickers, badges, etc., shall be used to indicate the person has Contractor authorization to be on the Site.

B. Unless Battelle issued badges are identified elsewhere in the contract documents as a condition of site access, Contractor shall have general use of areas designated in the contract documents for construction operations during the contract performance period.

C. Personnel protective equipment (PPE) requirements shall be appropriate to the identified hazards present and shall be as indicated in the General and Administrative Requirements for the Work (Division I Requirements) and on the Contractors approved Job Safety Analysis (JSA).

D. Contractor is responsible to ensure that it's direct hired and Subcontractor employees who will work on the Site and are newly hired for the Work, present proof of a negative drug screen dated within the last three (3) months prior to authorizing initial site access. Contractor employees hired prior to the start of this Work and now assigned to this Work must present proof of a negative drug screen dated within the last 12 months.

1. Only drug tests by a Substance Abuse and Mental Health Services (SAMHSA) certified laboratory will be considered acceptable as proof of a negative drug screen.

2. A confirmed positive will deny employee access to the Site for a minimum of one (1) year.

3. Suspect Behavior or Circumstances. If Battelle, or the Contractor or Subcontractor believes that a Contractor or Subcontractor employee's job performance is being adversely affected by drug or substance (including alcohol) use, Battelle may direct the Contractor to remove the employee from the Site and require the employee to submit to drug testing at Contractor's expense. Examples of behavior or circumstances indicating possible drug or substance abuse are possession, sale or delivery, or credible information that an individual is using drugs or abusing alcohol, or an accident or injury.

E. ***Disciplinary Policy and Suspension of Access***

1. General. It is the Contractor's responsibility to implement a policy which provides for discipline of unacceptable behaviors. Disciplinary policy should categorize the severity of the misconduct with a graded approach to implementing the disciplinary actions that result.

2. Contractor may adopt Battelle's model disciplinary policy or submit for approval a Contractor plan.

3. If the Contractor or its Subcontractors fail to have or enforce an approved plan or fail to take appropriate disciplinary action(s) as a result of identified employee misconduct, Battelle will respond to misconduct using a graded approach, considering the nature and severity of the misconduct in accordance with the following general guidelines.

   (i). First Infraction. A first infraction could result in actions ranging from a verbal reprimand to denying the employee further access to the site for the remainder of the work.

   (ii). II. Second Infraction. A second infraction, not necessarily of the same type, could result in actions ranging from a written reprimand to denying the employee further access to the site for the remainder of the work.

   (iii). III. Third Infraction. A third infraction could result in suspension from the site ranging from 3-days to 365 days, or the remainder of the work, whichever is longer.

F. ***Battelle Issued Badges***

1. If a Battelle issued badge is required for persons performing work on the Site, Battelle's Badging office is located in the Environmental Technology Building (ETB), Room 1104. The ETB Building address is 3200 Q Avenue, Richland WA 99352. Badges may be picked up between the hours of 7:30 A.M. to 4:00 P.M. Monday through Friday (excluding holidays).

2. Employee Termination / Completion of the Work. Upon termination of employment or completion of the Contractors work, and before final payment shall be made, all badges and dosimeters issued to Contractor employees shall be returned to the issuing office.

3. Lost badges and/or dosimeter shall be reported immediately upon discovery to Battelle. Battelle will charge Contractor $100 for each badge or dosimeter not returned. The charge shall be deducted from payments otherwise due the Contractor. Refund of charges, previously collected for badges and/or dosimeters subsequently found will not be made after the date of final payment to the Contractor.

4. Training required for a Battelle issued Badge

   (i). GERT / LAB Orientation. If Contractor employees are required to successfully complete General Employee Radiation Training (GERT) / Battelle Laboratory (LAB) Orientation, GERT / LAB Orientation is estimated to take four (4) hours. The employee cost of the orientation shall be by the Contractor.

   (ii). Vendor/Contractor Orientation for non-Battelle personnel. If Contractor employees are required to successfully complete Vendor/Contractor Orientation, it is estimated to take 2 ½ hours. The employee cost of the orientation shall be by the Contractor.

   (iii). Other Required Training. Other Battelle sponsored training identified as required for performance of the contract work will be provided to the Contractor at no cost for the trainer and/or course fees. Contractor shall be responsible for the cost of the employee's time to attend. Contractor shall allow Battelle two (2) weeks to schedule the training after proper notification.

   (iv). Failed Training / Tests and Contractor —No-Shows. Contractor shall be responsible for the trainer / classroom costs associated with Contractor employees that have either failed to successfully complete a required training or have failed to show up for a scheduled training date. Costs to be charged the Contractor for retaking failed training or rescheduling due to no-shows is: $352.25 (each) for Radiation Worker I and/or II including GAP and refresher training; Lock & Tag training is $348.85; Respiratory Protection Worker training is $352.25; Asbestos Awareness, Hot Work Fire Watch and Lock-Out-Tag-Out Gap training are all $350.75, all other Battelle sponsored training is $32.11.

   (v). Offsite Training. Contractor shall be responsible for all offsite training as required for performance of the contract work. Training offered at the HAMMER facility is considered offsite, therefore the Contractor shall be responsible for course registration and payment of any fees. Quantitative Mask-Fit or additional respiratory training conducted at the HAMMER facility is considered offsite training, therefore the Contractor shall be responsible for course registration and payment of any fees.

44. Prohibited Articles

A. Prohibited Articles Anywhere. The following are Prohibited Articles anywhere on the Site and offsite locations under the cognizance of Battelle or the DOE:

1. Dangerous weapons
2. Explosives, ammunition, and incendiary devices
3. Controlled substances and drug paraphernalia
4. Alcoholic beverages
5. Contraband (includes other items prohibited by law).

B. Exclusion, Limited and/or Protected Areas. The following are Prohibited Articles within Exclusion, Limited and/or Protected Areas:

1. All items listed above, and
2. Privately owned recording equipment
3. Privately owned cameras (still, motion, video)
4. Privately owned computers and associated media (including palm pilots)
5. Privately owned cellular telephones
6. Privately owned radio transmitters.

45. Work Limitations, Restrictions & Requirements

A. ***Time***. "Time," if stated as a number of days, is calculated using calendar days, unless otherwise specified, and will include Saturdays, Sundays, and legal holidays. If the last day of the Contract period of performance falls on a Saturday, Sunday, or legal holiday, then the period shall include the next working day. The following holidays shall be non-work days under this Contract unless otherwise directed by Battelle:

New Year's Day

Memorial Day

Independence Day

Labor Day

Thanksgiving Day and the day after

Christmas Eve and Christmas Day

B. ***Working Hours***. Unless identified otherwise in the Division 1 General Requirements for the contract work, normal working hours are Monday through Friday from 7:00am to 3:30pm. The Contractor shall not perform work at the Site other than during normal working hours without prior written approval. The Contractor shall give Battelle at least two (2) hours prior notice if its employees are to be working after the normal shift period Monday through Friday. The Contractor shall give Battelle notice on the prior working day if its employees will be working before normal shift hours, Monday through Friday, or will be working at any time on Saturday, Sunday, or holidays. The notice shall include the type of work to be performed, location of work, date and hours of work, and description of any heavy equipment to be used. Battelle advance approval is required any time work is to be performed at other than normal shift periods.

C. ***Overhead Work Restrictions***. Under no conditions shall the Contractor operate or move cranes, hoists or similar equipment within 20 feet of overhead electrical conductors, guy wires, or substations, unless prior authorization for such operations is obtained from Battelle, giving full details of the method of equipment operations. Authorization from Battelle shall also be obtained when transporting materials, machinery, or other equipment, which establishes a height exceeding 15 feet from the road and/or ground surface.

D. ***Oversize Loads***. An Oversize Load permit is required when the vehicle or load exceeds: Width -8'-6" x Height –14ft x Length –40ft (single unit), or 48ft (single trailing unit). Contact Battelle to obtain the permit.

E. ***Moving Heavy Equipment***. The Contractor shall notify Battelle at least two (2) working days prior to the date it proposes to move any heavy equipment into or from the Worksite and shall not move any such equipment into or from the Worksite until receipt of written approval from Battelle. Heavy equipment will not be allowed to travel across existing paved roadways unless rubber tires or other adequate protection such as heavy planking protects such roadway. Movement of heavy equipment equipped with crawler-type treads on existing paved surfaces is forbidden and such equipment must be transported to the Worksite on rubber- tired trailers. Upon completion of the Work, the equipment shall be promptly removed from the Worksite.

F. ***System Outages***. Work, which requires any existing building utility system (including fire protection) to be taken out of service, shall be scheduled and performed so that the length of time the utility is out of service is held to a minimum. All material for the alteration and tie-in work shall be on hand when each utility service interruption is scheduled. The Contractor shall notify Battelle not less than five (5) working days prior to each required utility shutdown. All tie-in work shall be scheduled and performed so that the shutdown time will not exceed four (4) hours for water and two (2) hours for electrical or fire alarm. Battelle shall approve methods of performing the tie-in work prior to any utility system outage. Prior approval must be obtained for connection to and use of existing fire hydrants.

G. ***Excavation Requirements***.

1. Definition: "Excavations include any operation in which earth, rock, or other material in the ground (below existing grade) is moved, removed, or otherwise displaced by means or use of any hand tools, mechanical equipment or explosives."
2. Excavation permitting is required when grading, trenching, digging, ditching, drilling, tunneling, scraping, pipe plowing, and driving ground rods or posts, at a depth of 12 inches or greater.
3. Where required, the Contractor shall provide an adequate supporting mechanism to prevent undermining or movement of any load bearing concrete slabs or footings. All excavations shall comply with OSHA and DOSH regulations.
4. In the event any underground pipe line, conduit or other object not shown on the drawings or

otherwise indicated in the Specifications is encountered, the Contractor shall immediately stop work and notify Battelle.

5. Except as otherwise specified, protection (and restoration) of existing facilities shall be as specified in section titled "Protection of Existing Utilities." All underground piping, conduits, ducts, and other utilities shall be satisfactorily shored, braced and/or guyed as specified in the above referenced section.

6. Contractors shall hand-dig within five (5) feet of all known utilities.

H. ***Blind Penetration Requirements***.

1. All "Blind Penetrations" where the Contractor must penetrate into or through a wall, ceiling, floor or similar obstruction and the path of the penetration is not visible requires a Battelle Permit. The Contractor shall notify Battelle five (5) days in advance of any planned Blind Penetrations to allow Battelle time to issue the permit.

2. The Contractor shall perform a sub-surface scan using penetrating radar of the surface to be blind penetrated. The Contractor shall physically mark the location of any suspected embedment and do not proceed without release by Battelle if a suspected embedment is marked within 8 inches of the planned penetration.

3. All potentially energized circuits or sources in the proximity of the penetration shall be locked out and tagged by the Contractor in a de-energized condition.

4. All energized Contractor equipment used in blind penetrations shall be equipped with a "kill switch" or "drill stop" to effectively stop the Contractor equipment when the drill or energized penetrating equipment comes in contact with any metallic object.

5. Contractor shall notify Battelle immediately upon hitting an obstruction and/or the kill switch de-energizes the penetrating equipment. Disengaging the kill switch requires Battelle concurrence.

6. In addition to whatever other PPE the Contractor considers necessary for a Blind Penetration, the worker performing the penetration operation shall wear class 00, 500 volt rated, insulated gloves or insulated gloves rated for the voltage potential during the penetrating activity.

I. ***Adverse Weather Conditions.*** To insure worker safety, work or portions of work may be temporarily and incrementally shut down due to high winds, lighting, or other inclement weather as determined by Battelle. Contractor will not be additionally compensated in terms of cost or schedule for weather related shutdowns. Battelle will issue weather warnings via radio, telephone, public announcement, or in person. The Contractor shall ensure that all contractor and subcontractor personnel are apprised of the warnings and take the required actions as stated below.

1. Sustained winds greater than 15 mph – the necessity for crane operations will be closely scrutinized

2. Sustained winds greater than 25 mph and/or gusts greater than 40 mph – all crane activities must cease and be secured. All loose outdoor material shall be secured. The Contractor's Safety Supervisor shall evaluate work on roofs or elevated work surfaces before continuing. All personnel working outdoors are required to wear safety goggles. Depending on dust hazards, work may be stopped. Personnel may be directed to shelter.

3. Sustained winds greater than 30 mph and/or gusts greater than 45 mph – all outdoor work activities may be stopped. Personnel may be directed to shelter.

4. Sustained winds greater than 50 mph – outdoor work activities will be curtailed and limited to those approved by Battelle and Contractor's Safety Supervisor. Personnel will be directed to shelter. Site closure may be implemented and all work activities ceased.

5. Thunderstorm/lighting advisory based on lighting activity within a 30 mile radius of the site – Contractor personnel shall not work on roofs or elevated surfaces. Personnel shall stay away from equipment such as drilling rigs, cranes, boom trucks, or elevated work platforms. The "30-30 Rule" states, when you see lightning, count the time until you hear thunder. If this time is 30 seconds or less go immediately to a safe location. These protective measures shall remain in place until Battelle cancels the warning. The Hanford Weather Station (373-2716) or the National Weather Service Office (NWSO) located in Pendleton (541 276-7832) can be used to detect, locate, and determine if the hazardous weather pattern has dissipated or moved pass the 30 mile radius.

6. Contractor shall be responsible to provide snow removal and ensure safe walking and transfer conditions for walkways and access points around all site offices and work areas and the job-site within the project boundaries.

7. In response to winter storm conditions, Battelle may close or delay the site operation. If so, Battelle will make appropriate announcements and coordinate closures or early dismissals. Battelle's inclement weather hotline phone number is 509 375-2124.

8. Access to PNNL facility roofs during inclement weather may be restricted or delayed until the appropriate mitigation of snow, ice, or frost can be eliminated. Authorization to access facility roofs are controlled by the Building Manager.

46. Performance of Work by the Contractor (FAR 52.236-1, Apr 1984)

The Contractor shall perform on the site, and with its own organization, work equivalent to at least fifteen percent [15%] of the total amount of work to be performed under the contract. This percentage may be reduced by a supplemental agreement to this contract if, during performing the work, the Contractor requests a reduction and the Contracting Officer determines that the reduction would be to the advantage of the Government.

47. Differing Site Conditions (FAR 52.236-2, Apr 1984)

A. The Contractor shall promptly, and before the conditions are disturbed, give a written notice to the Contracting Officer of—

1. Subsurface or latent physical conditions at the site which differ materially from those indicated in this contract; or

2. Unknown physical conditions at the site, of an unusual nature, which differ materially from those ordinarily encountered and generally recognized as inhering in work of the character provided for in the contract.

B. The Contracting Officer shall investigate the site conditions promptly after receiving the notice. If the conditions do materially so differ and cause an increase or decrease in the Contractor's cost of, or the time required for, performing any part of the work under this contract, whether or not changed as a result of the conditions, an equitable adjustment shall be made under this clause and the contract modified in writing accordingly.

C. No request by the Contractor for an equitable adjustment to the contract under this clause shall be allowed, unless the Contractor has given the written notice required; *provided*, that the time prescribed in paragraph (a) of this clause for giving written notice may be extended by the Contracting Officer.

D. No request by the Contractor for an equitable adjustment to the contract for differing site conditions shall be allowed if made after final payment under this contract.

48. Site Investigation and Conditions Affecting the Work (FAR 52.236-3, Apr 1984)

A. The Contractor acknowledges that it has taken steps reasonably necessary to ascertain the nature and location of the work, and that it has investigated and satisfied itself as to the general and local conditions which can affect the work or its cost, including but not limited to (1) conditions bearing upon transportation, disposal, handling, and storage of materials; (2) the availability of labor, water, electric power, and roads; (3) uncertainties of weather, river stages, tides, or similar physical conditions at the site; (4) the conformation and conditions of the ground; and (5) the character of equipment and facilities needed preliminary to and during work performance. The Contractor also acknowledges that it has satisfied itself as to the character, quality, and quantity of surface and subsurface materials or obstacles to be encountered insofar as this information is reasonably ascertainable from an inspection of the site, including all exploratory work done by the Government, as well as from the drawings and specifications made a part of this contract. Any failure of the Contractor to take the actions described and acknowledged in this paragraph will not relieve the Contractor from responsibility for estimating properly the difficulty and cost of successfully performing the work, or for proceeding to successfully perform the work without additional expense to the Government.

B. The Government assumes no responsibility for any conclusions or interpretations made by the Contractor based on the information made available by the Government. Nor does the Government assume responsibility for any understanding reached or representation made concerning conditions which can affect the work by any of its officers or agents before the execution of this contract, unless that understanding or representation is expressly stated in this contract.

49. Physical Data (FAR 52.236-4, Apr 1984)

Data and information furnished or referred to below is for the Contractor's information. The Government shall not be responsible for any interpretation of or conclusion drawn from the data or information by the Contractor.

50. Material and Workmanship (FAR 52.236-5, Apr 1984)

A. All equipment, material, and articles incorporated into the work covered by this contract shall be new and of the most suitable grade for the purpose intended, unless otherwise specifically provided in this contract. References in the specifications to equipment, material, articles, or patented processes by trade name, make, or catalog number, shall be regarded as establishing a standard of quality and shall not be construed as limiting competition. The Contractor may, at its option, use any equipment, material, article, or process that, in the judgment of the Contracting Officer, is equal to that named in the specifications, unless otherwise specifically provided in this contract.

B. The Contractor shall obtain the Contracting Officer's approval of the machinery and mechanical and other equipment to be incorporated into the work. When requesting approval, the Contractor shall furnish to the Contracting Officer the name of the manufacturer, the model number, and other information concerning the performance, capacity, nature, and rating of the machinery and mechanical and other equipment. When required by this contract or by the Contracting Officer, the Contractor shall also obtain the Contracting Officer's approval of the material or articles which the Contractor contemplates incorporating into the work. When requesting approval, the Contractor shall provide full information concerning the material or articles. When directed to do so, the Contractor shall submit samples for approval at the Contractor's expense, with all shipping charges prepaid. Machinery, equipment, material, and articles that do not have the required approval shall be installed or used at the risk of subsequent rejection.

C. All work under this contract shall be performed in a skillful and workmanlike manner. The Contracting Officer may require, in writing, that the Contractor remove from the work any employee the Contracting Officer deems incompetent, careless, or otherwise objectionable.

51. Superintendence by the Contractor (FAR 52.236-6, Apr 1984)

At all times during performance of this contract and until the work is completed and accepted, the Contractor shall directly superintend the work or assign and have on the worksite a competent superintendent who is satisfactory to the Contracting Officer and has authority to act for the Contractor.

52. Permits and Responsibilities (FAR 52.236-7, Nov 1991)

The Contractor shall, without additional expense to the Government, be responsible for obtaining any necessary licenses and permits, and for complying with any Federal, State, and municipal laws, codes, and regulations applicable to the performance of the work. The Contractor shall also be responsible for all damages to persons or property that occur as a result of the Contractor's fault or negligence. The Contractor shall also be responsible for all materials delivered and work performed until completion and acceptance of the entire work, except for any completed unit of work which may have been accepted under the contract.

53. Other Contracts (FAR 52.236-8, Apr 1984)

The Government may undertake or award other contracts for additional work at or near the site of the work under this contract. The Contractor shall fully cooperate with the other contractors and with Government employees and shall carefully adapt scheduling and performing the work under this contract to accommodate the additional work, heeding any direction that may be provided by the Contracting Officer. The Contractor shall not commit or permit any act that will interfere with the performance of work by any other contractor or by Government employees.

54. Protection of Existing Vegetation, Structures, Equipment, Utilities, and Improvements (FAR 52.236-9, Apr 1984)

A. The Contractor shall preserve and protect all structures, equipment, and vegetation (such as trees, shrubs, and grass) on or adjacent to the work site, which are not to be removed and which do not unreasonably interfere with the work required under this contract. The Contractor shall only remove trees when specifically authorized to do so, and shall avoid damaging vegetation that will remain in place. If any limbs or branches of trees are broken during contract performance, or by the careless operation of equipment, or by workmen, the Contractor shall trim those limbs or branches with a clean cut and paint the cut with a tree-pruning compound as directed by the Contracting Officer.

B. The Contractor shall protect from damage all existing improvements and utilities (1) at or near the work site, and (2) on adjacent property of a third party, the locations of which are made known to or should be known by the Contractor. The Contractor shall repair any damage to those facilities, including those that are the property of a third party, resulting from failure to comply with the requirements of this contract or failure to exercise reasonable care in performing the work. If the Contractor fails or refuses to repair the damage promptly, the Contracting Officer may have the necessary work performed and charge the cost to the Contractor.

55. Operations and Storage Areas (FAR 52.236-10, Apr 1984)

A. The Contractor shall confine all operations (including storage of materials) on Government premises to areas authorized or approved by the Contracting Officer. The Contractor shall hold and save the Government, its officers and agents, free and harmless from liability of any nature occasioned by the Contractor's performance.

B. Temporary buildings (*e.g.,* storage sheds, shops, offices) and utilities may be erected by the Contractor only with the approval of the Contracting Officer and shall be built with labor and materials furnished by the Contractor without expense to the Government. The temporary buildings and utilities shall remain the property of the Contractor and shall be removed by the Contractor at its expense upon completion of the work. With the written consent of the Contracting Officer, the buildings and utilities may be abandoned and need not be removed.

C. The Contractor shall, under regulations prescribed by the Contracting Officer, use only established roadways, or use temporary roadways constructed by the Contractor when and as authorized by the Contracting Officer. When materials are transported in prosecuting the work, vehicles shall not be loaded beyond the loading capacity recommended by the manufacturer of the vehicle or prescribed by any Federal, State, or local law or regulation. When it is necessary to cross curbs or sidewalks, the Contractor shall protect them from damage. The Contractor shall repair or pay for the repair of any damaged curbs, sidewalks, or roads.

56. Use and Possession Prior to Completion (FAR 52.236-11, Apr 1984)

A. The Government shall have the right to take possession of or use any completed or partially completed part of the work. Before taking possession of or using any work, the Contracting Officer shall furnish the Contractor a list of items of work remaining to be performed or corrected on those portions of the work that the Government intends to take possession of or use. However, failure of the Contracting Officer to list any item of work shall not relieve the Contractor of responsibility for complying with the terms of the contract. The Government's possession or use shall not be deemed an acceptance of any work under the contract.

B. While the Government has such possession or use, the Contractor shall be relieved of the responsibility for the loss of or damage to the work resulting from the Government's possession or use, notwithstanding the terms of the clause in this contract entitled "Permits and Responsibilities." If prior possession or use by the Government delays the progress of the work or causes additional expense to the Contractor, an equitable adjustment shall be made in the contract price or the time of completion, and the contract shall be modified in writing accordingly.

57. Cleaning Up (FAR 52.236-12Apr 1984)

The Contractor shall at all times keep the work area, including storage areas, free from accumulations of waste materials. Before completing the work, the Contractor shall remove from the work and premises any rubbish, tools, scaffolding, equipment, and materials that are not the property of the Government. Upon completing the work, the Contractor shall leave the work area in a clean, neat, and orderly condition satisfactory to the Contracting Officer.

58. Availability and Use of Utility Services (FAR 52.236-14, Apr 1984)

A. The Government shall make all reasonably required

amounts of utilities available to the Contractor from existing outlets and supplies, as specified in the contract. Unless otherwise provided in the contract, the amount of each utility service consumed shall be charged to or paid for by the Contractor at prevailing rates charged to the Government or, where the utility is produced by the Government, at reasonable rates determined by the Contracting Officer. The Contractor shall carefully conserve any utilities furnished without charge.

B. The Contractor, at its expense and in a workmanlike manner satisfactory to the Contracting Officer, shall install and maintain all necessary temporary connections and distribution lines, and all meters required to measure the amount of each utility used for the purpose of determining charges. Before final acceptance of the work by the Government, the Contractor shall remove all the temporary connections, distribution lines, meters, and associated paraphernalia.

59. Schedules for Construction Contracts (FAR 52.236-15, Apr 1984)

A. The Contractor shall, within five days after the work commences on the contract or another period of time determined by the Contracting Officer, prepare and submit to the Contracting Officer for approval three copies of a practicable schedule showing the order in which the Contractor proposes to perform the work, and the dates on which the Contractor contemplates starting and completing the several salient features of the work (including acquiring materials, plant, and equipment). The schedule shall be in the form of a progress chart of suitable scale to indicate appropriately the percentage of work scheduled for completion by any given date during the period. If the Contractor fails to submit a schedule within the time prescribed, the Contracting Officer may withhold approval of progress payments until the Contractor submits the required schedule.

B. The Contractor shall enter the actual progress on the chart as directed by the Contracting Officer, and upon doing so shall immediately deliver three copies of the annotated schedule to the Contracting Officer. If, in the opinion of the Contracting Officer, the Contractor falls behind the approved schedule, the Contractor shall take steps necessary to improve its progress, including those that may be required by the Contracting Officer, without additional cost to the Government. In this circumstance, the Contracting Officer may require the Contractor to increase the number of shifts, overtime operations, days of work, and/or the amount of construction plant, and to submit for approval any supplementary schedule or schedules in chart form as the Contracting Officer deems necessary to demonstrate how the approved rate of progress will be regained.

C. Failure of the Contractor to comply with the requirements of the Contracting Officer under this clause shall be grounds for a determination by the Contracting Officer that the Contractor is not prosecuting the work with sufficient diligence to ensure completion within the time specified in the contract. Upon making this determination, the Contracting Officer may terminate the Contractor's right to proceed with the work, or any separable part of it, in accordance with the default terms of this contract.

60. Layout of Work (FAR 52.236-17, Apr 1984)

The Contractor shall lay out its work from Government established base lines and bench marks indicated on the drawings, and shall be responsible for all measurements in connection with the layout. The Contractor shall furnish, at its own expense, all stakes, templates, platforms, equipment, tools, materials, and labor required to lay out any part of the work. The Contractor shall be responsible for executing the work to the lines and grades that may be established or indicated by the Contracting Officer. The Contractor shall also be responsible for maintaining and preserving all stakes and other marks established by the Contracting Officer until authorized to remove them. If such marks are destroyed by the Contractor or through its negligence before their removal is authorized, the Contracting Officer may replace them and deduct the expense of the replacement from any amounts due or to become due to the Contractor.

61. Organization and Direction of the Work (FAR 52.236-19, Apr 1984)

A. When this contract is executed, the Contractor shall submit to the Contracting Officer a chart showing the general executive and administrative organization, the personnel to be employed in connection with the work under this contract, and their respective duties. The Contractor shall keep the data furnished current by supplementing it as additional information becomes available.

B. Work performance under this contract shall be under the full-time resident direction of (1) the Contractor, if the Contractor is an individual; (2) one or more principal partners, if the Contractor is a partnership; or (3) one or more senior officers, if Contractor is a corporation, association, or similar legal entity. However, if the Contracting Officer approves, the Contractor may be represented in the direction of the work by a specific person or persons holding positions other than those identified in this paragraph.

62. Specifications and Drawings for Construction (FAR 52.236-21, Feb 1997)

A. The Contractor shall keep on the work site a copy of the drawings and specifications and shall at all times give the Contracting Officer access thereto. Anything mentioned in the specifications and not shown on the drawings, or shown on the drawings and not mentioned in the specifications, shall be of like effect as if shown or mentioned in both. In case of difference between drawings and specifications, the specifications shall govern. In case of discrepancy in the figures, in the drawings, or in the specifications, the matter shall be promptly submitted to the Contracting Officer, who shall promptly make a determination in writing. Any adjustment by the Contractor without such a determination shall be at its own risk and expense. The Contracting Officer shall furnish from time to time such detailed drawings and other information as considered necessary, unless otherwise provided.

B. Wherever in the specifications or upon the drawings the words "directed," "required," "ordered," "designated," "prescribed," or words of like import are used, it shall be understood that the "direction," "requirement," "order," "designation," or

"prescription," of the Contracting Officer is intended and similarly the words "approved," "acceptable," "satisfactory," or words of like import shall mean "approved by," or "acceptable to," or "satisfactory to" the Contracting Officer, unless otherwise expressly stated.

C. Where "as shown," "as indicated," "as detailed," or words of similar import are used, it shall be understood that the reference is made to the drawings accompanying this contract unless stated otherwise. The word "provided" as used herein shall be understood to mean "provide complete in place," that is "furnished and installed."

D. Shop drawings means drawings, submitted to the Government by the Contractor, subcontractor, or any lower tier subcontractor pursuant to a construction contract, showing in detail (1) the proposed fabrication and assembly of structural elements, and (2) the installation (*i.e.,* fit, and attachment details) of materials or equipment. It includes drawings, diagrams, layouts, schematics, descriptive literature, illustrations, schedules, performance and test data, and similar materials furnished by the contractor to explain in detail specific portions of the work required by the contract. The Government may duplicate, use, and disclose in any manner and for any purpose shop drawings delivered under this contract.

E. If this contract requires shop drawings, the Contractor shall coordinate all such drawings, and review them for accuracy, completeness, and compliance with contract requirements and shall indicate its approval thereon as evidence of such coordination and review. Shop drawings submitted to the Contracting Officer without evidence of the Contractor's approval may be returned for resubmission. The Contracting Officer will indicate an approval or disapproval of the shop drawings and if not approved as submitted shall indicate the Government's reasons therefor. Any work done before such approval shall be at the Contractor's risk. Approval by the Contracting Officer shall not relieve the Contractor from responsibility for any errors or omissions in such drawings, nor from responsibility for complying with the requirements of this contract, except with respect to variations described and approved in accordance with (f) of this clause.

F. If shop drawings show variations from the contract requirements, the Contractor shall describe such variations in writing, separate from the drawings, at the time of submission. If the Contracting Officer approves any such variation, the Contracting Officer shall issue an appropriate contract modification, except that, if the variation is minor or does not involve a change in price or in time of performance, a modification need not be issued.

G. The Contractor shall submit to the Contracting Officer for approval four copies (unless otherwise indicated) of all shop drawings as called for under the various headings of these specifications. Three sets (unless otherwise indicated) of all shop drawings, will be retained by the Contracting Officer and one set will be returned to the Contractor. Upon completing the work under this contract, the Contractor shall furnish a complete set of all shop drawings as finally approved. These drawings shall show all changes and revisions made up to the time the equipment is completed and accepted.

63. Back-Charges

A. When costs are sustained by Battelle or the Government as a result of Contractor failure in whole or in part to execute its responsibility under the terms of this Agreement, such costs are considered the responsibility of the Contractor and will be "back-charged." Contractor actions having potential to result in back-charges include:

1. Environmental, safety, health, or quality assurance violations;
2. Rework necessary to meet Contract requirements;
3. Support of Contractor's recovery schedule;
4. Inspections by Battelle not performed, as scheduled, due to incomplete or inadequate status of the work for which Contractor is at fault;
5. Inspections that must be repeated by Battelle due to errors, omissions, mismanagement or any fault of Contractor;
6. Vendor data review and processing as a result of re-submittals in excess of three (3), which are attributable to inadequate Contractor coordination or preparation;
7. Contractor's failure to restore all Battelle and/or Government-owned property, facilities, utilities, or systems, including replacement of survey stakes, to "like-for-like" condition after use or damage by Contractor;
8. Contractor's failure to adequately repair and/or replace property of a third party damaged by Subcontractor;
9. Subcontractor's failure to maintain the cleanliness and orderly arrangement of the work site during construction and at final acceptance, within reason, to the satisfaction of Contractor;
10. Subcontractor's failure to return or transfer to another project all security badges will result in a charge to the Subcontractor in the amount of $250.00 per badge; and
11. Hazardous or environmentally detrimental spills caused by Subcontractor with clean-up performed by Contractor will be charged to Subcontractor.

B. Notification

Upon identification of an actual or anticipated back-charge, Battelle will provide Contractor a written notice which shall describe the work to be performed, the schedule for performance, and the cost to be charged the Contractor. The cost may include:

1. actual labor cost,
2. actual material cost including transportation, and
3. taxes, levies, duties and assessments.

C. Contractor Acceptance

Contractor is required to accept the back-charge or re-perform work at Contractor's cost. In the event Contractor

refuses to accept or agrees to performance of the work within 24 hours after receipt of Battelle's notice, Battelle may elect to proceed with the back-charge work and withhold (set-off) the cost from Contractor's payment. Battelle has the right to set-off such cost against any amount payable to the Contractor whether or not in connection with this Agreement.

64. Vendor Data Requirements

A. Contractor shall furnish to Battelle copies of required data for disposition sufficiently in advance of the date that the material/equipment is required to be installed to meet the accepted construction schedule. The Vendor Data Schedule (VDS) (also called a "submittal log") summarizes the submittal requirements of the Subcontract and generally specifies the timing for each required submittal. Vendor data for all material and equipment requiring a disposition shall be submitted, reviewed, assigned a disposition code by Battelle and returned to Contractor.

B. Contractor shall perform no work for which the vendor data has not been reviewed and dispositioned. Any delay caused by Contractor's failure to submit vendor data in a timely manner for Battelle review will not be excusable or compensable. If submitted vendor data items are unacceptable, no excusable delay shall accrue there from, regardless of the number of re-submittals made by Contractor or lower- tiers.

C. Battelle's vendor data disposition will not affect or relieve Contractor from responsibility for performance of work in compliance with the Contract. Vendor data causing any change to design details, layouts, calculations, analyses, test methods, procedures or any other Contract requirement shall be submitted with a written description of the affected change.

D. Contractor shall submit, concurrent with each invoice, an updated Construction Vendor Data Submittal Log (CVDSL). Failure to submit the CVDSL may result in withholding of payment until CVDSL receipt. Information provided on the CVDSL shall correlate with Contractor's accepted construction schedule to assure prosecution of the work in accordance with the said construction schedule. The CVDSL shall clearly indicate expected or actual submittal dates and the disposition status of all submitted data.

E. Substitutions require Battelle approval. Refer to the clause title "Brand Name or Equal."

F. Samples.

1. When samples are required, they shall be furnished at Contractor's expense in accordance with the clause entitled "Material and Workmanship." Samples shall be submitted within the time specified, or if no time is specified, within a reasonable time before use to permit inspection and testing. Samples shall be shipped prepaid, delivered as directed by Battelle, and shall be properly marked to show the name of the material, trademark of manufacturer, place of origin, number and name of work where the material represented by the sample will be used, and the name of the Contractor submitting the sample.

2. Samples not subject to destructive testing may be retained by Battelle until completion of the construction. If requested in writing by the Contractor at the time of submission, samples will be returned at Contractor's expense upon completion of the construction. Failure of any samples to pass specified requirements will be sufficient cause for refusal to consider further any samples from the same manufacturer whose materials failed to pass testing requirements.

65. Cooperation with Others

A. Contractor may undertake or award other subcontracts at or near the site of the work under the Subcontract. Subcontractor shall fully cooperate with the other Subcontractors and with Contractor employees and shall carefully adapt scheduling and performing the work under the Subcontract to accommodate the work by others, heeding any direction that may be provided by Contractor. Subcontractor shall not commit or permit any act that shall interfere with the performance of work by any other Subcontractor or Contractor employees.

B. Concurrent Work and Interface Responsibilities

1. When portions of the construction work under the Subcontract are performed near active operating areas, Subcontractor shall plan its construction work so as not to interfere with the operation of these facilities and shall maintain free and clear access to same for routine operational and maintenance activities performed by Contractor.

2. In addition, Subcontractor shall carefully coordinate all construction activities with Contractor so as to avoid conflicts and unnecessary delays in construction. Except for authorized shutdowns for the tie-in of newly constructed facilities, construction activities shall not disrupt normal operation of existing plant facilities.

LABOR STANDARDS

66. Davis-Bacon Act (FAR 52.222-6, July 2005)

A. Definition.—"Site of the work"—

1. Means—

(i). The primary site of the work. The physical place or places where the construction called for in the contract will remain when work on it is completed; and

(ii). The secondary site of the work, if any. Any other site where a significant portion of the building or work is constructed, provided that such site is—

a. Located in the United States; and

b. Established specifically for the performance of the contract or project;

2. Except as provided in paragraph (3) of this definition, includes any fabrication plants, mobile factories, batch plants, borrow pits, job headquarters, tool yards, etc., provided—

(i). They are dedicated exclusively, or nearly so, to performance of the contract or project; and

(ii). They are adjacent or virtually adjacent to the "primary site of the work" as defined in

paragraph (a)(1)(i), or the "secondary site of the work" as defined in paragraph (a)(1)(ii) of this definition;

3. Does not include permanent home offices, branch plant establishments, fabrication plants, or tool yards of a Contractor or subcontractor whose locations and continuance in operation are determined wholly without regard to a particular Federal contract or project. In addition, fabrication plants, batch plants, borrow pits, job headquarters, yards, etc., of a commercial or material supplier which are established by a supplier of materials for the project before opening of bids and not on the Project site, are not included in the "site of the work." Such permanent, previously established facilities are not a part of the "site of the work" even if the operations for a period of time may be dedicated exclusively or nearly so, to the performance of a contract.

B. (1) All laborers and mechanics employed or working upon the site of the work will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR part 3)), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, or as may be incorporated for a secondary site of the work, regardless of any contractual relationship which may be alleged to exist between the Contractor and such laborers and mechanics. Any wage determination incorporated for a secondary site of the work shall be effective from the first day on which work under the contract was performed at that site and shall be incorporated without any adjustment in contract price or estimated cost. Laborers employed by the construction Contractor or construction subcontractor that are transporting portions of the building or work between the secondary site of the work and the primary site of the work shall be paid in accordance with the wage determination applicable to the primary site of the work.

(2) Contributions made or costs reasonably anticipated for bona fide fringe benefits under section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph (e) of this clause; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such period.

(3) Such laborers and mechanics shall be paid not less than the appropriate wage rate and fringe benefits in the wage determination for the classification of work actually performed, without regard to skill, except as provided in the clause entitled Apprentices and Trainees. Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein; provided that the employer's payroll records accurately set forth the time spent in each classification in which work is performed.

(4) The wage determination (including any additional classifications and wage rates conformed under paragraph (c) of this clause) and the Davis-Bacon poster (WH-1321) shall be posted at all times by the Contractor and its subcontractors at the primary site of the work and the secondary site of the work, if any, in a prominent and accessible place where it can be easily seen by the workers.

C. (1) The Contracting Officer shall require that any class of laborers or mechanics which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. The Contracting Officer shall approve an additional classification and wage rate and fringe benefits therefor only when all the following criteria have been met:

(i). The work to be performed by the classification requested is not performed by a classification in the wage determination.

(ii). The classification is utilized in the area by the construction industry.

(iii). The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(2) If the Contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the Contracting Officer agree on the classification and wage rate (including the amount designated for fringe benefits, where appropriate), a report of the action taken shall be sent by the Contracting Officer to the Administrator of the:

Wage and Hour Division
Employment Standards Administration
U.S. Department of Labor
Washington, DC 20210

The Administrator or an authorized representative will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the Contracting Officer or will notify the Contracting Officer within the 30-day period that additional time is necessary.

(3) In the event the Contractor, the laborers or mechanics to be employed in the classification, or their representatives, and the Contracting Officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the Contracting Officer shall refer the questions, including the views of all interested parties and the recommendation of the Contracting Officer, to the Administrator of the Wage and Hour Division for determination. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise the Contracting Officer or will notify the Contracting Officer within the 30-day period that additional time is necessary.

(4) The wage rate (including fringe benefits, where appropriate) determined pursuant to paragraphs (c)(2) and (c)(3) of this clause shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

D. Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the Contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

E. If the Contractor does not make payments to a trustee or other third person, the Contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program; provided, That the Secretary of Labor has found, upon the written request of the Contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the Contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

67. Withholding of Funds (FAR 52.222-7, Feb 1988)

The Contracting Officer shall, upon his or her own action or upon written request of an authorized representative of the Department of Labor, withhold or cause to be withheld from the Contractor under this contract or any other Federal contract with the same Prime Contractor, or any other federally assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same Prime Contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the Contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the site of the work, all or part of the wages required by the contract, the Contracting Officer may, after written notice to the Contractor, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

68. Payrolls and Basic Records (FAR 52.222-8, June 2010)

A. Payrolls and basic records relating thereto shall be maintained by the Contractor during the course of the work and preserved for a period of 3 years thereafter for all laborers and mechanics working at the site of the work. Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in section 1(b)(2)(B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made, and actual wages paid. Whenever the Secretary of Labor has found, under paragraph (d) of the clause entitled Davis-Bacon Act, that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in section 1(b)(2)(B) of the Davis-Bacon Act, the Contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.

B. (1) The Contractor shall submit weekly for each week in which any contract work is performed a copy of all payrolls to the Contracting Officer. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under paragraph (a) of this clause, except that full social security numbers and home addresses shall not be included on weekly transmittals. Instead the payrolls shall only need to include an individually identifying number for each employee (e.g., the last four digits of the employee's social security number). The required weekly payroll information may be submitted in any form desired. Optional Form WH-347 is available for this purpose and may be obtained from the U.S. Department of Labor Wage and Hour Division website at http://www.dol.gov/whd/forms/wh347.pdf. The Prime Contractor is responsible for the submission of copies of payrolls by all subcontractors. Contractors and subcontractors shall maintain the full social security number and current address of each covered worker, and shall provide them upon request to the Contracting Officer, the Contractor, or the Wage and Hour Division of the Department of Labor for purposes of an investigation or audit of compliance with prevailing wage requirements. It is not a violation of this section for a Prime Contractor to require a subcontractor to provide addresses and social security numbers to the Prime Contractor for its own records, without weekly submission to the Contracting Officer.

2. Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the Contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify—

(i). That the payroll for the payroll period contains the information required to be maintained under paragraph (a) of this clause and that such information is correct and complete;

(ii). That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in the Regulations, 29 CFR Part 3; and

(iii). That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.

3. The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by paragraph (b)(2) of this clause.

4. The falsification of any of the certifications in this clause may subject the Contractor or subcontractor to civil or criminal prosecution under Section 1001 of Title 18 and Section 3729 of Title 31 of the United States Code.

C. The Contractor or subcontractor shall make the records required under paragraph (a) of this clause available for inspection, copying, or transcription by the Contracting Officer or authorized representatives of the Contracting Officer or the Department of Labor. The Contractor or subcontractor shall permit the Contracting Officer or representatives of the Contracting Officer or the Department of Labor to interview employees during working hours on the job. If the Contractor or subcontractor fails to submit required records or to make them available, the Contracting Officer may, after written notice to the Contractor, take such action as may be necessary to cause the suspension of any further payment. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

69. Apprentices and Trainees (FAR 52.222-9, July 2005)

A. Apprentices.

1. An apprentice will be permitted to work at less than the predetermined rate for the work performed when employed—

   A. Pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship Training, Employer, and Labor Services (OATELS) or with a State Apprenticeship Agency recognized by the OATELS; or

   B. In the first 90 days of probationary employment as an apprentice in such an apprenticeship program, even though not individually registered in the program, if certified by the OATELS or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice.

2. The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the Contractor as to the entire work force under the registered program.

3. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated in paragraph (a)(1) of this clause, shall be paid not less than the applicable wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed.

4. Where a Contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the Contractor's or subcontractor's registered program shall be observed. Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination.

5. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination.

6. In the event OATELS, or a State Apprenticeship Agency recognized by OATELS, withdraws approval of an apprenticeship program, the Contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

B. Trainees.

1. Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship Training, Employer, and Labor Services (OATELS). The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by OATELS.

2. Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed in the wage determination unless the Administrator of the Wage and Hour Division determines that there is

an apprenticeship program associated with the corresponding journeyman wage rate in the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the OATELS shall be paid not less than the applicable wage rate in the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate in the wage determination for the work actually performed.

3. In the event OATELS withdraws approval of a training program, the Contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

C. Equal employment opportunity. The utilization of apprentices, trainees, and journeymen under this clause shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR Part 30.

70. Compliance with Copeland Act Requirements (FAR 52.222-10, Feb 1988)

The Contractor shall comply with the requirements of 29 CFR Part 3, which are hereby incorporated by reference in this contract.

71. Subcontracts (Labor Standards) (FAR 52.222-11, July 2005)

A. Definition. "Construction, alteration or repair," as used in this clause, means all types of work done by laborers and mechanics employed by the construction Contractor or construction subcontractor on a particular building or work at the site thereof, including without limitation—

1. Altering, remodeling, installation (if appropriate) on the site of the work of items fabricated off-site;
2. Painting and decorating;
3. Manufacturing or furnishing of materials, articles, supplies, or equipment on the site of the building or work;
4. Transportation of materials and supplies between the site of the work within the meaning of paragraphs (a)(1)(i) and (ii) of the "site of the work" as defined in the FAR clause at 52.222-6, Davis-Bacon Act of this contract, and a facility which is dedicated to the construction of the building or work and is deemed part of the site of the work within the meaning of paragraph (2) of the "site of work" definition; and
5. Transportation of portions of the building or work between a secondary site where a significant portion of the building or work is constructed, which is part of the "site of the work" definition in paragraph (a)(1)(ii) of the FAR clause at 52.222-6, Davis-Bacon Act, and the physical place or places where the building or work will remain (paragraph (a)(1)(i) of the FAR clause at 52.222-6, in the "site of the work" definition).

B. The Contractor shall insert in any subcontracts for construction, alterations and repairs within the United States the clauses entitled—

1. Davis-Bacon Act;
2. Contract Work Hours and Safety Standards Act—Overtime Compensation (if the clause is included in this contract);
3. Apprentices and Trainees;
4. Payrolls and Basic Records;
5. Compliance with Copeland Act Requirements;
6. Withholding of Funds;
7. Subcontracts (Labor Standards);
8. Contract Termination—Debarment;
9. Disputes Concerning Labor Standards;
10. Compliance with Davis-Bacon and Related Act Regulations; and
11. Certification of Eligibility.

C. The prime Contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor performing construction within the United States with all the contract clauses cited in paragraph (b).

D. (1) Within 14 days after award of the contract, the Contractor shall deliver to the Contracting Officer a completed Standard Form (SF) 1413, Statement and Acknowledgment, for each subcontract for construction within the United States, including the subcontractor's signed and dated acknowledgment that the clauses set forth in paragraph (b) of this clause have been included in the subcontract.

2. Within 14 days after the award of any subsequently awarded subcontract the Contractor shall deliver to the Contracting Officer an updated completed SF 1413 for such additional subcontract.

E. The Contractor shall insert the substance of this clause, including this paragraph (e) in all subcontracts for construction within the United States.

72. Contract Termination—Debarment (FAR 52.222-12, Feb 1988)

A breach of the contract clauses entitled Davis-Bacon Act, Contract Work Hours and Safety Standards Act—Overtime Compensation, Apprentices and Trainees, Payrolls and Basic Records, Compliance with Copeland Act Requirements, Subcontracts (Labor Standards), Compliance with Davis-Bacon and Related Act Regulations, or Certification of Eligibility may be grounds for termination of the contract, and for debarment as a Contractor and subcontractor as provided in 29 CFR 5.12.

73. Compliance with Davis-Bacon and Related Act Regulations (FAR 52.222-13, Feb 1988)

All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR parts 1, 3, and 5 are hereby incorporated by reference in this contract.

74. Disputes Concerning Labor Standards (FAR 52.222-14, Feb 1988)

The United States Department of Labor has set forth in 29 CFR parts 5, 6, and 7 procedures for resolving disputes concerning labor standards requirements. Such disputes shall be resolved in accordance with those procedures and not the Disputes clause of this contract. Disputes within the meaning of this clause include disputes between the Contractor (or any of its subcontractors) and the contracting agency, the U.S. Department of Labor, or the employees or their representatives.

75. Notice of Labor Disputes (cl. 359 - Feb 1997)

If the Contractor has knowledge that any actual or potential labor dispute is delaying or threatens to delay the timely performance of this contract, the Contractor shall immediately give notice, including all relevant information, to the Battelle Contracts Representative.

76. Certification of Eligibility (FAR 52.222-15, Feb 1988)

A. By entering into this contract, the Contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the Contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

B. No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

C. The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001.

CLAUSES INCORPORATED BY REFERENCE

This Contract incorporates one or more FAR and DEAR provisions/clauses by reference with the same force and effect as if they were given in full text. Such provisions/clauses are identified below and elsewhere in this Contract by their title, effective date, and reference where they appear in the FAR and/or DEAR. The FAR and DEAR may be obtained from the Superintendent of Documents, US Government Printing Office and is available for viewing/downloading at http://www.acquisition.gov/far/ and http://farsite.hill.af.mil.

A. Applicable to all Contracts:

1. FAR 52.223-3, Hazardous Material Identification and Material Safety Data (JAN 1997) (Alt I, JUL 1995)
2. DEAR 952.211-71, Priorities and Allocations (APR 2008)
3. FAR 52.204-9 Personal Identity Verification of Contractor Personnel (JAN 2011)
4. FAR 52.227-4, Patent Indemnity—Construction Contracts (DEC 2007)
5. FAR 52.247-64, Preference For Privately Owned U.S.-Flag Commercial Vessels (FEB 2006)
6. DEAR 952.204-71 Sensitive Foreign Nations Control (MAR 2011)
7. DEAR 952.217-70 Acquisition of Real Property (Apr 1984)

B. Applicable to Subcontracts Under This Contract For Commercial Items:

1. FAR 52.244-6, Subcontracts For Commercial Items (DEC 2010)
2. FAR 52.222-50 Combating Trafficking in Persons (FEB 2009)
3. FAR 52.223-15 Energy Efficiency in Energy-Consuming Products (DEC 2007)

C. Applicable if Contract identifies specific items to be accorded duty-free entry into a customs territory of the United States. Also applicable where other foreign supplies in excess of $15,000 may be imported to a customs territory of the United States.

1. FAR 52.225-8, Duty-Free Entry (OCT 2010)

D. Applicable if Contract exceeds $2,500:

1. FAR 52.225-9, Buy American Act—Construction Materials (FEB 2009)

   (Note: The fill-in for paragraph (b) (2) of this clause is "None.")
2. FAR 52.225-13, Restrictions on Certain Foreign Purchases (JUNE 2008)

E. Applicable if Contract Exceeds $3,000:

1. FAR 52.222-54, Employment Eligibility Verification (Jan 2009) – applies for (a) commercial or noncommercial services (except for commercial services that are part of the purchase of a COTS item (or an item that would be a COTS item, but for minor modifications), performed by the COTS provider, and are normally provided for that COTS item) and (b) construction services; only applies for work performed in the United States.

F. Applicable if Contract exceeds $10,000:

1. FAR 52.222-21, Prohibition of Segregated Facilities (FEB 1999)
2. FAR 52.222-23, Notice of Requirement for Affirmative Action to Ensure Equal Employment Opportunity for Construction (FEB 1999) (The term "Covered Area" referred to in this FAR clause includes the Missouri Counties of Clay, Platte, Jackson, Ray, and Cass; and the Kansas Counties of Wyandotte and Johnson. Goals for minority and female participation in each trade are 12.7% and 6.9%, respectively.)
3. FAR 52.222-26, Equal Opportunity (MAR 2007) - The Equal Employment Opportunity Act Poster referenced in paragraph (c)(3)of the above clause may be downloaded from the U.S. Department of Labor website at www.dol.gov/elaws/posters.htm
4. FAR 52.222-27, Affirmative Action Compliance Requirements for Construction (FEB 1999)

G. Applicable if Contract exceeds $15,000:

1. FAR 52.222-36, Affirmative Action for Workers with Disabilities (OCT 2010)

H. Applicable if Contract exceeds $30,000:

1. FAR 52.209-6 Protecting the Government's Interest When Subcontracting with Contractors Debarred, Suspended, or Proposed for Debarment (Dec 2010)

I. Applicable if Contract exceeds $100,000:

1. FAR 52.222-35, Equal Opportunity for Special Disabled Veterans, Veterans of the Vietnam Era, and Other Eligible Veterans (SEP 2010)
2. FAR 52.222-37, Employment Reports on Special Disabled Veterans, Veterans of the Vietnam Era, and Other Eligible Veterans (SEP 2010)
3. DEAR 970.5227-5, Notice and Assistance Regarding Patent and Copyright Infringement (AUG 2002)

J. Applicable if Contract exceeds $150,000:

1. FAR 52.203-6, Restrictions on Subcontractor Sales to the Government (SEP 2006)
2. FAR 52.203-7, Anti-Kickback Procedures, (OCT 2010) – excluding paragraph (c)(1)
3. FAR 52.219-8, Utilization of Small Business Concerns (JAN 2011)
4. FAR 52.227-1, Authorization and Consent (DEC 2007) – applies without Alternate I if this Contract is for supplies or services, including construction, architect-engineer services, and materials, supplies, models, samples, and design or testing services.

K. Applicable if Contract exceeds $100,000 and its performance involves international air transportation of personnel, including their personal effects or property.

1. FAR 52.247-63, Preference for U.S.-Flag Air Carriers (JUN 2003)

L. Applicable if Contract exceeds $100,000 unless exempt per the provisions of FAR 22.305:

1. FAR 52.222-4, Contract Work Hours and Safety Standards Act--Overtime Compensation (JUL 2005)

M. Applicable if Contractor, as a part of its' quote or proposal, submitted the certification entitled "Certification of Toxic Chemical Release Reporting," and the amount of this Contract, inclusive of option amounts, exceeds $100,000:

1. FAR 52.223-14, Toxic Chemical Release Reporting (AUG 2003)

N. Applicable If Work Is Performed On DOE Site:

1. DEAR 970.5223-1, Integration of Environment, Safety, and Health into Work Planning and Execution (DEC 2000)
2. DEAR 970.5223-4, Workplace Substance Abuse Programs at DOE Sites, (DEC 2010)
3. DEAR 952.203-70, Whistleblower Protection For Contractor Employees (DEC 2000)

O. Applicable if work is performed on DOE site or if Contractor or its Subcontractors have access to classified information:

1. DEAR 952.204-2, Security (AUG 2009)
2. DEAR 952.204-70, Classification/Declassification (SEP 1997)
3. DEAR 952.204-73, Facility Clearance (MAY 2002)

P. Applicable if this Contract exceeds $100,000 and is for advisory and assistance services as those terms are defined at FAR 37.201:

1. DEAR 952.209-72, Organizational Conflicts of Interest, Alt. I, (AUG 2009)

Q. Applicable if this Contract exceeds $500,000:

1. DEAR 952.226-74 Displaced Employee Hiring Preference (JUN 1997)
2. DEAR 970.5226-2, Workforce Restructuring Under Section 3161 of the National Defense Authorization Act for Fiscal Year 1993 (DEC 2000)

R. Applicable if this Contract exceeds $650,000:

1. FAR 52.219-9, Small Business Subcontracting Plan (JAN 2011) – applies if the Contractor is a large business concern

S. Applicable to Contracts which require printing (as that term is defined in Title I of the U.S. Government Printing Regulations):

1. DEAR 970.5208-1, Printing (DEC 2000)

T. Applicable if this Contract involves the design, development, or operation of a system of records on individuals to accomplish a DOE function per the requirements of FAR 24.1:

1. FAR 52.224-1, Privacy Act Notification (APR 1984)
2. FAR 52.224-2, Privacy Act (APR 1984)

U. Applicable if Battelle requires a Certificate of Current Cost or Pricing Data in connection with the initial award or subsequent modification of this Contract pursuant to the requirements of FAR 15.403-1 through 15.403-5:

1. FAR 52.215-10, Price Reduction for Defective Cost or Pricing Data (AUG 2011)
2. FAR 52.215-11, Price Reduction for Defective Cost or Pricing Data—Modifications (AUG 2011)
3. FAR 52.215-12, Subcontractor Cost or Pricing Data (OCT 2010)
4. FAR 52.215-13, Subcontractor Cost or Pricing Data—Modifications (OCT 2010)

V. Applicable if costs incurred are a factor in determining the amount payable to Contractor under this Contract, or if the Contractor furnished Battelle a Certificate of Current Cost or Pricing Data as specified above:

1. DEAR 970.5232-3, Accounts, Records, and Inspection (DEC 2010)

W. Applicable if Battelle furnishes Government property to the Contractor in the performance of this purchase order/Contract, including Contractor acquired property to which title vests in the government under this purchase order/Contract:

1. FAR 52.245-1, Government Property (AUG 2010)

X. Applicable if royalties exceeding $250 were included in the price of this Contract:

1. DEAR 970.5227-8, Refund of Royalties (AUG 2002)

Y. Applicable if foreign travel is required in the performance of this Contract.

1. DEAR 952.247-70, Foreign Travel (AUG 2009)

Z. Applicable to all Contracts which include the design or operation of any plants or facilities or specially designed equipment for such plants or facilities.

1. DEAR 970.5227-1 Rights in Data – Facilities (DEC 2000) [included in Contracts for support services, involving the design or operation of any plants or facilities or specially designed equipment for such plants or facilities that are managed or operated under an M&O Contract under 48 CFR 970 with DOE.]

Environment, Safety, and Health Requirements – PNNL F&O Sponsored Work Sites (JPP/WEA/JSA) *(cl. 3113b – Feb. 2012)*

A. In performing any work under this contract on property or facilities owned or controlled by Battelle that are identified as PNNL Work Sites (hereinafter "onsite"), the Contractor shall comply with all applicable federal, state and local environment, safety, and health laws and regulations. The Contractor shall also comply with 10 CFR 851, DOE Worker Safety and Health Program, and DEAR 970.5223-1, Integration of Environment, Safety and Health (ES&H) into Work Planning and Execution (Dec. 2000). In order to comply with the requirements of 10 CFR 851 and DEAR 970.5223-1, the Contractor shall be guided by the principles set forth below.

B. The Contractor shall perform work safely and in a manner that ensures adequate protection for employees, the public, and the environment, and shall be accountable for the safe performance of work. The Contractor shall exercise a degree of care commensurate with the work and the associated hazards. The Contractor shall ensure that management of ES&H functions and activities becomes an integral but visible part of the Contractor's work planning and execution processes. The Contractor shall, in the performance of work, ensure that—

1. Line management is responsible for the protection of employees, public, and the environment. Line management includes those contractor and subcontractor employees managing and supervising employees performing work.
2. Clear and unambiguous lines of authority and responsibility for ensuring (ES&H) are established and maintained at all organizational levels.
3. Personnel possess the experience, knowledge, skills, and abilities that are necessary to discharge their responsibilities, and shall retain records respecting such competency and qualifications, making them available upon request.
4. Resources are effectively allocated to address ES&H, programmatic, and operational considerations. Protecting employees, the public, and the environment is a priority whenever activities are planned and performed.
5. Before work is performed, the associated hazards are evaluated and a set of ES&H standards and requirements are established which, if properly implemented, provide adequate assurance that employees, the public, and the environment are protected from adverse consequences.
6. Administrative and engineering controls to prevent and mitigate hazards are tailored to the work being performed and associated hazards. Emphasis should be on designing the work and/or controls to reduce or eliminate the hazards and to prevent accidents and unplanned releases and exposures.

C. The Contractor, relative to the Statement of Work and contract specifications, shall be able to demonstrate through documentation and work practices that its performance of work under this contract—

1. Fulfilled the scope of work as outlined in this contract
2. Identified and analyzed specific, task-level hazards associated with the work
3. Developed and implemented hazard controls related to the hazards
4. Allowed the performance of work within the controls
5. Provided feedback to Battelle and Contractor employees on adequacy of hazard controls

D. The Contractor shall perform work in accordance with a DOE-approved Worker Safety and Health Program (also referred to in the DEAR as a Safety Management Plan) as described below:

1. The Contractor shall demonstrate well-established safety protocols applicable to the scope of work and consistent with the required elements stated in this clause. Prior to the initiation of any onsite work, the Contractor shall either—
   a. Accept and incorporate Battelle's PNNL Contractor Environment Safety and Health Manual (http://www.pnl.gov/contracts/esh-procedures/) as its own. The Battelle Contracts Representative can provide a hard copy of the manual upon request. In those cases where the Contractor's onsite activities are limited to an office or meeting environment, with no additional or unusual hazards, the CES&H Manual requirements can be met through review of the Visitor Orientation Pamphlet, available on-line at http://www.pnl.gov/contracts/esh-procedures/.
   b. Submit its own 10 CFR 851 and DEAR 970.5223-1 compliant Worker Safety and Health Program (WSHP) document to the Battelle Contracts Representative. The Battelle Contracts Representative will coordinate the review and approval of the program document by DOE. The Contractor will be notified by the Battelle Contracts Representative of the program document's approval by DOE. Acceptance of the Contractor's program document will be at the sole discretion of DOE.
2. The Contractor will be provided a completed Job Planning Package (JPP) and Workplace Exposure Assessment (WEA) in the Invitation for Bid (IFB) or Request for Proposal (RFP). The completed JPP and WEA, which are a part of this contract, incorporate elements of effective job planning and hazard identification. Elements include identifying: the scope of work to be performed; facility operating requirements; potential hazards to Battelle and Contractor staff, the public and environment created by the work performed; hazard control methods and mitigation; and mechanisms to evaluate the adequacy of those controls. The JPP and WEA are key control processes in the safe conduct of work at Battelle. The Contractor is expected to develop their work sequence and job safety analysis (JSA) including information provided within the JPP and WEA in order to access Battelle property or facilities and initiate work.

E. The Contractor shall perform the following additional hazard identification tasks consistent with an approved WSHP:

1. The Contractor shall be responsible for identifying all potential occupational exposures that its employees and the employees of its lower-tier subcontractors will be exposed to while performing any work under this contract.

2. The Contractor shall assure that its employees and those of any lower-tiered subcontractor are medically qualified to perform work associated with any potential occupational exposures that have been identified. Medical qualification and medical surveillance programs are the sole responsibility of the Contractor. In addition, the Contractor is responsible for maintaining any records associated with the administration of these programs.
3. For each of its employees and each of its lower-tier subcontract employees that the Contractor has identified as having potential occupational exposures that require enrollment in a medical surveillance or medical qualification program, the Contractor shall provide its Occupational Medical provider with the following information:
   a. Current information about actual or potential work-related site hazards (chemical, radiological, physical, biological, or ergonomic);
   b. Employee job-task and hazard analysis information, including essential job functions;
   c. Actual or potential work-site exposures of each employee; and
   d. Personnel actions resulting in a change of job functions such that a change of hazards, or exposures results.
4. For each of its employees and each of its lower-tier subcontract employees, a copy of the exposure information provided to the Contractor's occupational medical provider shall be submitted to the Battelle Contracts Representative and approved by Battelle before any of these employees begin work under this contract.

F. The Contractor shall notify the Battelle Contracts Representative immediately of any OSHA-recordable injuries/illnesses, any "off-normal occurrences," or Government property damaged, that the Contractor determines to have occurred in the course of operations onsite and shall furnish such further information as the Battelle Contracts Representative may require. An "off-normal occurrence" is any unplanned or unexpected event, including near misses, or the discovery of a deficiency in a procedure, plan, or system that has real or potentially undesirable consequences to personnel, equipment, facilities, the environment, and/or programs.

G. The Contractor's onsite ES&H activities will be subject to review by the Technical Administrator of this contract. Other representatives of Battelle may conduct periodic inspections of the Contractor's equipment, work and storage areas for compliance with the applicable ES&H requirements. The Battelle Contracts Representative will notify the Contractor by a written Notice of Non-compliance of any observed non-compliance with applicable ES&H requirements. The Contractor shall immediately take appropriate corrective action. The Contractor shall advise the Battelle Contracts Representative, in writing, within five (5) working days of the corrective action taken on any safety non-compliance noted on the written Notice of Non-compliance. If the Contractor fails or refuses to correct the safety non-compliance, Battelle may perform, or cause to be performed, the necessary corrective work and unilaterally charge the Contractor for the cost thereof. Such charges will be deducted from payments otherwise due the Contractor under this contract.

H. The Contractor shall promptly evaluate and resolve any non-compliance with applicable ES&H requirements. If the Contractor fails to provide resolution or if, at any time, the Contractor's acts or failure to act causes substantial harm or an imminent danger to the environment, or health and safety of employees or the public, the Battelle Contracts Representative may issue an order stopping work in whole or in part and the Contractor shall be liable for the delay and any costs thereby incurred. Any stop-work order issued by Battelle under this clause (or issued by the Contractor to a subcontractor in accordance with this clause) shall be without prejudice to any other legal or contractual rights of Battelle. In the event that the Battelle Contracts Representative issues a stop-work order, an order authorizing the resumption of the work may be issued at the discretion of the Battelle Contracts Representative. The Contractor shall not be entitled to an extension of time, or additional cost or fee, or damages by reason of, or in connection with, any work stoppage ordered in accordance with this clause.

I. Employee Concerns Program

1. The Contractor, its agents, employees or subcontractors, are entitled to use the Battelle Employee Concerns Program and Hotline (509) 375-3999. The Hotline operates 24 hours per day, 7 days a week. Messages may be left anonymously, and all concerns are handled with confidentiality to the maximum extent possible. Employee concerns may also be submitted in writing to the Battelle Employee Concerns Office, Battelle, Pacific Northwest National Laboratory, P.O. Box 999, K1-42, Richland, Washington, 99352, or in person at the Staff Concerns Office, Battelle's Research Operation Building during normal business hours, Monday through Friday 7:30 a.m. to 4:30 p.m.
2. For the purpose of this document, allegations, concerns, and complaints are handled in a like manner and are referred to collectively as "employee concerns." A concern can consist of a declaration, statement, or assertion of impropriety or inadequacy on the part of one's employer or others at a DOE Site that has affected (or threatens to affect) aspects of operations, such as the environment, health, safety, quality, or security, and may include fraud, mismanagement, waste, or abuse of authority.
3. No retaliation or retribution shall be taken toward any individual as a result of filing an employee concern consistent with 10 CFR 708.

J. Civil Penalties and Indemnification

1. The 2002 Bob Stump National Defense Authorization Act amended the Atomic Energy Act by adding section 234C "Worker Health and Safety Rules for Department of Energy Nuclear Facilities." It required DOE to promulgate a worker safety and health rule, published in the Federal Register on February 9, 2006, as 10 CFR 851. It establishes worker safety and health requirements that govern the conduct of contractor activities at both nuclear and non-nuclear DOE Sites. Contractors that fail to comply with the Rule are subject to civil penalties or contract penalties.
2. The Contractor assumes full responsibility and shall indemnify, hold harmless, and defend Battelle, its directors, officers, and employees from any civil or contractual liability under section 234C of the Atomic Energy Act of 1954, as amended, or

the implementing regulations, arising out of the activities of the Contractor, its subcontractors, suppliers, agents, employees, and their officers, or directors. The Contractor's obligation to indemnify and hold harmless shall expressly include attorney fees and other reasonable costs of defending any action or proceeding instituted under section 234C or DOE's implementing regulations.

K. The Contractor is responsible for its subcontractors' compliance with the ES&H requirements of this contract. The Contractor shall include a clause substantially the same as this clause in lower-tier subcontracts involving work at on property or facilities owned or controlled by Battelle that are identified as PNNL Work Sites. Such subcontracts shall provide for the right to stop work under the conditions described herein.

Test Report: Pressure and/or Leak Test *(cl. QA-189 – August 2011)*

Contractor shall submit a Pressure and/or Leak Test Report(s) that are legible, reproducible, and contain, in addition to any other requirements as specified by this contract, the following:

1. The contract number
2. A clear identification of the item or component tested, including as applicable,
    - drawing number
    - sketch number
    - item and/or component number
    - serial/lot/batch and/or heat number
3 Acceptance criteria
4. Date of test
5. Certification level (as applicable) and name of person conducting and/or accepting results of test
6. Test procedure number and revision
7. Test method or technique
8. Actual test results
9. Description of test instruments used (e.g., gauges, pressure relief devices, standard leaks, etc.) including:
    - ranges
    - leak rates
    - identification
    - calibration due dates
10. Test conditions, test pressure, tracer gases and gas concentrations
11. Temperature measuring devices, identification, and actual test temperatures, as applicable to the method or technique being performed.
12. Description and/or sketch showing method or technique setup
13. Action(s) taken in connection with any deviations

Unless otherwise specified, Contractor shall deliver all documents required by this contract to the Battelle Contracts Representative. A document is not delivered until it is received by Battelle. Battelle shall have the right to reject, as not in conformity with the requirements of this contract, any supplies or services for which all required reports, procedures or certifications are not delivered.

Pacific Northwest
NATIONAL LABORATORY
Proudly Operated by Battelle Since 1965

Invitation For Bid #233058
Part III – Schedule
Section J – Attached Documents

Documents Included in the Invitation For Bid Package:

1. Division 1
2. Project Drawings, Reference Drawings
3. Project Job Planning Package (JPP)
4. Project Workplace Exposure Assessment (WEA)
5. Prevailing Wage Determination

Sample Forms On-line:

http://www.pnnl.gov/contracts/documents/construction.asp

1. Acceptance of Completed Work
2. Bid Bond – SF 24
3. Certificate of Liability Insurance – ACORD 25
4. Certified Payroll - WH-347
5. Construction Badge Request
6. Contract Daily Report
7. Contract Release
8. Injury/Illness Report
9. Invoice Template
10. OSHA Record Keeping
11. Payment Bond – SF 25a
12. Performance Bond – SF 25
13. Recycling Submittal Form
14. Request for Information
15. Statement and Acknowledgement – SF 1413
16. Submittal Form

All attachments are provided in .pdf format. You must have a .pdf viewer. A free viewer is available from Adobe Acrobat at www.adobe.com.

S593062-SPCC03

Construction Specifications

HPCS-4 POWER & COOLING

RELEASE
Date 01.24.13

Revision No. 0 Date: 1/24/13

Prepared by: _____ Date 1/24/13

Checked by: _____ Date 1/24/13

TABLE OF CONTENTS

DIVISION 9 – FINISHES

DIVISION 20 – COMMON MECHANICAL

DIVISION 23 - HVAC

DIVISION 26 – ELECTRICAL

DIVISION 31 – EARTH WORK

SECTION 011000 - SUMMARY OF WORK

PART 1 - GENERAL

1.1 SUMMARY

A. Battelle Manages, Operates and Maintains the Pacific Northwest National Laboratory (PNNL) for the U.S. Department of Energy's Office of Science (DOE) in Richland, Washington. The PNNL is a multi-program laboratory providing world-class scientific research capabilities and advanced scientific knowledge to support DOE's and the nation's strategic goals in science, national security, energy, and the environment. To meet the laboratory's needs and mission objectives, Battelle is installing a new High Performance Computing System (HPCS) to support the Environmental Molecular Science Laboratory (EMSL). The building is located on Innovation Blvd in the middle of the PNNL campus in Richland Washington.

B. This specification details the General and Technical Requirements that will be followed for the construction modifications required to provide a new computer room (to be numbered/named – 1109) with infrastructure for electrical power and water cooling.

C. The work includes providing supervision, labor, subcontracts, inspections, startup, materials, equipment, machinery, means and methods, temporary utilities and facilities, to permit the completion of the construction modifications.

1.2 DESCRIPTION OF WORK

A. Installation of the HPCS-4 power and cooling infrastructure generally consists of the following work/modifications and is depicted on the project drawings:

1. Remove/reinstall raised flooring system.
2. Install new partition wall/door to create new computer room 1109.
3. Remove/reinstall existing suspended acoustical ceiling system.
4. Remove/salvage existing Liebert Cooling Air Handlers (CAH)
5. Remove CAH support stands, piping and electrical conduit/wiring connections back to panel boards in room 1119.
6. Remove existing HVAC ductwork/air diffusers (above ceiling) and modify existing.
7. Remove/dispose of existing light fixtures and install new fixtures.
8. Remove existing smoke/heat detectors and fire alarm wiring/conduit.
9. Install new chilled water piping system.
10. Excavate/backfill for new electrical duct banks.
11. Extend underground conduit/duct banks from room 1145 to exterior of room 1129.
12. Install conduit and wiring from exterior of room 1129 to new room 1109.
13. Install new distribution panelboards in room 1109
14. Connect electrical power to Power Distribution Units (PDU). (PDU's provided by computer vendor.)
15. Reconnect raised floor grounding grid system.

16. Install fire alarm in room 1109
17. Label/identification of equipment per PNNL nomenclature including Arc Flash labels.
18. Cooling system testing/verification.

1.3 CONTRACT

A. Project will be constructed under a competitively bid fixed-price contract.

1.4 DRAWINGS

A. Project Drawings:

PROJECT
WS9610/1 CIVIL, SOUTH POWER & COOLING PROJECT TITLE/DRAWING LIST
WS9611/1 CIVIL, SOUTH POWER & COOLING PROJECT LEGEND/ABBREVIATION

DEMOLITION
WS9612/1 ARCHITECTURAL, DEMO @ RAISED FLOOR RM 1109 PLAN
WS9613/1 ARCHITECTURAL, DEMO @ REFLECTED CEILING RM 1109 PLAN
WS9614/1 MECHANICAL/ELECTRICAL, DEMO @ LIEBERT UNIT RM 1109 PLAN
WS9614/2 MECHANICAL/ELECTRICAL, DEMO @ LIEBERT UNIT RM 1109 PLAN
WS9614/3 MECHANICAL/ELECTRICAL, DEMO @ LIEBERT UNIT RM 1109 PLAN
WS9615/1 MECHANICAL, DEMO ABOVE CEILING RM 1109 PLAN
WS9616/1 ELECTRICAL, DEMO @ LIGHTING RM 1109 PLAN
WS9617/1 ELECTRICAL, DEMO @ FIRE ALARM RM 1109 PLAN
WS9617/2 ELECTRICAL, DEMO @ FIRE ALARM PANEL M WIRING DIAGRAM
WS9618/1 ELECTRICAL, DEMO @ COMPUTER SHUTDOWN RM 1109 PLAN
WS9618/2 ELECTRICAL, DEMO @ COMPUTER SHUTDOWN WIRING DIAGRAMS
WS9619/1 NOT USED

CIVIL
WS9620/1 CIVIL, SOUTH POWER FEED PARTIAL SITE PLAN
WS9620/2 CIVIL, SOUTH POWER FEED PROFILE/TRENCH SECTIONS
WS9620/3 CIVIL, SOUTH POWER FEED ENLARGED DETAILS
WS9621/1 NOT USED
WS9622/1 NOT USED

ARCHITECTURAL
WS9623/1 ARCHITECTURAL, RAISED FLOORING & PARTITION RM 1109 PLAN
WS9623/2 ARCHITECTURAL, RAISED FLOORING & PARTITION RM 1109 DETAILS
WS9624/1 NOT USED
WS9625/1 ARCHITECTURAL, REFLECTED CEILING RM 1109 PLAN
WS9626/1 NOT USED

MECHANICAL
WS9627/1 MECHANICAL, CHWS/CHWR RM 1109 PLAN
WS9627/2 MECHANICAL, CHWS/CHWR SECTIONS AND DETAILS
WS9627/3 MECHANICAL, CHWS/CHWR SECTIONS AND DETAILS
WS9628/1 MECHANICAL, CHWS/CHWR SUPPORTS & DETAILS
WS9628/2 MECHANICAL, CHWS/CHWR SUPPORTS & DETAILS
WS9629/1 MECHANICAL, ABOVE CEILING RM 1109 PLAN
WS9630/1 NOT USED

ELECTRICAL
WS9631/1 ELECTRICAL, DISTRIBUTION BOARD 026 & 027 ONE-LINE DIAGRAM
WS9632/1 ELECTRICAL, POWER RM 1109 OVERALL PLAN
WS9632/2 ELECTRICAL, POWER RM 1109 PLAN
WS9632/3 ELECTRICAL, POWER RM 1109 SECTIONS
WS9632/4 ELECTRICAL, POWER RM 1109 SECTIONS
WS9633/1 ELECTRICAL, LIGHTING RM 1109 PLAN
WS9634/1 ELECTRICAL, CONTROL PLAN
WS9634/2 ELECTRICAL, CONTROL BUS DIAGRAM
WS9634/3 ELECTRICAL, CONTROL EXPANSION MODULE WIRING DIAGRAM
WS9634/4 ELECTRICAL, CONTROL EXPANSION MODULE WIRING DIAGRAM
WS9634/5 ELECTRICAL, CONTROL WIRING DIAGRAM
WS9635/1 ELECTRICAL, FIRE ALARM MODS PARTIAL PLAN RM 1109 PLAN
WS9635/2 ELECTRICAL, FIRE ALARM MODS WIRING DIAGRAM
WS9636/1 NOT USED

FIRE PROTECTION
WS9637/1 FIRE PROTECTION, SPRINKLER MOD RM 1109 PLAN
WS9638/1 NOT USED

B. Specifications:

1. S593062-SPCC03 Construction Specification, HPCS-4 Power & Cooling

C. Reference Drawings:

1. H-3-310246 Sheets 1 through 5, Civil UGND Utility Lines Partial Site Plan, EMSL Computer Expansion.

D. Reference Data:

1. Ground Scanning Report, EMSL S Power Feed Area, Meier Enterprises, March 13, 2011.

2. NEPA CX to Install EMSL Super-Computer Power Infrastructure, PNNL, Richland, WA, Letter 11-PNSO-0431, June 30, 2011.

1.5 CHILLED WATER TIE-IN/ISOLATION

A. Contractor shall perform chilled water tie-ins (wet taps) as noted on drawing WS9627 on an off-shift/weekend time frame. Schedule tie-in with PNNL CM two weeks in advance of work.

B. Contractor shall install isolation valves as noted on demolition drawing WS9614 on an off-shift/weekend time frame. Work includes draining/capturing the polypropylene glycol and turnover to building Operations for re-use. Schedule installation of valves with PNNL CM one week in advance of performing the work.

1.6 PNNL-FURNISHED PRODUCTS

A. The following products are Battelle (computer vendor) furnished:

1. The High Performance Computing System including Power Distribution Modules; Rack cooling door control valves, thermistors/thermowells and flexible connecting hoses.

1.7 SALVAGE PNNL CAH UNITS (Liebert Cooling Units)

A. Remove and Salvage the six each Liebert CAH units in room 1119 (new room 1109). Place on pallets and wrap in plastic. Two units to be delivered to Computational Sciences Building located directly west of the EMSL building. Stage two units on the west side of the EMSL building for Excess pickup. Deliver two units to PNNL warehouse for storage.

1.8 SCHEDULE:

A. Noted below are key contract schedule delivery and completion dates.

1. Delivery of owner furnished Rack cooling door control valves, thermowells and flexible connecting hoses will be on or around March 29, 2013.

2. Complete existing construction contract (currently underway) for “Extend Power to EMSL 1145” April 30, 2013.

3. Construction substantial completion by June 14, 2013 including system testing (except for connection of PDUs).

4. Delivery of HPCS including PDUs is July 8, 2013

5. Complete installation of HPCS (by Vendor) is July 31, 2013

6. Contract close-out on or before August 30, 2013

B. PNNL Scheduled Holidays (no construction work)

- New Year’s Day
- Memorial Day
- Independence Day
- Labor Day
- Thanksgiving Day
- Thanksgiving Day After

- Christmas Eve
- Christmas Day

1.9 WORK SEQUENCE/COORDINATION

A. EMSL will remain in operational mode during this contract work. Construction activities shall be conducted in a highly planned and potentially phased manner that minimizes impact on on-going research being conducted at EMSL. Work shall be coordinated with the PNNL Construction Manager who will in turn coordinate with the building system engineer and building management.

B. The Job Planning Package (JPP) provided by PNNL, contains safety information and work steps and or coordination with EMSL for the construction work.

C. Install partition wall above and below raised floor in room 1119 (to create new room 1109) before demolition/removal work begins. Note: to expedite the start of demolition/removal activities, temporary wall board (or fire retardant plastic) can be used until the permanent pre-finished gypsum board is available.

1.10 USE OF PREMISES

A. Work hours shall be 6:00 a.m. to 4:30 p.m. Monday through Thursday. Authorization to access the facility or perform work on site at times other than as specified shall require prior authorization from Battelle.

B. Key Supervisor: The Contractor's Key Supervisor (or superintendent) shall be on site during construction activities.

C. Identification Badge: this scope of work will require the issuance of a PNNL issued picture identification badge.

D. Doors shall not be left unattended any time when unlocked or blocked open. Doors that are alarmed or not customarily used require specific authorization for use and may require full time supervision by PNNL Security personnel while in use. Provide five (5) working day notice to arrange for Security personnel. Provide five (5) working days' notice for key and proximity badge access requests.

E. The EMSL Building is an operational research facility. The Contractor shall take all necessary measures to limit the impact of construction and demolition activities on the occupants. Noise, vibration, dust, fumes, and vapors shall be controlled to the greatest extent practicable. Housekeeping shall be performed on an ongoing basis. Do not obstruct doorways, corridors, and road access.

1. **Note: The EMSL Building Manager shall be notified 24 hours in advance of soil compaction activities using vibratory equipment.**

F. Access to work area: Request authorization to access work areas, use storage and laydown areas, perform isolations, conduct outages, and perform work from the Construction Manager (CM). Request authorization before the end of shift for the following day's access and work

requirements. Approval is obtained the following morning through the Plan of the Day (POD) meeting. Request authorization a minimum of twenty four (24) hours in advance for use of storage and laydown areas. Request authorization to perform isolations and conduct outages in writing a minimum of five (5) working days in advance.

1.11 PERMITS

A. Contractor Responsibility:

1. The Contractors obligations regarding permits required by Federal, State, and Municipal Laws, Codes and Regulations remain as required by the Contract General Provisions, and are not affected by this Section.

2. The EMSL Building is a federal government owned facility and as such, Benton County or City of Richland permit is **NOT** required.

3. A Washington State L&I electrical permit is **NOT** required for this project.

B. Permits

1. General.

a. Notify Battelle in advance of work requiring a site specific permit. The Contractor shall meet the requirements set forth in the permit and post the permit in a conspicuous location and ensure employees' awareness of the permit contents.

b. In addition to permits identified in this Section, other sections may require use or approval of forms and requests that are not titled as permits but have the same effect. Contractor shall comply with the requirements identified with those forms and requests.

2. Excavation Permit: An excavation permit is required prior to start of any excavations that are greater than 12" in depth. Battelle will provide the permit. Typical requirements/restrictions for excavations on PNNL property are noted in the Contractor Environmental Safety and Health manual.

3. Electrical Permit: An electrical work permit is not required. However, electrical inspections will be performed by Battelle's electrical code/inspection delegate. The contractor shall coordinate these inspections by contacting PNNL Electrical Code Inspector (Bill Bresina at 509-539-7473). Pre-work interface with the inspector is required to establish the extent and provisions for inspections.

4. Confined Space Entry Permit: This permit is required prior to entering a confined space. Permits are valid for one (1) day unless Battelle approves extended usage. Only work that is originally identified on the Entry Permit shall be conducted in a Confined Space. Obtain a new permit whenever changes in work conditions or work activities introduce new hazards into the space. Notify Battelle three (3) days before the work is scheduled. Confined space work is not anticipated for this project.

5. Class II Penetration Permit: Required for cutting, drilling, or otherwise penetrating solid material greater than 2 in. in depth, or penetrations through hollow structures where the absence of utilities or other hazards has not been positively determined. Notify Battelle

five (5) days before the work is scheduled. Requirements for performing Class I and Class II blind penetrations are located in the Contractor Environmental Safety and Health Manual procedure titled Electrical Work Safety.

6. Energized Electrical Permit: Required for work on existing energized electrical systems including safe-to-work checks of electrical current/voltage. Notify Battelle five (5) days before the work is scheduled.

7. Facility Modification Permit: Required for each facility on which work will be performed. Battelle will provide permit to Contractor.

8. Hot Work Permit: Required for each location in which work involves welding, cutting, grinding, open flame soldering, spark generation or open flame. Notify Battelle three (3) days before the work is scheduled.

9. Outage Permit: Require for removing any Battelle system from service. Notify Battelle five (5) days before outage is required.

10. Radiological work permit activities are **NOT** planned for this contract.

1.12 WORK UNDER OTHER CONTRACTS

A. Construction contract to “Extend Power to EMSL 1145.” Expected to be finished by March 29, 2013.

1.13 WORK BY CITY OF RICHLAND (COR)

A. The COR will energize the main transformers (if not already energized).

1.14 SPECIFICATION FORMATS AND CONVENTIONS

A. Specification Format: The Specifications are organized into Divisions and Sections using the 16-division format and/or 2004 48-division and CSI/CSC's "Master Format" numbering system.

B. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:

1. Abbreviated Language: Language used in the Specifications and other Contract Documents is abbreviated. Words and meanings shall be interpreted as appropriate. Words implied, but not stated, shall be inferred, as the sense requires. Singular words shall be interpreted as plural, and plural words shall be interpreted as singular where applicable as the context of the Contract Documents indicates.

2. Imperative mood and streamlined language: Are generally used in the Specifications. Requirements expressed in the imperative mood are to be performed by Contractor. Occasionally, the indicative or subjunctive mood may be used in the Section Text for clarity to describe responsibilities that must be fulfilled indirectly by Contractor or by others when so noted.

a. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.

1.15 WORK CONTROL PROCESS

A. Work Control Policy: The work control process identifies known hazards; outlines controls to mitigate the hazards, outlines expectations for hazard controls, as well as other activity specific work performance requirements. Battelle will assist in the identification and mitigation of hazards through the Battelle Job Planning Package (JPP), Training and Permitting, but the final responsibility of hazard identification and mitigation is the responsibility of the Contractor.

a. Job Planning Package: Battelle will provide the Contractor with a JPP as part of the Request For Proposal documents. The JPP identifies the phases of work to be performed, permits, training/qualifications, special tools or materials, pre- and post-notification requirements, pre- and post-job meetings, system/equipment configuration and verification, outages, waste disposal path, critical (mandatory) work steps and environmental and/or worker safety hazards. The JPP will contain the following attachments:

1) Work Place Exposure Assessment: Identifies non-radiological hazards.

B. During construction, the JPP shall be kept on site, maintained, and be available to all personnel associated with this Project.

1.16 TRAINING FOR CONTRACT PERSONNEL

A. General: Include costs for course attendee’s time in proposal. Battelle is responsible for initial and refresher training course fees. Contractor shall be required to pay course fees for no-shows and any retraining required as a result of failure. Classroom training will be conducted on Battelle premises unless otherwise noted.

B. GERT (General Employee Radiation Training) and Initial Security Briefing for Non-Staff are required prior to obtaining a Battelle badge and prior to performing work at PNNL. Coordinate with the Construction Manager to schedule training.

1. GERT (General Employee Radiation Training) (817)
   Required recipients: All workers on job site
   Duration: 0.4 hours
   Scheduling: 3 working days
   Method: External or Battelle - Web Based
   Retrain Cycle: 2 years

2. PNNL Non-Staff Orientation (2400)
   Required recipients: All workers on job site
   Duration: 1 hour
   Scheduling: 3 working days
   Method: External or Battelle - Web Based
   Retrain Cycle: 1 year

3. EMSL Orientation (1011)

Required recipients: All workers on job site who have previously received 3014
Duration: .5 hour
Scheduling: 3 working days
Method: External or Battelle - Web Based
Re-train Cycle: N/A

C. Contractor personnel are required to have at a minimum, training as defined on the Job Planning Package (JPP) Contractor personnel are required to have training appropriate to work to be performed. Submit documentation of previously completed courses to Battelle.

1. Lock & Tag for Authorized Staff Members (692)
Required recipients: Workers potentially exposed to the release of hazardous energy that do not have current documented OSHA/WISHA Lock and Tag training.
Duration: 3 hours
Scheduling: 3 working days
Method: Classroom
Retrain Cycle: 2 years

2. Lock & Tag – PNNL Site Specific Gap Training (Course 1992)
Required recipients: Workers potentially exposed to the release of hazardous energy that have other current documented OSHA/WISHA Lock and Tag training.
Duration: 1.5 hours
Scheduling: 3 working days
Method: Classroom
Retrain Cycle: N/A

3. Hot Work Fire Watch (679)
Required recipients: Workers that will perform or monitor activities requiring generation ofheat, sparks or open flame. All hot work shall be conducted in accordance with a Hot Work Permit.
Duration: 1 hour
Scheduling: 3 working days
Method : Classroom
Retrain Cycle: 2 years

4. Hot Work Permit Training (988)
Required recipients: Workers or supervisors responsible for Hot Work Permit documentation.
Duration: 1 hour
Scheduling: 3 working days
Method: Classroom
Retrain Cycle: 2 years

5. Hands-on Fire Extinguisher Training
Required recipients: Workers performing fire watch activities. Training to be provided by the performing Contractor. Training shall be documented.
Retrain Cycle: 2 years

PART 2 - PRODUCTS – Not Used

PART 3 - EXECUTION – Not Used

END OF SECTION 011000

SECTION 012000 - PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 SCHEDULE OF VALUES

A. Submit for approval a Schedule of Values allocating portions of the Contract sum to various portions of the Work. Once approved by Battelle, the Schedule of Values shall be used as the basis for reviewing Contractor Applications for Payment.

B. Submit a Schedule of Values at the earliest possible date but no later than seven days before the date scheduled for submittal of initial Applications for Payment.

C. Coordinate preparation of the Schedule of Values with preparation of Contractor's Construction Schedule and Submittal Schedule, correlating line items in the Schedule of Values with other Contract data. Where the Work is separated into phases requiring separately phased payments, provide sub-schedules showing values correlated with each phase of payment.

D. The Schedule of Values shall provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. At a minimum, format and content for the Schedule of Values should be as follows:

1. General Administration and Supervision.
    a. Mobilization
    b. Submittals
    c. General Administration/OH/Fee
    d. Supervision
    e. Procurement
    f. Removal/Salvage Equipment
    g. Demolition
    h. Outage Demolition
    i. Excavation/Backfill
    j. Install Conduit/Duct Banks
    k. Install Chilled Water System
    l. Install switchboards
    m. Pull Wire and Terminate
    n. Install raised floor
    o. Install lights
    p. Install ceiling
    q. Install control system
    r. Connect power to PDUs
    s. Acceptance Testing

E. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
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. (Differentiate between items stored on-site and items stored off-site.)

F. Include the following Project / Contract identification on the Schedule of Values:

1. Project name and location.
2. Battelle Contract number.
3. Contractor's name and address.
4. Date of submittal.

G. Arrange the Schedule of Values in tabular form with separate columns (generally by calendar month) to indicate the scheduled date of work performance.

H. 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.

1.2 APPLICATIONS FOR PAYMENT

A. PAYMENT TERMS

1. See FIXED PRICE CONSTRUCTION GENERAL PROVISIONS, Section 13, Payments-Construction. Each progress payment shall be for a value of Work completed by the Contractor, in accordance with the Schedule of Values, less the amount retained.

2. The Contract Price shall be payable in monthly progress payments, payable Thirty (30) calendar days after receipt of a proper invoice, or at more frequent intervals as determined and approved by Battelle.

3. The cut-off date for the Contractor’s invoice shall be the same as Battelle’s Financial Processing Schedule – Month End as noted below. Only Notarized Invoices stamped by Battelle as received within five days of the cut-off date will be paid in the next 30-day cycle. Invoices that are received late by Battelle will be paid within sixty- (60) calendar days of receipt.

Note: Monthly accruals or invoice/payment estimations, are due three (3) days before month-end. Submit accruals to Battelle’s Construction Manager.

Month-End Schedule:

- January 25 2013
- February 22
- March 22
- April 26
- May 24
- June 21
- July 26
- August 23
- September 30
- October 25

- November 22
- December 20

4. Each progress payment shall be for a value of Work completed by the Contractor, as approved by Battelle's Construction Manager, in accordance with the Schedule of Values.

B. INVOICING INSTRUCTIONS

1. See FIXED PRICE CONSTRUCTION GENERAL PROVISIONS, Section 13, Payments-Construction.

1.3 DIRECT PAYMENTS TO SUBCONTRACTORS

A. Contract revenues representing payments to subcontractors shall not be considered earned by Contractor unless and until Contractor has paid the current invoices of such subcontractor. In the event Battelle determines, in its sole discretion, that Contractor has become insolvent or is in danger of becoming insolvent, then Battelle is authorized, but not required to make direct payment to Contractor's subcontractors with respect to any current or past due invoices then outstanding. Title to any materials or equipment for which such direct payment is made shall pass directly from such subcontractor to Battelle.

1.4 BACKCHARGES

A. A Back-charge is a cost sustained by Battelle and chargeable to the Contractor for Battelle's performance of Work, for which the Contractor is responsible. Without limitation and by way of example only, Back-charges may result from:

1. Services performed by Battelle, at Contractor's request for work which is within Contractor's Scope of Work under this Contract, or

2. Costs sustained by Battelle as a result of Contractor's non-compliance with the provisions of this Contract or Contractor's act of omission or negligence.

B. Upon identification by Battelle of an actual or anticipated Back-charge, Battelle will issue a Back-charge Notice to Contractor. This Notice shall describe the Back-charge Work to be performed, the scheduled period for performance, the cost to be charged by Battelle to the Contractor and other terms.

C. In the event the Contractor refuses to agree to the Back-charge, Battelle shall at its option proceed with the Back-charge Work and charge the Back-charge Cost to the Contractor's accounts.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012000

12/03/2012
CONSTRUCTION SPECIFICATION
HPCS-4 POWER AND COOLING

SECTION 013000 - ADMINISTRATIVE REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative and procedural requirements:

1. Submittals.
2. Product delivery, storage, and handling.
3. Product Substitutions and Comparable products.
4. Requests for Information (RFI).

B. Contractor shall utilize the web based Skire Unifier electronic system for Submittal, and/or Transmittal of all submittals, RFI’s, Formal Written Correspondence, and Substitution Requests. Battelle will grant Contractor a maximum of five (5) licenses (at no cost to Contractor) for use of Battelle’s existing Skire Unifier System. Battelle shall provide training for up to five (5) Contractor employees in the use of the Skire Unifier system. Contractor shall pay all costs for its employees’ time to attend to the 8 Hour Skire Unifier Training provided by Battelle.

1.2 DEFINITIONS

A. Products: Items purchased for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.

1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation, shown or listed in manufacturer's published product literature that is current as of date of the Contract Documents.
2. New Products: Items that have not previously been incorporated into another project or facility, except that products consisting of recycled-content materials are allowed, unless explicitly stated otherwise. Products salvaged or recycled from other projects are not considered new products.
3. Comparable Product: Product that is demonstrated and approved through submittal process, or where indicated as a product substitution, to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.

B. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.

C. Approval Submittals: Written and graphic information that requires Battelle’s approval responsive action.

D. Informational Submittals: Written information that does not require Battelle’s approval. Informational Submittals may be rejected for not complying with requirements.

E. Request for Information (RFI): An RFI is a written documented administrative method by which the Contractor can request clarification and/or direction from Battelle on Contract requirements. An RFI is not a change document, therefore, the contractor is not authorized to make or infer changes to the Contract Work based on a Battelle response to an RFI.

1.3 SUBMITTALS

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 requires 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. Battelle reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

B. Submittal Schedule: A submittal schedule identifying required submittals and the number of copies required. (A Master Submittal Log will be provided with the Invitation for Bid documents.)

1. This schedule is provided as a convenience to the Contractor.

2. The omission of an item from the submittal schedule does not relieve the Contractor from the responsibility of submitting an item listed in the individual specification sections.

3. The submittal schedule shall be updated by the Contractor to show critical submittal and review dates, and submitted for approval with the project schedule.

C. Processing Time: Allow enough time for submittal review, including time for re-submittals, as follows. Time for review shall commence on Battelle's receipt of submittal.

1. Initial Review: Allow 10 working days for initial review of each submittal. Allow additional time if processing must be delayed to permit coordination with subsequent submittals. Battelle will advise Contractor when a submittal being processed must be delayed for coordination.

2. Re-submittal Review: Allow 10 working days for processing each re-submittal.

3. Lack of Timely Submittal: No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing.

D. 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. Provide a space approximately 4 by 5 inches on label or beside title block to record Contractor's review and approval markings and action taken by Battelle.

3. Use submittal number from table at end of this section. Include the following information on label for processing and recording action taken:

   a. Project name. “S593062, Extend Power to EMSL 1145.
   b. Contract number.
   c. Date.
   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, including revision number, as identified on the Submittal Schedule. Continue numbering for items not included on table. Multiple submittals of a single subject item provide unique decimal number; 3.1, 3.2, etc.
   i. Number and title of appropriate Specification Section or drawing number.

E. Transmittal: Package each submittal individually and appropriately for transmittal and handling. Transmit each submittal using submittal form provided by Battelle. Battelle will return submittals, without review, received from sources other than Contractor.

1. On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Battelle on previous submittals, and deviations from requirements of the Contract Documents, including minor variations and limitations. Include the same label information as the related submittal.

2. Include Contractor's certification stating that information submitted complies with requirements of the Contract Documents.

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

G. Product Data Submittals: Submit documents in electronic format (Word, PDF, etc.). Include Specification Section number and title and Drawing numbers and titles.

1. Product data submittals shall include performance, electrical, dimensional, accessories, make and model number for the equipment at a minimum. Enough information must be provided to determine the appropriateness, fit and function of the equipment within the system.

   a. If the technical specifications are on the drawings leave the following to direct the contractor as to which product data submittals are required. Product data submittals are required for all items listed in the Submittal Schedule at the end of the section.

2. Manufacturers' Data Sheets: Where product data contain manufacturers' standard 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.

H. 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. Schedules.
i. Design calculations.
j. Compliance with specified standards.
k. Notation of coordination requirements.
l. Notation of dimensions established by field measurement.
m. Relationship to adjoining construction clearly indicated.
n. Seal and signature of professional engineer if specified.
o. Wiring Diagrams: Differentiate between manufacturer-installed and field-installed wiring.

2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches but no larger than 30 by 40 inches.

3. Number of Copies: Submit electronically (Word, PDF, DWG).

I. 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. Identification: Attach label on unexposed side of Samples that includes the following:

a. Generic description of Sample.
b. Product name and name of manufacturer.
c. Sample source.
d. Number and title of appropriate Specification Section.

3. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.

a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.

b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.

4. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.

   a. Number of Samples: Except where noted otherwise submit two full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line.

5. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.

   a. Number of Samples: Except where noted otherwise submit three sets of Samples.

      1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.

      2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.

J. 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.
4. Number of Copies: Submit three copies of product schedule or list, unless otherwise indicated.

   a. Mark up and retain one returned copy as a Project Record Document.

K. Substitution Requests: Submit five copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Documentation: Show compliance with requirements for substitutions and the following, as applicable:

   a. Statement indicating why specified material or product cannot be provided.

b. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by Battelle and separate contractors that will be necessary to accommodate proposed substitution.

c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.

d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.

e. Samples, where applicable or requested.

f. List of similar installations for completed projects with project names and addresses and names and addresses of owners and architects.

g. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.

h. Research/evaluation reports evidencing compliance with building code in effect for Project, from a model code organization acceptable to authorities having jurisdiction.

i. Detailed comparison of Contractor's Construction Schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating lack of availability or delays in delivery.

j. Cost information, including a proposal of change, if any, in the Contract Sum.

k. Contractor's certification that proposed substitution complies with requirements in the Contract Documents and is appropriate for applications indicated.

l. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.

2. Battelle Review: Battelle will make every attempt to expedite review of a substitution requests, however, Contractor shall allow 10 days for disposition. If necessary, Battelle will request additional information or documentation for evaluation within five working days of receipt of a request for substitution.

a. If no decision on use of a proposed substitution is made within the time allocated, the Contractor is obligated to use the product specified and shall hold Battelle harmless for any impact to the Construction Schedule, and shall further be held responsible for completing all Work within the approved period of performance.

b. Any acceptance of a Contractors request for substitution shall be documented on a formal written Change Order.

L. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, product selected shall be compatible with products previously selected, even if previously selected products were also options.

1. Each contractor is responsible for providing products and construction methods compatible with products and construction methods of other contractors.

2. If a dispute arises between contractors over concurrently selectable but incompatible products, Battelle will determine which products shall be used.

M. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, and installers, and others as necessary for performance of construction activities. Show distribution on transmittal forms. Reference Section 01400.

N. Use for Construction: Use only final submittals with mark indicating action taken by Battelle in connection with construction.

1. Contractor shall maintain copies of latest submitted and dispositioned submittals at the Worksite and available for Battelle review at all times.

1.4 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft. Comply with the manufacturers written instructions.

1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.

2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.

3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.

4. Inspect products on delivery to ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected. Reference Section 01400.

5. Store products to allow for inspection and measurement of quantity or counting of units.

6. Store products that are subject to damage by the elements, under cover in a weather tight enclosure above ground, with ventilation adequate to prevent condensation.

B. Storage: Provide a secure location and enclosure at Project site for storage of materials and equipment. Coordinate location with Battelle.

PART 2 - PRODUCTS

2.1 PRODUCT OPTIONS

A. General Product Requirements: Provide products that comply with the Contract Documents, that are undamaged, and unless otherwise indicated, that are new products at time of installation.

1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.

2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.

3. Descriptive, performance, and reference standard requirements in the Specifications establish "salient characteristics" of products.

4. Or Equal: Where products are specified by name and accompanied by the term "or equal" or "or approved equal" or "or approved," the Contractor shall comply with provisions in "Comparable Products" Article to obtain approval for use of an unnamed product.

B. Product Selection Procedures: Procedures for product selection include the following:

1. Available Products: Where Specification paragraphs or subparagraphs titled "Available Products" introduce a list of names of both products and manufacturers, provide one of the products listed or another product that complies with requirements. Comply with provisions in "Comparable Products" Article to obtain approval for use of an unnamed product.

2. Available Manufacturers: Where Specification paragraphs or subparagraphs titled "Available Manufacturers" introduce a list of manufacturers' names, provide a product by one of the manufacturers listed or another manufacturer that complies with requirements. Comply with provisions in "Comparable Products" Article to obtain approval for use of an unnamed product.

3. Product Options: Where Specification paragraphs titled "Product Options" indicate that size, profiles, and dimensional requirements on Drawings are based on a specific product or system, provide either the specific product or system indicated or a comparable product or system by another manufacturer. Comply with provisions in "Product Substitutions" Article.

4. Visual Matching Specification: Where Specifications require matching an established Sample, select a product (and manufacturer) that complies with requirements and matches Battelle's sample. Battelle's decision will be final on whether a proposed product matches satisfactorily.

a. If no product available within specified category matches satisfactorily and complies with other specified requirements, comply with provisions of the Contract Documents on "substitutions" for selection of a matching product.

5. Visual Selection Specification: Where Specifications include the phrase "as selected from manufacturer's colors, patterns, textures" or a similar phrase, select a product (and manufacturer) that complies with other specified requirements.

    a. Standard Range: Where Specifications include the phrase "standard range of colors, patterns, textures" or similar phrase, Battelle will select color, pattern, or texture from manufacturer's product line that does not include premium items.
    b. Full Range: Where Specifications include the phrase "full range of colors, patterns, textures" or similar phrase, Battelle will select color, pattern, or texture from manufacturer's product line that includes both standard and premium items.

2.2 PRODUCT SUBSTITUTIONS

A. Timing: Contractor shall time the submission of substitution requests so as not to impact the Construction Schedule or the Contract period of performance.

B. Conditions: Battelle will only consider product substitutions under the following described conditions:

1. Requested substitution offers Battelle a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Battelle must assume. Battelle's additional responsibilities may include cost of redesign and evaluation, increased cost of other construction by Battelle, and similar considerations.
2. Requested substitution does not require extensive revisions to the Contract Documents.
3. Requested substitution is consistent with the Contract Documents and will produce indicated results.
4. Substitution request is fully documented and properly submitted.
5. Requested substitution will not adversely affect Contractor's Construction Schedule.
6. Requested substitution has received necessary approvals of authorities having jurisdiction.
7. Requested substitution is compatible with other portions of the Work and has been coordinated with other portions of the Work.
8. Requested substitution provides specified warranty.
9. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

2.3 COMPARABLE PRODUCTS

A. Where products or manufacturers are specified by name, submit the following, in addition to other required submittals, to obtain approval of an unnamed product:

1. Evidence that the proposed product does not require extensive revisions to the Contract Documents that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.

2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.

3. Evidence that proposed product provides specified warranty.

4. List of similar installations for completed projects with project names and addresses and names and addresses of owners and architects, if requested.

5. Samples, if requested.

PART 3 - EXECUTION

3.1 SUBMITTALS

A. Contractor Review

1. Prior to submittal to Battelle, Contractor shall review each submittal and check for accuracy completeness and compliance with the Contract Documents.

2. Include all information per section 1.2.D and include name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

B. Battelle Review

1. Battelle will review each submittal, and make marks or comments to indicate corrections or modifications required, and return the submittal to the Contractor. Battelle will indicate Battelle's disposition of the submittal and any subsequent actions required by the Contractor as follows: (Note: Battelle will not review submittals that do not bear Contractor's approval and will return them without action.)

   a. No Exception Taken: Battelle has not found anything within the submittal that requires rework to the submittal.

   b. Exception Taken as Noted: No Re-submittal Required: Battelle has found and marked up discrepancies within the submittal. Contractor shall make corrections as noted but is not required to resubmit the package to Battelle.

   c. Exception Taken as Noted - Resubmittal Required: Battelle has found and marked up discrepancies within the submittal; contractor shall make corrections as noted and resubmit the package to Battelle.

   d. Reject – Revise and Resubmit: Submittal is rejected in its entirety or has not been transmitted per these specifications; contractor shall remedy the discrepancy and resubmit the entire package.

2. Informational Submittals: Battelle will review each submittal without returning any disposition to the contractor, unless the submittal does not comply with requirements, in which case the submittal will be rejected and returned.

3. Unsolicited Submittals: Submittals not required by the Contract Documents are reviewed at Battelle's sole discretion and may not be reviewed and may be discarded.

3.2 REQUESTS FOR INFORMATION (RFI)

A. RFI Form. Requests For Information shall be submitted on the Battelle Request For Information (RFI) form. The Battelle Request For Information (RFI) form shall be furnished to the Contractor in electronic format, using the PNNL Skire System.

B. RFI Process

1. RFI Submittal: All RFIs shall be submitted by the Contractor, in writing, in clear concise language, and in sufficient detail to fully describe the issue. RFIs from sub-tier contractors shall be reviewed by the Contractor, and if appropriate, submitted by the Contractor in accordance with this specification.

2. Required Information: The following items shall be required on the RFI Form.

   a. Project Name: "S663433, RPL 325 (or 331) Energy Conservation Modifications
   b. Contract Number
   c. Date
   d. RFI Number: Contractor shall sequentially number each RFI and maintain a system sufficient to ensure that duplicate numbers or gaps shall not occur.
   e. Contractor Name
   f. To: Identify the name of the Battelle Technical Representative identified in the Contract Agreement.
   g. Subject: A brief description of the issue.
   h. References: As detailed on the RFI form and to the level required to fully identify the issue. (RFIs which lack sufficient detail or clarity to identify the issue, shall be returned to the Contractor for correction)
   i. Problem/Information Requested: A complete narrative on the problem or information requested.
   j. Information Requested By: The name of the requestor or entity
   k. Reply Needed Date: The date that reply is needed to maintain schedule and not disrupt construction. Reply Needed Date shall comply with section 3.2.B.4 of this specification

3. Optional Information:

   a. Contractor is encourage to provide a statement of interpretation or proposed resolution in the space provided on the RFI form.

4. Request For Information Review Time: Battelle shall review properly submitted RFIs and return them, with an answer, within 10 working days of receipt. Where conditions warrant, the Contractor may request expedited review. Failure of Battelle to fulfill Contractors request for expedited review shall not justify any extension of time to the Contractor.

END OF SECTION 013000

SECTION 013200 – CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 CONSTRUCTION AND SUBMITTALS SCHEDULE

A. Bar Chart Schedule: A bar chart schedule shall be provided and maintained depicting major construction activities, submittals, key deliverables from the Contract, permits and utility tie in dates to Battelle. The bar chart shall correlate back to the schedule of values. Revise the bar chart as needed to reflect actual construction dates. See General Provisions for Fixed Price Construction Contacts, Item #35.

1.2 DEFINITIONS

A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.

1. Critical activities are activities on the critical path. They must start and finish on the planned early start and finish times.
2. Predecessor activity is an activity that must be completed before a given activity can be started.

B. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of Project.

C. Critical Path: The longest continuous chain of activities through the network schedule that establishes the minimum overall Project duration and contains no float.

D. Event: The starting or ending point of an activity.

E. Earned Value: The measure of dollars earned for completing work on an activity basis.

F. Float: The measure of leeway in starting and completing an activity.

1. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the following activity.

2. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.

G. Fragnet: A partial or fragmentary network that breaks down activities into smaller activities for greater detail.

H. Major Area: A story of construction, a separate building, or a similar significant construction element.

I. Milestone: A key or critical point in time for reference or measurement.

J. Network Diagram: A graphic diagram of a network schedule, showing activities and activity relationships.

K. Resource: A definable labor entity, material commodity, or subcontract service with a corresponding measurement for each activity. Labor shall be shown by craft or labor type and man-hour, materials by the standard industry measurement for material in place, subcontract services shall be measured by an appropriate standard as approved by the Project Manager.

1.3 SUBMITTALS

A. Construction bar chart Schedule: 10 working days after Notice of Award submit the Construction Schedule for the entire construction period.

B. Reports

a. CPM Reports: (at monthly intervals).
b. Daily Construction Reports: (provide weekly intervals, submit monthly).
c. Manpower Reports: (at monthly intervals).
d. Two Week Look Ahead Schedules: (provide at bi-weekly intervals, submit monthly).

PART 2 - PRODUCTS

2.1 Prepare schedules using commercial project planning software. Preferred software (used by Battelle) is Primavera Project Planner.

2.2 Provide only one (1) database for generating schedule reports, including graphs, charts, and tabular supporting materials.

PART 3 - EXECUTION

3.1 SCHEDULE PREPARATION

A. Prepare Construction schedule contents in accordance with the following:

1. Schedule format shall be a detailed, integrated, Critical Path Method time-scaled logic diagram (time scaled activity bars and constraints), with a supporting tabulation of activities. As a minimum, activity bars, activity descriptions and numbers, constraints, milestones and critical path shall be shown on the diagram.

2. Activity durations shall be in working days. Typically, activity durations shall not exceed 20 working days, with exception of level-of-effort activities. Activity titles shall be self-explanatory, with abbreviations shown in a legend on the document. Identify early start, late finish, restraining activities, total float, and critical path.

3. Submittal Review Time: Include allowance for review and re-submittal times of Contract required data. Coordinate submittal review times in Contractor's Construction Schedule with Submittals Schedule.

4. Activity description logic sequence and relationship. Schedules shall identify critical path activities, including logical sequence and relationship of activities for submittals, procurement, fabrication, delivery, erection, installation, and testing of work covered by Contract. Level of detail is at discretion of Battelle.

    a. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.

        1) Arrange list of activities on schedule by phase.
        2) Include a separate activity for each portion of the Work performed by Battelle.
        3) Include a separate activity for each long lead or critical delivery.
        4) Include a separate activity for each product, include delivery dates; stipulate the earliest possible delivery date.
        5) Show the effect of Work Restrictions on the schedule.

    b. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:

        1) Subcontract awards.
        2) Mobilization.
        3) Submittals.
        4) Purchases.
        5) Mockups.
        6) Fabrication.
        7) Sample testing.
        8) Deliveries.
        9) Installation.
        10) Tests and inspections.
        11) Commissioning.
        12) Punch list.

    c. Area Separations: Identify each major area of construction for each major portion of the Work. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities to provide for the following:

    d. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Contract Milestones Substantial Completion, and Final Completion.

3.2 SCHEDULE MAINTENANCE

A. Contract Modifications: For each proposed contract modification and concurrent with its submission, prepare a time-impact analysis using fragnets to demonstrate the effect of the proposed change on the overall project schedule.

B. Schedule Updating: At monthly intervals, a review of job progress shall take place between the Contractor and designated Battelle representatives to determine actual progress. Participants shall compare actual job progress with scheduled progress. The parties shall negotiate percent complete for each applicable activity.

1. Update shall include agreed to actual quantities of materials installed, actual labor hours, and deliverables furnished. Contractor shall issue the updated schedule with the Contractors monthly Application for Payment.
2. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Contractor shall issue updated schedule(s) concurrently with the report of each such meeting.

3.3 REPORTS

A. Statused Schedule: The Contractor shall submit a statused schedule on a monthly basis. The report shall compare the progress to date to the approved baseline schedule.

B. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:

1. List of subcontractors at Project site.
2. List of separate contractors at Project site.
3. Approximate count of personnel at Project site.
4. High and low temperatures and general weather conditions.
5. Accidents.
6. Meetings and significant decisions.
7. Unusual events.
8. Stoppages, delays, shortages, and losses.
9. Change Orders received and implemented.
10. Equipment or system tests and startups.
11. Partial Completions and occupancies.
12. Substantial Completions authorized.

C. Manpower Report. The Contractor shall report all hours worked on-site on a monthly basis. The report shall itemize labor hours by contractor direct report employee and subcontractor employee. No distinction shall be made between Straight time and Overtime hours or the job classification of the employee.

D. Two Week Look Ahead. The Contractor shall prepare and submit on a bi-weekly basis a two week schedule that looks at the upcoming two weeks in the Construction Schedule on a detailed level that forecasts daily planning of the work, and outages and interfaces with existing utilities, systems, services, and building personnel.

3.4 CONSTRUCTION PHOTOGRAPHS

A. Date Stamp: Unless otherwise indicated, date and time stamp each photograph as it is being taken so stamp is integral to photograph.

B. Pre-construction Photographs: Before starting construction, take photographs of Project site and surrounding properties from different vantage points. Show existing conditions adjacent to property.

C. Periodic Construction Photographs: Take photographs monthly, coinciding with cutoff date associated with each Application for Payment. Photographer shall select vantage points to best show status of construction and progress since last photographs were taken.

D. Final Completion Construction Photographs: Take photographs after date of Substantial Completion for submission as Project Record Documents.

END OF SECTION 013200

SECTION 014000 - QUALITY REQUIREMENTS

GENERAL

SUMMARY

1.1.1 This Section includes administrative and procedural requirements for implementation of Contract specific quality assurance (QA) and quality control (QC) requirements.

A. Inspection and testing requirements.

1. Specific inspection and testing requirements are specified in specification sections and/or drawings.
2. Any specific inspections, tests or other related actions do not relieve Contractor from requirement to implement specified QA and/or QC requirements nor relieve Contractor of compliance with Contract requirements.
3. Work included in this specification is on Systems, Structures and Components (SSC's) that are Category 3. These SSC's are not related to critical safety or environmental controls for the facility.

1.2 REFERENCES, CODES AND STANDARDS

A. All codes and standards, specifications, drawings and datasheets referenced refer to the latest accepted revision and errata as of September 2010. Any conflict between referenced documents shall be brought to the attention of the Buyer for resolution prior to proceeding with the work.

1.3 DEFINITIONS

A. Quality Assurance: Associated documented program/procedures and resultant activities, actions, and performance during the execution of the Contract to provide confidence that quality is achieved. Quality is a condition that is achieved when items, services or processes meets or exceeds, Contract requirements.

B. Quality Control (Inspection and Testing): Associated documented program/procedures and resultant inspections, test activities, actions, and performance during the execution of the Contract to evaluate that ongoing and completed construction complies with requirements. This does not include verification for Contract acceptance performed by Battelle or other Battelle Contracted parties.

C. Testing Agency: An entity engaged by Contractor and/or Battelle to perform specific inspections, tests or both. Testing laboratory shall mean the same as testing agency.

D. Qualifications:

.

1. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Contract work scope and with a record of successful in-service performance, as well as sufficient production capacity.
2. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to install, inspect, test or calibrate manufacturer's products that are similar in material, design, and extent to those indicated for this Contract.
3. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Contract, whose work has resulted in construction with a record of successful in-service performance.
4. Manufacturer's Field Services: A factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections.
5. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Contract and with a record of successful in-service performance.
6. Testing Agency Qualifications: An agency with the experience, capability and as applicable certification to conduct testing and inspecting indicated and that specializes in types of tests and inspections to be performed.

1.4 SUBMITTALS

A. Inspection and Test Report Documentation: Submit at completion of Work.

1. Leak/Pressure Test Reports
2. Electrical Megger Tests
3. NEC Inspection Reports
4. Vendor Test Reports
5. Vendor Start-up/Test Reports
6. Acceptance Test Reports

B. Certificates:

1. As required, submit copies of licenses, certifications, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the work.

2. Certificate of EPA refrigeration is required for installers.

1.5 QUALITY ASSURANCE

A. Specific Quality Assurance Program/Procedures:

1. Not Used

B. Contract specific Battle Quality Assurance Clauses:

1. Battelle Quality Assurance Clauses may be included in Contract, as applicable.

.

1.6 QUALITY CONTROL

A. Battelle Responsibilities:

1. Battelle will perform inspection and/or testing or engage inspection / testing agencies as identified in Contract Documents. All other inspection and testing shall be the responsibility of the Contractor.

B. Contractor Responsibilities:

1. Conduct inspections and tests specified in Contract documents. Coordinate sequence of activities to accommodate required inspections and tests with a minimum of delay. Conduct inspections and re-testing and re-inspecting, for construction that revised or replaced Work that failed to comply with requirements established by the Contract documents. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.

2. Excluding Suspect/Counterfeit and Misrepresented Products (S/CI):

a. See Fixed Price Construction General Provisions, Item 38.

1.7 BATTELLE VERIFICATION:

1. General: Battelle will perform acceptance verifications as identified in this and other Contract documents. Contractor shall ensure that Contractor personnel have completed inspections of, and approved portions of work in accordance with Contract requirements before notifying Battelle.

2. Specific verification points are defined as follows:

a. Hold (H): Required for witnessing of specific construction features, before further construction is allowed to proceed.

b. Receiving (R): Special items of fabrication, equipment, or material scheduled to be delivered to the Contract site, or other designated location, which require inspection upon arrival and before installation. Notify Battelle within one (1) working day after item arrival.

c. Witness (W): Selected for inspection at the option of Battelle. Work may proceed upon verbal release by Battelle or upon expiration of one hour beyond scheduled time of witnessing.

3. Notification Requirements: H, R, and W points apply to site work. Except where a longer period is specified notify Battelle at least four (4) working hours before each point for site work.

4. Schedule of H, R, and W points:

a. Backfill of Electrical Duct Banks or Conduit (W)
b. Energizing of circuits or equipment (W)
c. GFCI testing (W)
d. Final closure of electrical enclosures (H)
e. Prior to any testing of voice and data communications systems (W)

.

f. Leak/Pressure Test Reports (W)
g. Any functional testing (H)

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 REPAIR AND PROTECTION

A. On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.

B. Provide materials and comply with installation requirements specified in other Sections of these Specifications or on the drawings. Restore patched areas and extend restoration into adjoining areas in a manner that eliminates evidence of patching.

C. Protect construction exposed by or for inspection and testing activities.

D. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality control services.

END OF SECTION 014000

SECTION 014200 - REFERENCES

PART 1 - GENERAL

1.1 DEFINITIONS

A. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.

B. "Install": Operations at Project site including unloading, temporarily storing, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.

C. "Provide": Furnish and install, complete and ready for the intended use.

1.2 INDUSTRY STANDARDS

A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.

B. Publication Dates: Comply with standards in effect as of date of the Contract Documents, unless otherwise indicated.

C. Conflicting Requirements: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer uncertainties and requirements that are different, but apparently equal, to Battelle for a decision before proceeding.

1. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Battelle for a decision before proceeding.

D. Copies of Standards: Each entity engaged in construction on Project must be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.

1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source and make them available on request.

E. Abbreviations and Acronyms for Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the

recognized name of the standards and regulations in the following list. Names, telephone numbers, and Web-site addresses are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

ADAAG	Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities Available from Access Board www.access-board.gov	 (800) 872-2253 (202) 272-5434
CFR	Code of Federal Regulations Available from Government Printing Office www.access.gpo.gov/nara/cfr	 (888) 293-6498 (202) 512-1530
FS	Federal Specification Available from Defense Automated Printing Service www.astimage.daps.dla.mil/online Available from General Services Administration www.fss.gsa.gov/pub/fed-specs.cfm Available from National Institute of Building Sciences www.nibs.org	 (215) 697-6257 (202) 619-8925 (202) 289-7800
MILSPEC	Military Specification and Standards Available from Defense Automated Printing Service www.astimage.daps.dla.mil/online	 (215) 697-6257
UFAS	Uniform Federal Accessibility Standards Available from Access Board www.access-board.gov	 (800) 872-2253 (202) 272-5434

1.3 ABBREVIATIONS AND ACRONYMS

A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web-site addresses are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

AA	Aluminum Association, Inc. (The) www.aluminum.org	(202) 862-5100
ACI	American Concrete Institute/ACI International www.aci-int.org	(248) 848-3700
AGC	Associated General Contractors of America (The) www.agc.org	(703) 548-3118

AI	Asphalt Institute www.asphaltinstitute.org	(859) 288-4960
AIA	American Institute of Architects (The) www.aia.org	(800) 242-3837 (202) 626-7300
AISC	American Institute of Steel Construction www.aisc.org	(800) 644-2400 (312) 670-2400
AISI	American Iron and Steel Institute www.steel.org	(202) 452-7100
AMCA	Air Movement and Control Association International, Inc. www.amca.org	(847) 394-0150
ANSI	American National Standards Institute www.ansi.org	(202) 293-8020
API	American Petroleum Institute www.api.org	(202) 682-8000
ARI	Air-Conditioning & Refrigeration Institute www.ari.org	(703) 524-8800
ASCE	American Society of Civil Engineers www.asce.org	(800) 548-2723 (703) 295-6300
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers www.ashrae.org	(800) 527-4723 (404) 636-8400
ASME	ASME International (The American Society of Mechanical Engineers International) www.asme.org	(800) 843-2763 (212) 591-7722
ASSE	American Society of Sanitary Engineering www.asse-plumbing.org	(440) 835-3040
ASTM	ASTM International (American Society for Testing and Materials International) www.astm.org	(610) 832-9585
AWCI	AWCI International (Association of the Wall and Ceiling Industries International) www.awci.org	(703) 534-8300
AWS	American Welding Society www.aws.org	(800) 443-9353 (305) 443-9353
AWWA	American Water Works Association	(800) 926-7337

	www.awwa.org	(303) 794-7711
BHMA	Builders Hardware Manufacturers Association www.buildershardware.com	(212) 297-2122
BIA	Brick Industry Association (The) www.bia.org	(703) 620-0010
CDA	Copper Development Association Inc. www.copper.org	(800) 232-3282 (212) 251-7200
CGA	Compressed Gas Association www.cganet.com	(703) 788-2700
CISPI	Cast Iron Soil Pipe Institute www.cispi.org	(423) 892-0137
CLFMI	Chain Link Fence Manufacturers Institute www.chainlinkinfo.org	(301) 596-2583
CPPA	Corrugated Polyethylene Pipe Association www.cppa-info.org	(800) 510-2772 (202) 462-9607
CRSI	Concrete Reinforcing Steel Institute www.crsi.org	(847) 517-1200
CSA	CSA International (Formerly: IAS - International Approval Services) www.csa-international.org	(800) 463-6727 (416) 747-4000
CSI	Construction Specifications Institute (The) www.csinet.org	(800) 689-2900 (703) 684-0300
CTI	Cooling Technology Institute (Formerly: Cooling Tower Institute) www.cti.org	(281) 583-4087
EIA	Electronic Industries Alliance www.eia.org	(703) 907-7500
EJMA	Expansion Joint Manufacturers Association, Inc. www.ejma.org	(914) 332-0040
FCI	Fluid Controls Institute www.fluidcontrolsinstitute.org	(216) 241-7333
FM	Factory Mutual System (See FMG)	
FMG	FM Global	(401) 275-3000

	(Formerly: FM - Factory Mutual System) www.fmglobal.com	
GA	Gypsum Association www.gypsum.org	(202) 289-5440
HI	Hydraulic Institute www.pumps.org	(888) 786-7744 (973) 267-9700
HI	Hydronics Institute www.gamanet.org	(908) 464-8200
HPVA	Hardwood Plywood & Veneer Association www.hpva.org	(703) 435-2900
IAS	International Approval Services (See CSA)	
ICEA	Insulated Cable Engineers Association, Inc. www.icea.net	(770) 830-0369
ICRI	International Concrete Repair Institute, Inc. www.icri.org	(847) 827-0830
IEC	International Electrotechnical Commission www.iec.ch	41 22 919 02 11
IEEE	Institute of Electrical and Electronics Engineers, Inc. (The) www.ieee.org	(212) 419-7900
IESNA	Illuminating Engineering Society of North America www.iesna.org	(212) 248-5000
IGMA	Insulating Glass Manufacturers Alliance (The) www.igmaonline.org	(613) 233-1510
LPI	Lightning Protection Institute www.lightning.org	(800) 488-6864 (847) 577-7200
MBMA	Metal Building Manufacturers Association www.mbma.com	(216) 241-7333
MFMA	Metal Framing Manufacturers Association www.metalframingmfg.org	(312) 644-6610
MPI	Master Painters Institute www.paintinfo.com	(888) 674-8937
MSS	Manufacturers Standardization Society of The Valve and Fittings Industry Inc.	(703) 281-6613

	www.mss-hq.com	
NAAMM	National Association of Architectural Metal Manufacturers www.naamm.org	(312) 332-0405
NAIMA	North American Insulation Manufacturers Association (The) www.naima.org	(703) 684-0084
NCMA	National Concrete Masonry Association www.ncma.org	(703) 713-1900
NCTA	National Cable & Telecommunications Association www.ncta.com	(202) 775-3550
NECA	National Electrical Contractors Association www.necanet.org	(301) 657-3110
NEMA	National Electrical Manufacturers Association www.nema.org	(703) 841-3200
NETA	InterNational Electrical Testing Association www.netaworld.org	(303) 697-8441
NFPA	National Fire Protection Association www.nfpa.org	(800) 344-3555 (617) 770-3000
NRMCA	National Ready Mixed Concrete Association www.nrmca.org	(888) 846-7622 (301) 587-1400
NSF	NSF International (National Sanitation Foundation International) www.nsf.org	(800) 673-6275 (734) 769-8010
PCI	Precast/Prestressed Concrete Institute www.pci.org	(312) 786-0300
PGI	PVC Geomembrane Institute //pgi-tp.ce.uiuc.edu	(217) 333-3929
SAE	SAE International www.sae.org	(724) 776-4841
SDI	Steel Deck Institute www.sdi.org	(847) 462-1930
SDI	Steel Door Institute www.steeldoor.org	(440) 899-0010
SJI	Steel Joist Institute	(843) 626-1995

	www.steeljoist.org	
SMACNA	Sheet Metal and Air Conditioning Contractors' National Association www.smacna.org	(703) 803-2980
SSMA	Steel Stud Manufacturers Association (Formerly: ML/SFA - Metal Lath/Steel Framing Association) www.ssma.com	(312) 456-5590
SSPC	SSPC: The Society for Protective Coatings www.sspc.org	(877) 281-7772 (412) 281-2331
STI	Steel Tank Institute www.steeltank.com	(847) 438-8265
SWRI	Sealant, Waterproofing, and Restoration Institute www.swrionline.org	(816) 472-7974
TCA	Tile Council of America, Inc. www.tileusa.com	(864) 646-8453
TIA/EIA	Telecommunications Industry Association/Electronic Industries Alliance www.tiaonline.org	(703) 907-7700
UL	Underwriters Laboratories Inc. www.ul.com	(800) 704-4050 (847) 272-8800
WDMA	Window & Door Manufacturers Association (Formerly: NWWDA - National Wood Window and Door Association) www.wdma.com	(800) 223-2301 (847) 299-5200

B. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web-site addresses are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

IAPMO	International Association of Plumbing and Mechanical Officials (The) www.iapmo.org	(909) 595-8449
ICBO	International Conference of Building Officials www.icbo.org	(800) 284-4406 (562) 699-0541

C. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the

following list. Names, telephone numbers, and Web-site addresses are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

CE	Army Corps of Engineers www.usace.army.mil	
EPA	Environmental Protection Agency www.epa.gov	(202) 260-2090
GSA	General Services Administration www.gsa.gov	(202) 708-5082
OSHA	Occupational Safety & Health Administration www.osha.gov	(800) 321-6742 (202) 693-1999

D. Battelle Acronyms: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall have the following meaning as listed:

ALARA	As Low As Reasonably Achievable
ARA	Airborne Radioactive Area
ATP	Acceptance Test Procedure
BE	Building Engineer
BM	Building Manager
CA	Contamination Area
CAS	Criticality Alarm System
CCA	Criticality Control Area
CERCLA	Comprehensive Environmental Response, Compensation, & Liability Act
CM	Construction Manager
CSM	Cognizant Space Manager
CTR	Contract Technical Representative
DOE	Department of Energy
ECN	Engineering Change Notice
ES&H	Environmental Safety and Health
F&O	Facilities & Operations Directorate
FAR	Federal Acquisition Regulation
FDC	Field Design Change
FMP	Facility Modification Permit
FPP	Fall Protection Plan
FSR	Facility Service Representative
HCA	High Contamination Area
HEAT	High Energy Awareness Training
HEPA	High Efficiency Particulate Air Filter
HRA	High Radiation Area
HVAC	Heating, Ventilation, and Air Conditioning
JPP	Job Planning Package
LD	Limiting Dose
LO/TO	Lockout/Tagout
M&O	Maintenance and Operating
M&TE	Measurement and Test Equipment

MEL	Master Equipment List
MSDS	Material Safety Data Sheet
NCR	Non–Conformance Report
NEPA	National Environmental Policy Act
ORCAA	Olympia Region Clean Air Agency
PAAA	Price Anderson Amendment Act
PJB	Pre–Job Briefing
PM	Project Manager
POD	Plan of the Day
PPE	Personnel Protective Equipment
QA	Quality Assurance
QC	Quality Control
RA	Radiation Area
RBA	Radiological Buffer Area
RCA	Radiological Controlled Area
RCRA	Resource Conservation and Recovery Act
RFI	Request For Information
RMA	Radiological Material Area
RWP	Radiological Work Permit
SBMS	Standards Based Management System
SCBA	Self Contained Breathing Apparatus
SOP	Standard Operating Procedure
UPS	Uninterruptible Power Supply
URMA	Underground Radioactive Material Area
VHRA	Very High Radiation Area
VI	Vendor Information

PART 2 - PRODUCTS (Not Use)

PART 3 - EXECUTION (Not Used)

END OF SECTION 014200

SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes requirements for temporary facilities and controls, including temporary utilities, support facilities, and security and protection facilities.

B. Temporary utilities include, but are not limited to, the following:

1. Water service and distribution.
2. Sanitary facilities, including toilets, wash facilities, and drinking-water facilities.
3. Heating and cooling facilities.
4. Ventilation.
5. Electric power service.
6. Lighting.

C. Support facilities include, but are not limited to, the following:

1. Temporary roads and paving.
2. Project identification and temporary signs.
3. Field offices.
4. Storage and fabrication sheds.
5. Lifts and hoists.
6. Construction aids and miscellaneous services and facilities.

D. Security and protection facilities include, but are not limited to, the following:

1. Environmental protection.
2. Site enclosure fence.
3. Security enclosure and lockup.
4. Barricades, warning signs, and lights.
5. Temporary enclosures.
6. Temporary emergency egress stair from second floor office area.
7. Temporary partitions.
8. Fire protection.

1.2 USE CHARGES

A. Services furnished by Battelle: The Contractor will not be charged a cost or use fee for any temporary facilities, utilities or services supplied to the Contractor in the performance of this work by Battelle.

B. Services furnished by Others: The Contractor is responsible for all use fees for temporary services assessed directly by the State, City or County relative to this Contract Work.

1.3 REFERENCES, CODES AND STANDARDS

A. All codes and standards, specifications, drawings and datasheets referenced refer to the latest accepted revision and errata as of February 8, 2007. Any conflict between referenced documents shall be brought to the attention of the Buyer for resolution prior to proceeding with the work.

B. National Codes and Standards:

1. American National Standards Institute.
2. ANSI A10.6 Safety Requirements for Construction and Demolition.
3. NFPA International.
4. NFPA 241 Safeguarding Construction, Alteration, and Demolition Operations.
5. NFPA 701 Standard Methods of Fire Tests for Flame Propagation of Textiles and Films.
6. NFPA703, Standard for Fire Retardant–Treated Wood and Fire-Retardant Coatings.

1.4 QUALITY ASSURANCE

A. Standards: Comply with ANSI A10.6, NECA's "Temporary Electrical Facilities," and NFPA 241, “Standard for Safeguarding Construction, Alteration & Demolition 0perations.

B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

1.5 PROJECT CONDITIONS

A. Temporary Use of Permanent Facilities: Installer of each permanent service shall assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Battelle’s acceptance, regardless of previously assigned responsibilities.

B. Conditions of Use: The following conditions apply to use of temporary services and facilities by all parties engaged in the Work:

1. Keep temporary services and facilities clean and neat.

1.6 Relocate temporary services and facilities as required by progress of the Work.

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT

A. Suitable for use intended: Provide materials and equipment suitable for use intended. In general, materials shall be new materials. Equipment shall be in good operating condition with current safety and operational checks performed.

1. Undamaged, previously used materials in serviceable condition may be used if approved by Battelle.

2. Exposed lumber and plywood shall be painted with exterior-grade, acrylic-latex emulsion over exterior primer.

3. Interior walls shall be painted with two coats of interior latex-flat wall paint.

4. Roofs shall be covered with asphalt shingles or roll roofing.

5. Fire Extinguishers: Minimum 10 lbs ABC dry chemical.

B. Self-Contained Toilet Units: Single-occupant units of chemical or aerated re-circulation type; vented; fully enclosed with a glass-fiber-reinforced polyester shell or similar nonabsorbent material.

C. Heating Equipment: Temporary heating system shall be a vented, self-contained electric, liquefied-propane gas (LPG) or fuel oil heater with individual space thermostatic control.

1. Electric heaters shall be used for all applications unless the required power supply is not available.

2. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.

3. Heating Units: Listed and labeled, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use for type of fuel being consumed.

D. Electrical Outlets: Properly configured, NEMA-polarized outlets to prevent insertion of 110- to 120-V plugs into higher-voltage outlets; equipped with ground-fault circuit interrupters, reset button, and pilot light.

E. Power Distribution System Circuits: Where permitted and overhead and exposed for surveillance, wiring circuits, not exceeding 125-V ac, 20-A rating, and lighting circuits may be nonmetallic sheathed cable.

F. Fire Retardant Plastic Sheeting: Materials shall meet the performance criteria of NFPA 701 Method 2 and the material containers shall be labeled to show compliance with the test criteria.

G. Fire Retardant Treated Wood: Materials shall meet the performance criteria of NFPA 703. If treated by contractor, the treatment material containers shall be labeled to show compliance with the test criteria. Where fire retardant treated wood is exposed to the weather, it shall be further identified to indicate that there is no increase in the listed flame spread classification when subjected to ASTM D 2898-Standard Method for Accelerated Weathering of Fire Retardant Treated Wood for Fire Testing.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required.

B. Provide each facility ready for use when needed to avoid delay. Maintain and modify as required. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.2 TEMPORARY UTILITY INSTALLATION

A. General: Engage appropriate local utility company to install temporary service or connect to existing service. Where utility company provides only part of the service, provide the remainder with matching, compatible materials and equipment. Comply with utility company recommendations.

B. Water Service: Use of Battelle's existing water service facilities will be permitted, as long as facilities are cleaned and maintained in a condition acceptable to Battelle. At Substantial Completion, restore these facilities to condition existing before initial use.

1. Provide rubber hoses as necessary to serve Project site.
2. As soon as water is required at each level, extend service to form a temporary water- and fire-protection standpipe. Provide distribution piping. Space outlets so water can be reached with a 100-foot hose. Provide one hose at each outlet.
3. Where installations below an outlet might be damaged by spillage or leakage, provide a drip pan of suitable size to minimize water damage. Drain accumulated water promptly from pans.

C. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking-water fixtures. Comply with regulations and health codes for type, number, location, operation, and maintenance of fixtures and facilities.

1. Disposable Supplies: Provide toilet tissue, paper towels, paper cups, and similar disposable materials for each facility. Maintain adequate supply. Provide covered waste containers for disposal of used material.
2. Toilets: Use of Battelle's existing toilet facilities is subject to prior approval. When use of Battelle’s toilets is permitted, Contractor will ensure that facilities are cleaned and maintained in a condition acceptable to Battelle. At Substantial Completion, restore these facilities to condition existing before initial use.
3. Wash Facilities: Install wash facilities supplied with potable water at convenient locations for personnel who handle materials that require wash up. Dispose of drainage properly. Supply cleaning compounds appropriate for each type of material handled.

a. Provide safety showers, eyewash fountains, and similar facilities for convenience, safety, and sanitation of personnel.

4. Drinking-Water Facilities: Provide bottled-water, drinking-water units.

a. Where power is accessible, provide electric water coolers to maintain dispensed water temperature at 45 to 55 deg F.

5. Locate toilets and drinking-water fixtures so personnel need not walk more than two stories vertically or 200 feet horizontally to facilities.

D. Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment from that specified that will not have a harmful effect on completed installations or elements being installed.

1. Maintain a minimum temperature of 50 deg F in permanently enclosed portions of building for normal construction activities, and 65 deg F for finishing activities and areas where finished Work has been installed.

E. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment from that specified that would not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.

F. Electric Power Service: Provide weatherproof, grounded electric power service and distribution system of sufficient size, capacity, and power characteristics during construction period. Include meters, transformers, overload-protected disconnecting means, automatic ground-fault interrupters, and main distribution switchgear.

1. Install electric power service underground, unless overhead service must be used.
2. Install power distribution wiring overhead and rise vertically where least exposed to damage.
3. Connect temporary service to Battelle's existing power source, as directed by electric company officials.

G. Electric Power Service: Use of Battelle's existing electric power service will be permitted, as long as equipment is maintained in a condition acceptable to Battelle.

H. Electric Distribution: Provide receptacle outlets adequate for connection of power tools and equipment.

1. Provide waterproof connectors to connect separate lengths of electrical power cords if single lengths will not reach areas where construction activities are in progress. Do not exceed safe length-voltage ratio.
2. Provide metal conduit enclosures or boxes for wiring devices.

I. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations and traffic conditions.

1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.

2. Install exterior-yard site lighting that will provide adequate illumination for construction operations, traffic conditions, and signage visibility when the Work is being performed.
3. Install lighting for Project identification sign.

a. Telephone Service: Provide temporary telephone service throughout construction period for common-use facilities used by all personnel engaged in construction activities.

3.3 SUPPORT FACILITIES INSTALLATION

A. General: Comply with the following:

1. Locate field offices, storage sheds, sanitary facilities, and other temporary construction and support facilities for easy access.
2. Provide noncombustible construction for offices, shops, and sheds located within construction area or within 30 feet of building lines.

    a. Comply with NFPA 241.
    b. Battelle shall approve such structure.

3. Maintain support facilities until near Substantial Completion. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Battelle.

B. Temporary Roads and Paved Areas: Construct and maintain temporary roads and paved areas adequate to support loads and to withstand exposure to traffic during construction period. Locate temporary roads and paved areas within construction limits indicated on Drawings.

1. Provide a reasonably level, graded, well-drained sub-grade of satisfactory soil material, compacted to not less than 95 percent of maximum dry density in the top 6 inches.
2. Provide gravel-paving course of sub-base material not less than 3 inches thick; roller compacted to a level, smooth, dense surface.
3. Provide dust-control treatment that is nonpolluting and non-tracking. Reapply treatment as required to minimize dust.

C. Traffic Controls: Provide temporary traffic controls at junction of temporary roads with public roads. Include warning signs for public traffic and "STOP" signs for entrance onto public roads. Comply with requirements of authorities having jurisdiction.

D. Project Identification and Temporary Signs: Prepare Project identification and other signs in sizes indicated. Install signs where indicated to inform public and persons seeking entrance to Project. Do not permit installation of unauthorized signs.

E. Janitorial Services: Provide janitorial services on a daily basis for temporary offices, first-aid stations, toilets, wash facilities, lunchrooms, and similar areas.

F. Common-Use Field Office:

1. A field office, at or on the PNNL Site is not required for this contract. However, the Contractor shall maintain all contract original files and all files or records generated during performance of this contract at a suitable location within a 30-minute driving distance, (not to exceed 20 miles) of Battelle’s research Operations Building (ROB). Project Records shall be maintained in a manner that facilitates expedient review of the files.

2. Contractor is not allowed to use facilities provided for their use by Battelle or DOE on other contracts without Battelle approval. Approval may include monetary consideration if Battelle or DOE is currently paying any site or utility fees related to the Contractor's facility.

G. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment involved, including temporary utility services. Sheds may be open shelters or fully enclosed spaces within building or elsewhere on-site.

H. Lifts and Hoists: Provide facilities for hoisting materials and personnel. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Site Enclosure Fence: If required, locate a site enclosure fence where indicated on the drawings, or enclose entire Project site or portion determined sufficient to accommodate construction operations. Install in a manner that will prevent people from easily entering site except by entrance gates.

1. Set fence posts in compacted mixture of gravel and earth or in concrete bases.
2. Provide gates in sizes and at locations necessary to accommodate delivery vehicles and other construction operations.

B. Barricades, Warning Signs, and Lights: Comply with standards and code requirements for erecting structurally adequate barricades. Paint with appropriate colors, graphics, and warning signs to inform personnel and public of possible hazard. Where appropriate and needed, provide lighting, including flashing red or amber lights.

1. For safety barriers, sidewalk bridges, and similar uses, provide minimum 5/8-inch thick exterior fire-retardant treated plywood.

C. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weather tight enclosure for building exterior. All wood or plastic sheeting shall be of the fire-retardant type.

1. Where heating or cooling is needed and permanent enclosure is not complete, provide insulated temporary enclosures. Coordinate enclosure with ventilating and material drying or curing requirements to avoid dangerous conditions and effects.
2. Vertical Openings: Close openings of 25 sq. ft. or less with fire-retardant treated plywood or similar materials.
3. Horizontal Openings: Close openings in floor or roof decks and horizontal surfaces with load-bearing, fire-retardant treated wood or metal-framed construction.
4. Install fire-retardant treated tarpaulins or fire-retardant treated plastic sheeting securely using fire-retardant treated wood framing and other materials.
5. Temporary enclosures shall be fire-retardant treated wood or metal-framed construction, use fire-retardant treated material or plastic for main sheathing.

D. Temporary Stairs: Provide temporary emergency egress stairs from second floor office area. Coordinate location with Buyer and install prior to removal of existing exterior steel stairs at west side of building. Provide temporary steel exit door with frame and fire exit hardware for egress from office area to temporary stairs. Comply with code requirements for structurally adequacy and egress width, stair rise and run dimensions, guards and handrails.

E. Temporary Partitions: Erect and maintain fire retardant dust control partitions and temporary enclosures to limit dust and dirt migration and to separate areas from fumes and noise.

F. Temporary Fire Protection: Until fire-protection needs are supplied by permanent facilities, install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241.

1. Provide fire extinguishers, installed on walls on mounting brackets, visible and accessible from space being served, some installations may require a sign mounted above.

   a. Locate fire extinguishers where convenient and effective for their intended purpose; provide not less than one extinguisher on each floor at or near each usable stairwell.

   b. Additional extinguishers may be needed for locations where open flame, torch cutting, welding or grinding operations are performed.

2. Store combustible materials in containers in fire-safe locations.

3. Maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire-protection facilities, stairways, and other access routes for firefighting. Prohibit smoking in any Battelle buildings.

4. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition.

5. Permanent Fire Protection: At earliest feasible date in each area of Project, complete installation of permanent fire-protection facility, including connected services, and place into operation and use. Instruct key personnel on use of facilities.

6. Develop and supervise an overall fire-prevention and first-aid fire-protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.

3.5 OPERATION, TERMINATION, AND REMOVAL

A. Maintenance: Maintain facilities in good operating condition until removal. Protect from damage caused by freezing temperatures and similar elements.

1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.

2. Prevent water-filled piping from freezing. Maintain markers for underground lines. Protect from damage during excavation operations.

B. Temporary Facility Changeover: Except for using permanent fire protections as soon as available, do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.

C. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

1. Materials and facilities that constitute temporary facilities are the property of Contractor.
2. Remove temporary paving not intended for or acceptable for integration into permanent paving. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.
3. At Substantial Completion, clean and renovate permanent facilities used during construction period.

END OF SECTION 015000

SECTION 016000 - SAFETY AND HEALTH

PART 1 - GENERAL

1.1 CONTRACTOR RESPONSIBILITY

A. The Contractor shall obtain all required permits for work to be performed. The Contractor shall assume full responsibility and liability for compliance with all applicable Codes, Standards, Regulations and Statutes pertaining to the health and safety of personnel during execution of the Work, and shall hold Battelle and the Government harmless for any action or omission on the Contractor's part, or that of the Contractor's employees or subcontractors, that results in fines, penalties, illness, injury or death.

1. Contractor Environment Safety and Health (CESH) Program: The Contractor shall comply with Battelle's 10CFR851 DOE approved Safety and Health Program and shall confirm in writing that it will adopt Battelle's CESH Program as its own.
2. Contractor shall download and utilize the current revision of the CESH Manual located at http//www.pnl.gov/contracts/esh-procedures/. Maintain on (1) copy of the CESH at the Battelle job site for Contractor personnel reference.

1.2 COMPLIANCE WITH REGULATIONS

A. References: In addition to references in the Construction General Provisions, the following Codes, Standards, Regulations and Statutes designate and define hazardous materials and conditions, and establish procedures for handling these materials and conditions. Omission of any code, regulation, or statutory requirement in this section does not remove any obligation or legal requirement on the part of the Contractor to comply with all legal requirements for the location of the work.

1. Code of Federal Regulations (CFR).

    a. 10 CFR 851: Worker Safety and Health Program.
    b. 29 CFR, Part 1910: Occupational Safety and Health Administration (OSHA) General Industry and Health Standards.
    c. 29 CFR, Part 1926: OSHA Construction Industry Standards.
    d. 40 CFR, Part 61: National Emission Standards for Hazardous Air Pollutants.
    e. 40 CFR, Part 261: Environmental Protection Agency (EPA) Characteristics of Hazardous Waste.
    f. 40 CFR, Part 761, EPA Polychlorinated Biphenyls (PCBs), Manufacturing, Processing, Distribution in Commerce and Use Prohibitions.
    g. 40 CFR, Part 763: EPA Asbestos.

2. Washington Administrative Code (WAC).

    a. Chapter 296-24 WAC, General Safety and Health Standards
    b. Chapter 296-27, Record Keeping and Reporting
    c. Chapter 296-32, Safety Standards for Telecommunications

d. Chapter 296-36, Safety Standards – Compressed Air
e. Chapter 296-43, Heating Installations – Cable, Radiant, Soil, etc.
f. Chapter 296-45, Safety Standards for Electrical Workers
g. Chapter 296-46A, Safety Standards – Installing Electric Wires and Equipment Administrative Rules
h. Chapter 296-62, General Occupational Health Standards
i. Chapter 296-65, Asbestos Removal and Encapsulation
j. Chapter 296-67, Safety Standards for Process Safety Management of Highly Hazardous Chemicals
k. Chapter 296-155, Safety Standards for Construction Work
l. Chapter 296-800, Safety and Health Core Rules
m. Chapter 173-303, Dangerous Waste Regulations

3. National Fire Protection Association (NFPA).

a. NFPA 70, National Electric Code
b. NFPA 70E, Standard for Electrical Safety in the Work Place
c. NFPA 241 Standard for Safeguarding Construction Alteration and Demolition, 2000 Edition.

B. Conflicts: In case of a conflict between applicable regulations, the more stringent requirements shall apply.

1.3 SUBMITTALS

A. Letter of Confirmation: The Contractor shall submit a letter confirming it will adopt the Battelle CESH Program as its own for contract work.

B. Job Safety Analysis (JSA): Contractor shall submit a JSA(s) that addresses work to be performed before commencing any work activities on Site.

C. Heavy Equipment: Prior to mobilizing heavy equipment on Site, submit a letter stating that Heavy Equipment brought on site meets all applicable federal and state safety codes and has been inspected by a qualified person. Specify if equipment is owned by contractor or rented. If rented, name the rental company.

D. Declaration of Key Supervisor(s). Key Supervisors include as a minimum the Contractors Job site Superintendent and the Site Safety Supervisor. Prior to on-Site work, Contractor shall declare its key supervisor(s) and submit documentation to demonstrate the individuals are adequately qualified to supervise the contract Work. The Site Safety Supervisor must meet the following minimum qualifications:

1. Have performed as Key Supervisor on minimum of two construction projects at Hanford and/or PNNL.
2. Safety training in construction through seminars, workshops, conferences, educational courses, etc.
3. 10-Hour OSHA Construction course
4. Knowledge of CFR, Title 29, Part 1910, Occupational Safety and Health Standards
5. Knowledge of CFR, Title 29, Part 1926, Safety and Health Regulations for Construction
6. Knowledge of CFR, Title 10, Part 851, Worker Safety and Health Program

E. Crane Operator Certification: Submit copies of crane operator(s) National Commission for the Certification of Crane Operators (NCCCO) before allowing operators to operate cranes on Site.

F. Hoisting and Rigging: Submit qualifications/training records of individuals that will be engaged in hoisting and rigging activities before allowing individuals to perform hoisting and rigging activities on Site.

G. Lift Plan: Submit Lift Plan(s) for review as required prior to lifting.

H. Forklift Operator Qualifications: Submit qualifications/training records for operators of forklifts prior to using forklifts on Site.

I. Electrical Qualifications: Submit a valid Washington State Electrician Journeyman Certificate for individuals performing electrical work.

1.4 KEY SUPERVISOR(S)

A. Jobsite Superintendent

1. The Jobsite Superintendent or qualified designee shall be present on site (PNNL Richland Campus) during the performance of fieldwork to oversee and coordinate the daily work activities. The Jobsite Superintendent shall be identified as the designated line management representative responsible for Contractor and sub-tier contractor's employees and empowered by Contractor to take immediate action to correct unsafe conditions/acts, and other deficiencies identified during inspections.

2. The Jobsite Superintendent shall have a thorough knowledge of construction industry safety standards established by Federal and State regulations and shall provide documentation that they have attended a 10 hour OSHA Construction Course within the last three (3) years. This individual shall have the authority and responsibility to identify and correct hazardous and unsafe conditions, acts and non-compliances.

3. The Jobsite Superintendent shall ensure that the Site Safety Supervisor is fully engaged and empowered to oversee and implement the CESH Program requirements.

4. Copies of the following documents, when applicable, shall be maintained at the jobsite for Battelle review; safety inspections, employee orientations, employee training records, weekly and monthly safety meeting records, equipment inspections, and competent person designations.

B. SITE SAFETY SUPERVISOR

1. The Safety Supervisor(s) must be on site during the performance of all fieldwork and shall be responsible for oversight of Contractor's and sub-tier contractor's implementation of the CESH Program.

2. The Safety Supervisor(s) shall be responsible for implementation of the CESH Program and ensuring job-site safety requirements and procedures are being accomplished, to include: conducting employee training; performing safety inspections of work; conducting weekly safety meetings with craft and sub-tier employees; and providing monthly report to Battelle documenting safety activities. The Safety Supervisor will also be responsible for a continuing survey/trending analysis of Contractor's operations, to ensure that probable causes

of injury and accident are controlled and the operating equipment, and facilities are used, inspected, and maintained as required by applicable safety and health regulations.

3. The Safety Supervisor designation and responsibility may be shared with responsibilities and designation of the Jobsite Superintendent if the Jobsite Superintendent meets the minimum Safety Supervisor qualification requirements.

1.5 SAFE WORK COMMUNICATION

A. Incorporating Battelle Job Planning Package. Battelle will provide the Contractor with a Battelle Job Planning Package (JPP). The JPP will identify the phase of work to be performed, permits, training/qualifications, special tools or materials, pre- and post-notification requirements, pre- and post-job meetings, system/equipment configuration and verification, outages and/or worker safety hazards. The JPP shall be incorporated directly, or by reference, into the Contractor’s Safety and Health Program.

B. Preconstruction Safety Meeting. Prior to commencing construction, representatives of the Contractor’s management, including the General Superintendent and Site Safety Supervisor, shall meet with Battelle for the purpose of reviewing the Contract's Safety and Health requirements.

1. The Contractor's Safety and Health Program shall be reviewed, and implementation of any Battelle and Hanford Site Safety and Health provisions pertinent to the Work shall be discussed.
2. The Contractor shall advise Battelle of any special safety restrictions it has established so that Battelle and other Project or Site personnel can be notified of these restrictions.
3. No later than three (3) calendar days after the Preconstruction Safety Meeting, the Contractor shall distribute minutes of the meeting to Battelle for information and record.
4. Battelle and the Contractor shall walk down the construction site prior to commencing work.

C. Monthly Safety Meeting. Contractor’s Site Safety Supervisor shall conduct a monthly meeting with Contractor employees (including subcontractors) to review work hazards and controls, and to address particular requirements associated with work in progress and work upcoming. The meeting may also be used for training to applicable requirements identified in the CESH Manual. Contractor shall record minutes of the meeting and transmit to Battelle for information and record along with signed roster of the individuals in attendance.

D. Weekly Safety Meeting. Contractor’s Management and Key Supervisor shall conduct a weekly meeting with Contractor employees (including subcontractors) to review work hazards and controls, and to address particular requirements associated with work in progress and work upcoming. The meeting may also be used for training to applicable requirements identified in the Contractor’s Safety and Health Program. Contractor shall record minutes of the meeting and transmit to Battelle for information and record.

E. Employee Orientation. All new employees to the project shall be required to attend an initial orientation given by the Contractor’s Site Safety Supervisor. This orientation shall include the site specific safety requirements (i.e. training, JSA, injury reporting, emergency contact number, JPP, etc.). Minimum Personal Protective Equipment (PPE) requirements for employees to work on Site include: safety glasses, ankle high boots and high visibility vests or clothing.

F. Tool Box Meeting. Contractor's Management and Key Supervisor shall conduct a daily "Tool Box" meeting to review specific work operations to be performed that day, ensure that the Job Hazard Analysis adequately addresses hazards and controls, and that employees possess adequate knowledge of the requirements to perform the work.

G. Job Safety Analysis. All work sequences, steps and processes shall be evaluated for the hazards the activity presents to employees, systems, services, buildings, structures and/or the environment, and shall provide tools, controls and adequate training to perform such work safely. Contractor shall document the analysis of identified hazards and the subsequent worker notification and training. Items addressed in the JSA shall include, but not limited to the following safety issues:

1. Barricades and Signs
2. Fire Prevention
3. Hazardous Materials and Communication
4. Concrete Health Hazards
5. Hoisting and Rigging
6. Fall Protection
7. Confined Space Entry
8. Ladders
9. Painting
10. Power and Hand Tools
11. Welding and Cutting
12. Heat/Cold Stress
13. Personal Protective Equipment
14. Aerial Lifts
15. Asbestos Abatement
16. Scaffolds
17. Lockout/Tagout
18. Electrical Safety
19. Stop Work Authority
20. System Outages (utilities, fire protection, & communications)
21. Respiratory Protection
22. Mechanized Equipment
23. Excavation
24. Pressure Testing

1.6 GENERAL TRAINING (BY CONTRACTOR)

A. The Contractor is required to provide proof of training/certification for employees whose work/job description would require the following safety training courses. The training listed below is to be provided by the Contractor, and is solely at the Contractor's expense:

1. Aerial Lift Operator Training
2. Crane Operation
3. Rigging – Initial and Advanced
4. Heavy Equipment Operation
5. Electrical Worker Safety Training
6. Fall Protection Training
7. Forklift Training

8. Scaffolding Erector
9. Scaffolding Inspector
10. Scaffolding User
11. Ladder Safety
12. Confined Space Training
13. Powder Actuated Fastener Training
14. Excavation Competent Person Training
15. Hazard Communication
16. PNNL Hot Work Fire Watch (and hot work permit)
17. Fire Extinguisher
18. First Aid Provider
19. Hearing Protection
20. Blood Borne Pathogens
21. Personnel Protective Equipment
22. Respiratory Protection

1.7 EMERGENCY NOTIFICATIONS

A. Post emergency first aid information and Battelle and Hanford Site emergency Telephone Numbers at the work site.

ON-SITE Emergency (Police/Fire/Rescue) 375-2400
On-Site is defined as all Battelle Facilities and areas north of 2400 Stevens
OFF-SITE Emergency (Police/Fire/Rescue) .....Dial 911

1.8 MEDICAL FIRST AID

A. Medical Provider: The Contractor will establish and provide comprehensive occupational medical services to its employees and each of its lower-tier employees as described in the Construction General Provisions.

1.9 EMERGENCY SUSPENSION OF WORK

A. When notified of non-compliance with the safety or health provisions of the Contract, immediately correct the unsafe or unhealthy condition.

1. If the Contractor fails to comply promptly, all or part of the work will be stopped by notice from Battelle.
2. When, in the opinion of and by notice given by Battelle, the Contractor has taken satisfactory corrective action, work may resume.
3. The Contractor shall not be allowed any extension of time or compensation for damages in connection with a work stoppage for an unsafe or unhealthy condition.

1.10 PROTECTION OF PERSONNEL AND EQUIPMENT

A. Take all necessary precautions to prevent injury to Contractor employees, Battelle, the public, or damage to property of others or the environment. The public includes all persons not employed by the Contractor or a subcontractor.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EMERGENCY RESPONSE

A. Battelle will provide emergency response for situations arising on the Site as noted in paragraph 1.7.A above. All injuries, accidents and incidents shall be reported to Battelle's Construction Manager, including fires that are extinguished without causing damage.

3.2 INTEGRATED SAFETY MANAGEMENT SYSTEM

A. Consistent with the requirements of 10 CFR 851, it is Battelle's expectation that Contractors and their Subcontractors will plan and perform work in accordance with Integrated Safety Management System principles – workers participating in work planning: identifying hazards and proposed controls, methods of performing work, and providing feedback at job task completion. Contractor shall provide evidence of using these work planning principles upon request.

3.3 DAILY WORK PLANNING

A. The Contractor is expected to brief all employees and subcontractor employees daily on the work activities and associated hazards planned for each day. This is best accomplished by supervisors meeting prior to the morning pre-job briefing and PNNL coordinating and planning interdisciplinary work activities and then passing the information on to the general employees at their pre-job briefing.

3.4 EXCAVATION

A. Daily inspections of excavation, the adjacent areas, and protective systems will be made by a competent person for evidence of a situation that could result in possible cave-ins, indications of failure of protective systems, hazardous atmospheres, or other hazardous conditions. An inspection shall be conducted by the competent person prior to the start of work and as needed throughout the shift. Inspections must also be made after every rainstorm or other hazard-increasing occurrence if employee exposure can be reasonably anticipated.

B. The location of utility installations, such as sewer, telephone, fuel, electric, water lines, or any other underground installations that reasonably may be expected to be encountered during excavation work, must be located prior to performing excavation work. Before excavating, obtain an excavation permit from Battelle's Construction Manager.

C. The exact location(s) of the underground utilities must be determined by safe and acceptable means.

D. Field markings that identify utility locations must be maintained throughout excavation activities.

E. Excavate by hand within a 5-foot radius of a known or suspected underground utility. Use a non-conductive shovel or vacuum-excavation within a 5-foot radius of an energized, direct-buried cable. Wear protective, insulated gloves, rated for the potential voltage when working near energized cables.

F. While the excavation is open, the underground utilities must be protected, supported, or removed as necessary.

G. The area of the excavation needs to be appropriately barricaded to prevent unauthorized or inadvertent access.

3.5 SAFETY INSPECTIONS

A. The Contractor and its subcontractors will be required to participate in weekly work site walk-through inspections. Participants for the walk-through include the Site Safety Supervisor, Jobsite Superintendent, other Contractor/Subcontractor management and representative craft employees.

3.6 WOKER SAFETY – WEATHER CONDITIONS

A. To insure worker safety, work or portions of work may be temporarily and incrementally shut down due to high winds, lighting, or other inclement weather as determined by Battelle. Contractor will not be additionally compensated in terms of cost or schedule for weather related shutdowns. Battelle will issue weather warnings via radio, telephone, public announcement, or in person. The Contractor shall ensure that all contractor and subcontractor personnel are apprised of the warnings and take the required actions as stated below:

1. Sustained winds greater than 15 mph – the necessity for crane operations will be closely scrutinized.
2. Sustained winds greater than 25 mph and/or gusts greater than 40 mph – all crane activities must cease and be secured. All loose outdoor material shall be secured. The Contractor's safety representative shall evaluate work on roofs or elevated work surfaces before continuing. All personnel working outdoors are required to wear safety goggles. Depending on dust hazards, work may be stopped. Personnel may be directed to shelter.
3. Sustained winds greater than 30 mph and/or gusts greater than 45 mph – all outdoor work activities may be stopped. Personnel may be directed to shelter.
4. Sustained winds greater than 50 mph – outdoor work activities will be curtailed and limited to those approved by Battelle and Contractor's Safety Representative. Personnel will be directed to shelter. Site closure may be implemented and all work activities ceased.
5. Thunderstorm/lighting advisory based on lighting activity within a 30 mile radius of the Site – Contractor personnel shall not work on roofs or elevated surfaces. Personnel shall stay away from equipment such as drilling rigs, cranes, boom trucks, or elevated work platforms. These protective measures shall remain in place until Battelle cancels the warning.

6. Contractor shall be responsible to provide snow removal and ensure safe walking and transfer conditions for walkways and access points around all Site offices and work areas and the job-site within the project boundaries.
7. In response to winter storm conditions, Battelle may close the Site. If so, Battelle will make appropriate announcements and coordinate closures or early dismissals.

3.7 LIFT PLAN DETERMINATION

A. Battelle will make determinations as to when a “lift” requires a “Lift Plan”. A lift would require a Lift Plan under any of the following circumstances:

1. If the item being lifted were to be damaged or upset, it could result in a release of hazardous material to the environment which would exceed the established Permissible Environmental Limits (PEL).
2. The item being lifted is unique and, if damaged, would be irreplaceable or not repairable and is vital to a system, facility, or project operation.
3. The cost to replace or repair the item being lifted, or the delay in operations of having the item damaged would have a negative impact on facility, organizational, or budget to the extent that it would affect program commitments.
4. The item, although non-critical, is to be lifted above or in close proximity to a critical item or component.
5. The load being lifted is 95% or more of a crane’s chart rating for the maximum radius that will be experienced.
6. Two mobile cranes are lifting the load and the load share equals more than 70% of one crane’s chart rating for the maximum radius that will be experienced.
7. To ensure safe working conditions, Battelle may determine that any lift could require a Lift Plan.

END OF SECTION 016000

SECTION 017000 - ENGINEERING, LAYOUT AND INSTALLATION

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. General installation of products.
3. Coordination of Battelle-installed products.
4. Progress cleaning.
5. Starting and adjusting.
6. Protection of installed construction.
7. Correction of the Work.

1.2 SUBMITTALS

A. Not Used.

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.

1. Before construction, verify the location and points of connection of utility services.

B. Existing Utilities: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning site-work, 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.

C. Acceptance of Conditions: Examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.

1. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:

   a. Description of the Work.
   b. List of detrimental conditions, including substrates.
   c. List of unacceptable installation tolerances.
   d. Recommended corrections.

2. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.

3. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.

4. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.

5. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Existing Utility Information: Furnish information to Battelle 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. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Battelle or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:

1. Notify Battelle not less than two (5) days in advance of proposed utility interruptions.
2. Do not proceed with utility interruptions without Battelle's written permission.

C. 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.

D. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.

E. 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 Battelle. 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 Battelle promptly.

B. General: Contractor shall use accepted surveying practices.

1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
2. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
3. Inform installers of lines and levels to which they must comply.
4. Check the location, level and plumb, of every major element as the Work progresses.
5. Notify Battelle when deviations from required lines and levels exceed allowable tolerances.
6. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.

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

D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.

E. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Battelle.

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.
4. Maintain minimum headroom clearance of 8 feet in spaces without a suspended ceiling.

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. Tools and Equipment: Do not use tools or equipment that produces harmful noise levels.

F. 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 Battelle.
2. Allow for building movement, including thermal expansion and contraction.

G. 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.

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

3.5 BATTELLE-INSTALLED PRODUCTS

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

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

1. Construction Schedule: Inform Battelle of Contractor's preferred construction schedule for Battelle's portion of the Work. Adjust construction schedule based on a mutually agreeable timetable. Notify Battelle if changes to schedule are required due to differences in actual construction progress.
2. Pre-installation Conferences: Include Battelle's construction forces at pre-installation conferences covering portions of the Work that are to receive Battelle's work. Attend pre-installation conferences conducted by Battelle's construction forces if portions of the Work depend on Battelle's construction.

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.

1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
2. Do not hold materials more than 7 days during normal weather or 3 days if the temperature is expected to rise above 80 deg F.

3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.

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

C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.

1. Remove liquid spills promptly.
2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.

D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.

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

F. Exposed Surfaces: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

G. Cutting and Patching: Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar materials.

1. Thoroughly clean piping, conduit, and similar features before applying paint or other finishing materials. Restore damaged pipe covering to its original condition.

H. 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.

I. Protective Coatings: Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

J. Completed Work: 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.

K. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.7 STARTING AND ADJUSTING

A. Start equipment and operating components to confirm proper operation. Repair or 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. Repair or replace damaged and malfunctioning controls and equipment.

D. Manufacturer's Field Service: Use only factory-authorized service representative if work is required to inspect field-assembled components and equipment installation.

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 manufacturers 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.

1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.

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

C. Repair damaged coatings on surfaces and equipment.

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

E. Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.

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

END OF SECTION 017000

SECTION 017320 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Demolition and removal of selected portions of building or structure.
2. Demolition and removal of selected site elements.
3. Salvage of existing items to be reused or recycled.

1.2 DEFINITIONS

A. Remove: Detach items from existing construction and legally dispose of them off-site, unless indicated to be removed and salvaged or removed and reinstalled.

B. Remove and Salvage: Detach items from existing construction and deliver them to Battelle.

C. Remove and Reinstall: Detach items from existing construction, prepare them for reuse, and reinstall them where indicated.

D. Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.3 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

B. Standards: Comply with ANSI A10.6 and NFPA 241.

C. Pre-demolition Meeting: Conduct meeting at Project site. Review methods and procedures related to selective demolition including, but not limited to, the following:

1. Inspect and discuss condition of construction to be selectively demolished.
2. Review structural load limitations of existing structure.
3. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
4. Review areas where existing construction is to remain and requires protection.
5. Identify any existing nonconforming items before or during demolition.

1.4 PROJECT CONDITIONS

A. Battelle will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Battelle's operations will not be disrupted.

1. Comply with requirements specified in Division 1 Section "Summary."

B. Conditions existing at time of inspection for bidding purpose will be maintained by Battelle as far as practical.

1. Before selective demolition, Battelle will remove research equipment and associated items (i.e. glassware, chemicals, etc.) so not to impact the contractor from performing the contracted work.

C. Notify Battelle of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

D. Hazardous Materials: Hazardous materials are likely present in construction to be selectively demolished. A Work Place Exposure Assessment (WEA) and Job Planning Package (JPP) are on file for review and use. Examine WEA to become aware of locations where hazardous materials may be present.

1. Do not disturb hazardous materials or items suspected of containing hazardous materials except under procedures specified in the WEA and JPP.

2. Should unexpected hazardous materials be discovered, immediately contact Battelle.

E. Storage or sale of removed items or materials on-site is not permitted.

F. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.

1. Maintain fire-protection facilities in service during selective demolition operations.

2. Outages of fire-protection facilities necessary for demolition of specific items may be scheduled by contacting Battelle 5 days in advance of needed outage.

1.5 WARRANTY

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials so as not to void existing warranties.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that utilities have been disconnected and capped.

B. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.

C. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Battelle.

D. Survey of Existing Conditions: Record existing conditions by use of preconstruction photographs, preconstruction videotapes and templates.

1. Comply with requirements specified in Division 1 Section "Photographic Documentation."

E. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.

3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

A. Existing Services/Systems: Maintain services/systems indicated to remain and protect them against damage during selective demolition operations.

1. Comply with requirements for existing services/systems interruptions specified in Division 1 Section "Summary."

B. Service/System Requirements: Locate, identify, disconnect, and seal or cap off indicated utility services and mechanical/electrical systems serving areas to be selectively demolished.

1. Battelle will arrange to shut off indicated services/systems when requested by Contractor.

2. Arrange to shut off indicated utilities with Battelle.

3. Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing.

3.3 PREPARATION

A. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

1. Comply with requirements for access and protection specified in Division 1 Section "Temporary Facilities and Controls."

B. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.

1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.

2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.

3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.

4. Cover and protect furniture, furnishings, and equipment that have not been removed.

5. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Division 1 Section "Temporary Facilities and Controls."

C. Temporary Shoring: Provide and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.

1. Strengthen or add new supports when required during progress of selective demolition.

3.4 SELECTIVE DEMOLITION, GENERAL

A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:

1. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.

2. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.

3. Do not use cutting torches.

4. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.

5. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.

6. Dispose of demolished items and materials promptly.

B. Removed and Salvaged Items:

1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers.
3. Store items in a secure area until delivery to Battelle.
4. Transport items to Battelle's storage area designated by Battelle.
5. Protect items from damage during transport and storage.

C. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition

3.5 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

A. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, then remove masonry between saw cuts.

B. Repair damage caused by demolition activities. Restore surface coatings and paints to as found conditions.

3.6 DISPOSAL OF DEMOLISHED MATERIALS

A. All waste items generated during the project shall be managed in accordance with the requirements of general specification 17600 - Environmental Protection and Waste Management

3.7 CLEANING

A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

END OF SECTION 017320

SECTION 017600

ENVIRONMENTAL PROTECTION AND WASTE MANAGEMET

PART 1 - GENERAL

1.1 SUMMARY

A. This section provides requirements for environmental protection and waste management. It also highlights key applicable requirements and best-management practices described in the 40 CFR (Code of Federal Regulations), Washington Administrative Codes (WAC), Benton Clean Air Agency (BCAA) and Olympic Region Clean Air Agency (OCAA) air regulations, and Washington State Department of Ecology (Ecology) guidance regarding environmental and waste management compliance. Please note that this plan does not provide comprehensive environmental requirements. It is the contractor's responsibility to determine project-specific requirements on case-by-case basis.

1.2 DEFINITIONS

A. Construction Debris—solid waste, largely inert, resulting from the demolition or razing of buildings, roads, and other man-made structures. Demolition waste consists of, but is not limited to, concrete, brick, bituminous concrete, wood and masonry, roofing and roofing insulation, steel, and minor amounts of other metals like copper.

B. Battelle Representative—the primary Battelle representative at the construction or demolition site is the Construction Manager. Other Battelle representatives may include the Environmental Compliance Representative (ECR) or the waste management Field Service Representative (FSR).

C. Demolition—The wrecking or taking out of any load-supporting structural member of a facility together with any related handling operations or the intentional burning of any facility.

D. Hazardous Material—a chemical or substance that is classified as a physical-hazard material or a health-hazard material.

1. A physical-hazard material is a chemical or substance classified as a combustible liquid, explosive, flammable cryogen, flammable gas, flammable liquid, flammable solid, organic peroxide, oxidizer, oxidizing cryogen, pyrophoric substance, or unstable (reactive) or water-reactive material.

2. A health-hazard material is a chemical or substance classified as a toxic, highly toxic, or corrosive material.

3. Examples of hazardous materials include, but are not limited to, paints, solvents, adhesives, lead solder, asbestos and cadmium brazing material.

E. Hazardous Waste or Dangerous Waste—Solid wastes designated by 40 CFR Part 261 or WAC 173-303 and regulated as hazardous and/or mixed waste by the U.S. Environmental Protection Agency (EPA) or the Washington State Department of Ecology).

F. Other Regulated Waste—Waste that is regulated and managed per applicable regulations and U.S. Department of Energy (DOE) Orders. This includes, but is not limited to, polychlorinated biphenyls (PCBs), asbestos, beryllium, radioactive wastes, and radioactive and hazardous (mixed) wastes.

G. Universal Waste – Dangerous wastes including batteries, thermostats, lamps and mercury containing equipment subject to the universal waste requirements of WAC 173-303-573

1.3 REFERENCES

A. Contemporary versions of the following as applicable:

B. 29 CFR 1926.59. 2006. "Hazard Communication." *Code of Federal Regulations*, U.S. Environmental Protection Agency.

C. 33 CFR 330. 2002. "Navigation and Navigable Waters: National Permit Program." *Code of Federal Regulations*, U.S. Environmental Protection Agency

D. 40 CFR 61. 2007. "National Emission Standards for Hazardous Air Pollutants." *Code of Federal Regulations*, U.S. Environmental Protection Agency.

E. 40 CFR 82. 2007. "Protection of Stratospheric Ozone." *Code of Federal Regulations*, U.S. Environmental Protection Agency.

F. 40 CFR 261. 2007. "Identification and Listing of Hazardous Waste." *Code of Federal Regulations*, U.S. Environmental Protection Agency.

G. 40 CFR 262. 2006. "Standards applicable to Generators of Hazardous Waste." *Code of Federal Regulations*, U.S. Environmental Protection Agency.

H. 40 CFR 279. 2006. "Standards for Management of Used Oils." *Code of Federal Regulations*, U.S. Environmental Protection Agency.

I. 40 CFR 761. 2006. "PCB Manufacturing, Processing, Distribution in Commerce, and Use Prohibition." *Code of Federal Regulations*, U.S. Environmental Protection Agency.

J. 49 CFR 172. 2010. "Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response Information, Training Requirements, and Security Plans." *Code of Federal Regulations*, U.S. Department of Transportation.

K. 49 CFR 173. 2010. Shippers-General Requirements for Shipments and Packagings. *Code of Federal Regulations*, U.S. Department of Transportation.

L. 49 CFR Part 177 - Carriage by Public Highway. *Code of Federal Regulations*, U.S. Department of Transportation.

M. 49 CFR Federal Motor Carrier Safety Regulations, *Code of Federal Regulations*, U.S. Department of Transportation.

N. WAC 173-303. 2004. "Dangerous Waste Regulations." *Washington Administrative Code*, Olympia, Washington.

O. WAC 173-200. 1990. "Water Quality Standards for Ground Waters of the State of Washington". *Washington Administrative Code*, Olympia, Washington.

P. WAC 173-218. 2006. "Washington State Department of Ecology Underground Injection Control Program". *Washington Administrative Code*, Olympia, Washington.

Q. WAC 173-220. 2002. "National Pollutant Discharge Elimination System Permit Program". *Washington Administrative Code*, Olympia, Washington.

R. WAC 173-226. 2002. "Waste Discharge General Permit Program." *Washington Administrative Code*, Olympia, Washington.

S. WAC 173-350. 2005. "Minimum Functional Standards for Solid Waste Handling." *Washington Administrative Code*, Olympia, Washington.

T. WAC 173-400, 2009. "General Regulations for Air Pollution Sources." *Washington Administrative Code*, Olympia, Washington.

U. WAC 173-460. 2009. "Controls for New Sources of Toxic Air Pollutants." *Washington Administrative Code*, Olympia, Washington.

V. Benton County Clean Air Agency. 2008. *Regulation 1*, Richland, Washington.

W. Olympic Region Clean Air Agency. 2008. *Regulations 1through 8*, Olympia, Washington

X. National Fire Protection Association (NFPA) 5000. 2006. Quincy, Massachusetts.

Y. Washington Department of Ecology. 2004. *Stormwater Management Manual for Eastern Washington*, Chapter 7—"Construction Stormwater Pollution Prevention." Publication number 03-10-038C, Richland, Washington.

1.4 TRAINING

A. Refer to Division 1 "Summary of Work" for requirements.

1.5 PERMITS

A. Identify and obtain all required permits, and submit any required notices, for contractor activities in accordance with applicable federal, state, and local governing jurisdictions before any construction or demolition activities. Provide copies of permits and notices to the Battelle representative.

B. Conduct all work in accordance with requirements outlined in the issued permits and submitted notices.

C. Immediately report in writing to Battelle any non-compliances or potential non-compliances with the issued permits or notices.

D. Immediately report in writing any complaints by members of the public regarding air emissions to Battelle.

1.6 SUBMITTALS

1. None.

PART 2 - PRODUCT AND MATERIALS

2.1 REQUIREMENT FOR SUSTAINABLE GOODS AND SERVICES

A. Provide environmentally sustainable products in accordance with the General Provision Clause "Sustainable Acquisition Requirements." A request for an exception to the requirement to provide environmentally sustainable goods must be submitted and approved prior to installation.

2.2 SPILL KIT

A. Provide a spill kit at the job site to absorb spilled materials and properly manage spill-cleanup residues. At a minimum, the spill kit will contain the following items: an appropriately sized container with lid, a spill kit identification sign on the container, absorbent pads, absorbent containment pigs, absorbents, shovel, rags, gloves, and safety glasses.

2.3 HAZARDOUS MATERIAL STORAGE

A. Manage hazardous materials and chemical products at the project site in accordance with applicable federal, state, and local laws, manufacturer instructions, fire codes, and general safe practices to prevent accidental discharges to the environment. Close the container when not in use, use secondary containment when applicable, and store materials inside or under shelter. If material must be stored outside, then store in a manner to prevent releases and discharges to the environment.

PART 3 - EXECUTION

3.1 Excavation

A. Excavated earth may be placed back into the original excavations or used as fill onsite.

3.2 Cultural Resource Protection

A. In order to prevent disturbance of culturally significant resources comply with the following:

1. If culturally significant materials are encountered in the work area immediately stop work in the vicinity and notify the Battelle CM for archaeological assessment. Culturally significant materials may include, but are not limited to, items such as bones, shell, artifacts, brick, cans and bottles.

3.3 Biological Resource Protection

A. In order to prevent disturbance of priority animal habitats and protected plant and animal species comply with the following:

1. If nesting birds (e.g., bank swallows), a pair of birds of the same species or a single bird that will not leave the area when disturbed, defensive behaviors (such as flying at workers or strident vocalizations), animal dens, or other wildlife are encountered in the work area (e.g., equipment, facilities, or soil with vertical banks) immediately stop work in the vicinity and notify the Battelle CM for biological assessment.

2. Before disturbing native vegetation verify authorization to proceed with the Battelle CM.

3.4 Erosion and Sediment Control

A. Implement one or more of the following erosion and sediment control methods before land-disturbing activities.

1. Minimize vehicles tracking sediments on to roads by limiting vehicle access and exit to one route, and stabilize roadway at the access points.

2. Access points shall be stabilized with quarry spall or crushed rock to minimize the tracking of sediment onto public roads.

3. Design, construct, and cut and fill slopes in a manner that minimizes erosion through terracing, reducing slope steepness, roughening surfaces, or other methods.

4. Soil stockpiles must be stabilized and protected with sediment-trapping measures.

5. Perform erosion inspection and sediment controls on a weekly schedule before expected storm events and after each heavy rainfall event.

6. Provide temporary or permanent modifications to surface-terrain gradient (soil or crushed stone berms, sediment retention basins, etc.) to minimize the flow of stormwater into or out of excavated or otherwise disturbed areas.

7. Maintain erosion and sediment-control measures throughout the course of the project and remove at completion of project.

8. Remove accumulated sediment and repairs and/or replacement of storm-damaged or otherwise deteriorated structures.

9. Stabilize disturbed areas as soon as practicable to minimize erosion from rain and wind. Methods of soil stabilization include mulching, using nets or plastic covers, sodding, and surface roughening.

3.5 Dust Control

A. Minimize dust generated by construction operations by one or more of the following methods:

1. Vegetate or mulch areas that will not receive vehicle traffic. Apply gravel or landscaping rock in areas where planting, mulching, or paving is impractical.

2. Clear vegetation only from those areas where immediate activity will take place.

3. Apply water until surface is wet. Repeat as needed. Water applied to the construction site for dust control must not leave the site as surface runoff.

4. Cover piles with wind-impervious fabric.

5. Obtain Battelle approval before using chemical dust suppressants and follow the manufacturer's instructions and cautions regarding handling and application.

3.6 Groundwater Containment

A. Contact Battelle representative when groundwater is encountered during excavation.

B. Pump and contain the water onsite and use engineering controls to prevent runoff.

3.7 Equipment Air Emissions

A. Comply with Benton Clean Air Agency or Olympic Clean Air Agency regulations applicable to the operation of non-road engines and portable and temporary sources of regulated air emissions.

3.8 Non-Hazardous Waste Accumulation

A. Accumulate non-hazardous waste in appropriate containers to prevent nuisance, contamination, dispersal by wind or precipitation, or visual blight.

B. Arrange for periodic collection of non-hazardous waste to prevent excessive accumulation of non-hazardous waste.

C. Refer to Section 3.11, "Waste Minimization and Pollution Prevention," of this provision for management of recyclable material.

3.9 Hazardous Waste Accumulation and Inspection

A. Contact Battelle representative and obtain written approval before establishing an accumulation area for hazardous waste.

3.10 Waste Disposal

A. All hazardous wastes generated by the Subcontractors will be turned over to Battelle for subsequent disposal at Contractor expense, unless other arrangements are authorized in writing by Battelle in advance.

B. Recycle non-hazardous or non-dangerous waste or dispose of it in one of the following Battelle-approved landfills: City of Richland landfill in Richland, Washington (if meeting City of Richland Landfill's waste acceptance criteria); the Finley Buttes Regional Landfill located in Boardman, Oregon; the Roosevelt Landfill located in Roosevelt, Washington; or the Waste Management landfill located in Arlington, Oregon.

C. Dispose of Other Regulated Wastes only at Battelle approved locations.

D. No waste is to be disposed of on Battelle-owned, managed, or leased property unless directed within the contract documents or authorized in writing by Battelle.

E. Comply with BCAA or OCAA regulations regarding prohibitions on open-air burning.

F. All Universal Waste shall be managed by the Contractor in accordance with the requirements of WAC 173-303-573. Dispose of at Battelle approved site and ensure segregation from the municipal waste stream.

3.11 Spill Control and Management

A. Report, immediately, any spill or leaks of materials such as oil, fuel, solvents, paints, coolants, acids, caustics, and equipment leaks to the Battelle Construction Manager. Call 375-2400 if the Battelle Construction Manager is not immediately available. Stop work and contain spills to the extent possible without compromising personnel safety. At the earliest possible time report to Battelle, in writing, the circumstances surrounding the spill event.

B. Prevent liquids such as gasoline, diesel fuel, lubricating oil, or antifreeze from entering the sanitary, process, or storm sewer systems, waterways, drainage ditches, or the ground. Where necessary, implement appropriate control measures, including, but not limited to, the use of physical barriers (plastic or tarps, berms, etc.), secondary containment, and/or absorbent materials to capture leaked or splattered contamination.

C. Waste from cleanup of spills may require being managed as a hazardous waste. The Battelle representative will make this determination.

1. All containerized hazardous cleanup waste will be turned over to Battelle, within 12 hours after the spill cleanup, for subsequent disposal at the Contractor's expense. (Note: Cleanup waste from a gasoline spill is an example of hazardous waste.)

2. The Contractor may dispose of non-hazardous or non-dangerous cleanup waste, as determined by Battelle, at one of the facilities listed in Section 3.8. (Note: Cleanup waste from a motor oil spill is an example of non-regulated waste.)

3.12 Liquid Effluent Management

A. Obtain prior written approval from Battelle for liquid effluent discharged to the ground, sanitary sewer, process sewer, storm sewer, or surface water.

B. Requirements for managing wastewater generated from concrete, asphalt, or saw-cutting and surfacing operations are provided below.

1. Concrete or Asphalt Wastewater:

a. Wash out concrete truck chutes, pumps, and internals only into formed areas awaiting installation of concrete or asphalt.

b. Return unused concrete remaining in the truck or in the pump to the originating batch plant for recycling. For smaller projects, reuse, recycle, or dispose of concrete in a dumpster.

c. Wash hand tools including, but not limited to, screeds, shovels, rakes, floats, trowels, and wheelbarrows only into formed areas awaiting installation of concrete or asphalt.

d. Wash equipment that cannot be easily moved, such as concrete pavers, only in areas that do not directly drain to natural or constructed storm-water conveyances.

e. When no formed areas are available, contain the washwater and leftover product in a lined container. Dispose of contained concrete in a manner that does not violate groundwater or surface-water quality standards.

f. Do not discharge to a storm sewer, surface water, or sanitary sewer.

2. Saw-cutting and Surfacing Operation:

a. Collect material generated as part of a saw-cutting or surfacing operation and dispose of it in a Battelle-approved landfill (see Section 3.8). Saw-cutting and surfacing operations include, but are not limited to, sawing, coring, grinding, roughening, or hydro-demolition.

1) Remove slurry and cuttings on the day they occur, as directed by the Battelle representative.

2) Do not drain slurry, cuttings, or process water to any natural or constructed drainage conveyance including storm sewers, catch basins, or other underground injection control wells, trenches, or ditches.

3) Collected slurry, cutting, or process water can also be placed in a “lined holding pond” for evaporation. Dispose of the dried material as instructed by the Battelle representative.

4) Handle and dispose of cleaning waste material and demolition debris in a manner that does not cause contamination of water.

3.13 Waste Minimization and Pollution Prevention Program

A. Examples of waste minimization and pollution prevention practices are provided below:

1. Material Substitution: Minimize the number of chemicals used to perform the same or similar tasks. Where practical, replace hazardous materials with non-hazardous or less hazardous substitutes.
2. Inventory Reduction: Minimize product inventory to reduce accumulation of partially used and unused materials requiring disposal. Remove partially used lots and unused materials from the worksite at contract completion.
3. Packaging: Minimize packaging brought on worksite. Whenever feasible, return empty containers to vendor.
4. Waste Segregation: Separate wastes to avoid creating additional wastes and mixtures that cannot be recycled, or that would be more difficult to manage.
5. Process Modification: Streamline processes for more efficient operation and less waste generation.

B. Collect, package, and transport recyclable items. Typical recyclable items may include the following items:

1. Aluminum
2. Cardboard
3. Scrap metal
4. Aerosol cans
5. Batteries
6. Scrap wood
7. Used oil
8. Concrete
9. Asphalt
10. Shrubs and trees exceeding 2” caliper in size.

3.14 LEED Recycling and Construction Waste Management

A. Refer to Specification Section 013520 as applicable for project requirements related to LEED.

3.15 Other Regulated Waste

1. To the extent applicable the Contractor shall comply with the Code of Federal Regulations: Title 49, Chapter I, Part 107, and Subchapter C Hazardous Material Regulations; Chapter III, Subchapter B Federal Motor Carrier Safety Regulations.

END OF SECTION 017600

SECTION 017800 - COMPLETION AND TURNOVER

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. Quality Records.
2. Inspection Documents.
3. Contract Submittals.
4. Project Record Documents.
5. Warranties.

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. Include submittal list items not completed or closed.
2. Coordinate with Battelle initiation and approval of Acceptance of Completed Work form. Attach punch list of work to be completed for final acceptance.
3. Deliver tools, spare parts, extra materials, and similar items to location designated by Battelle. Label with manufacturer's name and model number where applicable.
4. Make final changeover of permanent locks and deliver keys to Battelle.
5. Complete startup testing of systems.
6. Submit test/adjust/balance records.
7. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
8. Advise Battelle of changeover in heat and other utilities.
9. Complete final cleaning requirements, including touchup painting. Repair and restore marred exposed finishes to eliminate visual defects.

B. Inspection: Request inspection for Substantial Completion. On receipt of request, Battelle will either proceed with inspection or notify Contractor of unfulfilled requirements. Battelle will prepare the Acceptance of Completed Work form after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Battelle that must be completed or corrected before certificate will be issued.

1. Re-inspection: Request re-inspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.3 FINAL COMPLETION

A. Preliminary Procedures: Before requesting final inspection for determining date of Final Completion, complete the following:

1. Provide a copy of punch list of items to be completed or corrected, endorsed and dated by Battelle's. The copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
2. Instruct Battelle's personnel in operation, adjustment, and maintenance of products, equipment, and systems.

B. Inspection: Request Battelle final inspection for acceptance. On receipt of request, Battelle will either proceed with inspection or notify Contractor of unfulfilled requirements. Battelle will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

1. Re-inspection: Request re-inspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.4 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

A. Preparation: Submit exceptions list two weeks prior to request for substantial completion. 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, separate list by exterior areas, interior areas and general.
2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
3. Include the following information at the top of each page:
    a. Project name.
    b. Contract Number.
    c. Date.
    d. Name of Contractor.
    e. Page number.

1.5 PROJECT RECORD DOCUMENTS

A. Submittals:

1. Record Drawings: Submit one (1) set of marked-up Record Prints.

2. Record Specifications: Submit one (1) copy of Project's Specifications, including addenda and Contract Modifications.

1.6 WARRANTIES

A. Submittal Time: Submit written warranties on request of Battelle 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 Battelle during construction period by separate agreement with Contractor.

C. Organize warranty documents into an orderly sequence with a table of contents.

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 RECORD DRAWINGS

A. Record Prints: Maintain one set of 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.

   a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.

   b. Record data as soon as possible after obtaining it. Record and check the markup before enclosing concealed installations.

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

   a. Changes in dimensions or detail on Drawings.
   b. Locations and depths of underground and/or concealed utilities.
   c. Piping, duct and conduit routing.
   d. Revisions to electrical circuitry.

e. Actual equipment locations.

3. Format:

a. Mark the Contract Drawings or Shop Drawings, whichever is most capable of showing actual physical conditions, completely and accurately. If Shop Drawings are marked, show cross-reference on the Contract Drawings.

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

c. Note Change Order numbers, and similar identification, where applicable.

B. Format: Identify and date each Record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.

1. Record Prints: Organize Record Prints into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.

2. Identification: As follows:

a. Project name.
b. Date.
c. Designation "PROJECT RECORD DRAWINGS."
d. Name of Contractor.

2.2 MISCELLANEOUS RECORD SUBMITTALS

A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.

PART 3 - EXECUTION

3.1 ACCEPTANCE TEST AND START-UP

A. Contractor shall coordinate, manage and conduct an acceptance test as indicated in the technical sections of this specification.

3.2 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 manufacturers written instructions.

1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a portion of Project:

    a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.

        1) Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.

        2) Rake grounds that are neither planted nor paved to a smooth, even-textured surface.

        3) Remove tools, construction equipment, machinery, and surplus material from Project site.

    b. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces. Sweep concrete floors broom clean in unoccupied spaces.

    c. Clean exposed surfaces and finishes (exterior and interior) to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.

        1) Vacuum carpet and similar soft surfaces, removing debris and excess nap; shampoo if visible soil or stains remain.

        2) Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.

        3) Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration. Do not paint over "UL" and similar labels, including mechanical and electrical nameplates.

        4) Wipe surfaces of mechanical and electrical equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.

    d. Clean plumbing, filters, ducts and fixtures

        1) Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.

        2) Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.

        3) Clean ducts, blowers, and coils if units were operated without filters during construction.

4) Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned-out bulbs, and those noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

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

3.3 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.

B. Maintenance of Record Documents and Samples: Maintain Record Documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to Project Record Documents for Battelle reference during normal working hours.

END OF SECTION 017800

SECTION 033000

CAST-IN-PLACE CONCRETE

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 specifies cast-in place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes, for the following:

1. Slabs-on-grade.
2. Concrete equipment housekeeping pads.
3. Concrete coatings.

B. Related Sections include the following:

1. Division 31, Section 312000, “Earth Moving”.

1.3 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume; subject to compliance with requirements.

1.4 SUBMITTALS

A. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

1. If required, indicate amounts of mixing water to be withheld for later addition at Project site.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.

1. Manufacturer certified according to NRMCA’s “Certification of Ready Mixed Concrete Production Facilities.”

B. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from one source, and obtain admixtures through one source from a single manufacturer.

C. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:

1. ACI 301, "Specification for Structural Concrete," Sections 1 through 5.
2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."

1.6 DELIVERY, STORAGE, AND HANDLING

A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage. Avoid damaging coatings on steel reinforcement.

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. Products: Subject to compliance with requirements, provide one of the products specified.

2. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 FORM-FACING MATERIALS

A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.

1. Plywood, metal, or other approved panel materials.

B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.

C. Chamfer Strips: Wood, metal, PVC, or rubber strips, 1 inch x 1 inch.

D. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

1. Formulate form-release agent with rust inhibitor for steel form-facing materials.

2.3 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.

1. Provide ASTM A 615, Grade 60 deformed reinforcing bars typical, unless noted otherwise.

B. Plain-Steel Welded Wire Reinforcement: ASTM A 185, plain, fabricated from as-drawn steel wire into flat sheets.

2.4 REINFORCEMENT ACCESSORIES

A. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:

1. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.

2.5 CONCRETE MATERIALS

A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:

1. Portland Cement: ASTM C 150, Type I/ II, gray. Supplement with either/or of the following, minimum 25% total by weight of cementitous material:

a. Fly Ash: ASTM C 618, Class F.

b. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.

B. Silica Fume: ASTM C 1240, amorphous silica.

C. Normal-Weight Aggregates: ASTM C 33, Class 3M coarse aggregate or better, graded. Provide aggregates from a single source.

1. Maximum Coarse-Aggregate Size: 3/4 inch nominal.

2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

D. Water: ASTM C 94/C 94M and potable.

2.6 ADMIXTURES

A. Air-Entraining Admixture: ASTM C 260.

B. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.

1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.

2. Retarding Admixture: ASTM C 494/C 494M, Type B.

3. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

2.7 CURING METHODS AND MATERIALS

A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.

B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

C. Water: Potable.

D. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, non-dissipating, and compatible with the final floor sealer/hardener.

2.8 CONCRETE SEALER/HARDENER

A. Interior concrete slabs and housekeeping pads: Water based low VOC polymer liquid sealer which penetrates and chemically reacts to harden the surface of the concrete and provide water repellency. Euclid Chemical Company, EUCO Diamond Hard. Prepare the concrete surface and install sealer per the manufacturer’s instructions.

2.9 CONCRETE MIXTURES, GENERAL

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.

B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:

1. Combined Fly Ash or Pozzolan and Ground Granulated Blast-Furnace Slag: 50 percent portland cement minimum, with fly ash or pozzolan not exceeding 25 percent.

C. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.

D. Admixtures: Use admixtures according to manufacturer’s written instructions.

1. Use water-reducing or plasticizing admixture in concrete, as required, for placement and workability.

2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.

3. Use water-reducing admixture as needed in pumped concrete or concrete with a water-cementitious materials ratio below 0.50.

2.10 CONCRETE MIXTURES FOR BUILDING ELEMENTS

A. Slabs-on-Grade and housekeeping pads: Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength: 3000 psi at 28 days.

2. Maximum Water-Cementitious Materials Ratio: 0.40.

3. Slump Limit: 2 - 4 inches.

4. Air Content for concrete exposed to weather only: 6 percent, plus or minus 1.5 percent at point of delivery for 3/4-inch nominal maximum aggregate size.

2.11 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.12 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M, and furnish batch ticket information.

1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 FORMWORK

A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.

B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.

C. Limit concrete surface irregularities, designated by ACI 347R as abrupt or gradual, as follows:

1. Class A, 1/8 inch for smooth-formed finished surfaces.

D. Construct forms tight enough to prevent loss of concrete mortar.

E. Exposed concrete surfaces such as side of housekeeping pads shall be smooth form finished.

F. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.

G. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.

H. Radius exterior corners and edges of permanently exposed concrete.

I. Form any openings or provide sleeves as required in the work. Determine sizes, materials, and locations from trades providing such items.

J. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.

K. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

L. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.2 EMBEDDED ITEMS

A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

1. Install anchor rods, bolts, or studs, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC's "Code of Standard Practice for Steel Buildings and Bridges."

3.3 STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that would reduce bond to concrete.

C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.

D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

E. Install welded wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

3.4 JOINTS

A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.

B. Construction Joints: Joints with existing concrete shall be finished flush with the existing slab.

3.5 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.

B. Do not add water to concrete during delivery, at Project site, or during placement unless approved by the Battelle Construction Manager.

C. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.

1. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.

2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.

3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.

D. Deposit and consolidate concrete for slabs and housekeeping pads in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.

1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.

2. Maintain reinforcement in position on chairs during concrete placement.

3. Screed slab surfaces with a straightedge and strike off to correct elevations.

4. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

5. Finish floor slabs to achieve floor flatness criteria per paragraph 3.9.

E. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

1. When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.

2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.

3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

F. Hot-Weather Placement: Comply with ACI 301 and as follows:

1. Maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.

2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

3.6 FINISHING FORMED SURFACES

A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces not exposed to public view.

B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces exposed to view.

C. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

D. Exposed Edges: Unless shown otherwise, at top of walls, or other formed surfaces with exposed corners, provide a smooth finished 1 inch x 1 inch chamfered edge.

3.7 FINISHING SLABS AND HOUSEKEEPING PADS

A. General: Comply with ACI 302.1R recommendations for screeding, re-straightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Re-straighten, cut down high spots, and fill low spots. Repeat float passes and re-straightening until surface is left with a uniform, smooth, granular texture.

1. Apply float finish to surfaces indicated.

C. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and re-straighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would affect finish tolerance or telegraph through applied coatings.

1. Apply a trowel finish slabs, housekeeping pads, and other surfaces exposed to view.

2. Finish surfaces to the following tolerances, according to ASTM E 1155 for a randomly trafficked floor surface:

a. Specified overall values of flatness, F(F) 35; and of levelness, F(L) 25; with minimum local values of flatness, F(F) 24; and of levelness, F(L) 17; for slabs-on-grade.

3. Finish and measure surface so gap at any point between concrete surface and an unleveled, freestanding, 10-foot long straightedge resting on 2 high spots and placed anywhere on the surface does not exceed 1/4 inch.

3.8 MISCELLANEOUS CONCRETE ITEMS

A. Filling In: Fill in holes and openings left in concrete structures, unless otherwise indicated, after work of other trades is in place. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.

B. Housekeeping pads: If required by other trades, locate and set anchor bolts for equipment at correct elevations, complying with diagrams or templates from the equipment manufacturer.

3.9 CONCRETE PROTECTING AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.

B. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for the remainder of the curing period.

C. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.

D. Cure concrete according to ACI 308.1, by one or a combination of the methods specified in paragraph 2.7.

3.10 LIQUID FLOOR TREATMENTS

A. Interior or Exterior Sealer/hardener Coat: Uniformly apply a continuous coat of compound to hardened concrete according to manufacturer's written instructions.

3.11 CONCRETE SURFACE REPAIRS

A. Defective Concrete: Repair and patch defective areas when approved by the Battelle Construction Manager. Remove and replace concrete that cannot be repaired and patched to the Battelle Construction Manager's approval. Any required repairs must be completed prior to installation of the final sealer/hardener or the sealer/hardener shall be installed over the repair in accordance with the manufacturer's instructions.

B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part portland cement to two and one-half parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.

C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.

1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch in any dimension in solid concrete, but not less than 1 inch in depth. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.

2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.

3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Architect.

D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.

1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.

2. After concrete has cured at least 14 days, correct high areas by grinding.

3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.

4. Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.

5. Repair random cracks and single holes 1 inch or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.

E. Repair materials and installation not specified above may be used, subject to the Battelle Construction Manager’s approval.

END OF SECTION 033000

SECTION 054000

COLD FORMED METAL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
1. Interior wall framing.

1.2 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide cold-formed metal framing capable of withstanding design loads within limits and under conditions indicated.

1. Design Loads:
a. Live Loads: 5 psf

2. Deflection Limits: Design framing systems to withstand design load without deflections greater than the following:

a. Interior Load-Bearing Wall Framing: Horizontal deflection of **1/360** of the wall height under a horizontal load of 5 lbf/sq. ft.

1.3 QUALITY ASSURANCE

A. AISI Specifications and Standards: Comply with AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members" and its "Standard for Cold-Formed Steel Framing - General Provisions."

PART 2 - PRODUCTS

2.1 MATERIALS

A. Steel Sheet: ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of grade as follows:

1. Grade: **ST33H**

2.2 FRAMING ACCESSORIES

A. Fabricate steel-framing accessories from steel sheet, ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of same grade and coating weight used for framing members.

B. Expansion Anchors: Fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 5 times design load, as determined by testing per ASTM E 488 conducted by a qualified independent testing agency.

C. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 10 times design load.

D. Mechanical Fasteners: ASTM C 1513, corrosion-resistant-coated, self-drilling, self-tapping steel drill screws.

1. Head Type: Low-profile head.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Install cold-formed metal framing according to AISI's "Standard for Cold-Formed Steel Framing - General Provisions" and to manufacturer's written instructions unless more stringent requirements are indicated.

B. Install cold-formed metal framing and accessories plumb, square, and true to line, and with connections securely fastened.

C. Install framing members in one-piece lengths.

D. Install temporary bracing and supports to secure framing and support loads comparable in intensity to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.

E. Do not bridge building expansion and control joints with cold-formed metal framing. Independently frame both sides of joints.

F. Fasten hole reinforcing plate over web penetrations that exceed size of manufacturer's standard punched openings.

G. Erection Tolerances: Install cold-formed metal framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:

1. Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

END OF SECTION 054000

SECTION 055000
METAL FABRICATIONS

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. Section Includes:

1. Steel framing and supports for piping, conduit, and mechanical and electrical equipment.

2. Steel framing and supports for applications where framing and supports are not specified in other Sections.

B. Products furnished, but not installed, under this Section:

1. Anchor bolts, steel pipe sleeves, and wedge-type inserts.

C. Related Sections:

1. Division 3, Section 033300, “Cast-In-Place Concrete” for installing anchor bolts, steel pipe sleeves, and wedge-type inserts into concrete.

1.3 SUBMITTALS

A. Shop Drawings: Show fabrication and installation details for metal fabrications.

1. As needed, include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.

B. Welding submittals.

1. Provide certifications for each welder and each weld type used.

2. Provide welding procedure specifications (WPS) and procedure qualification records (PQR) for each weld type specified.

3. No formal third party weld inspection is required. However, see section 1.4 for PNNL internal inspection hold points. Schedule all hold points with the PNNL Construction Manager.

1.4 QUALITY ASSURANCE

A. Welding fabrication and installation shall be in accordance with AWS D1.1-2010.

B. Hold points: All field welds shall be inspected by PNNL Engineering for fit-up prior to welding and upon completion of weld prior to painting. All shop welds shall be inspected by PNNL Engineering prior to painting.

1.5 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of walls, floors, utilities, and other construction contiguous with metal fabrications by field measurements before fabrication.

1.6 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of anchorages. If required, 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.

PART 2 - PRODUCTS

2.1 METALS, GENERAL

A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

2.2 FERROUS METALS

A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

B. Steel Tubing: ASTM A 500, cold-formed steel tubing.

C. Steel Pipe: ASTM A 53/A 53M, standard weight (Schedule 40) unless otherwise indicated.

2.3 FASTENERS

A. General: Unless otherwise indicated, provide Type 304 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.

B. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307; with hex nuts, ASTM A 563, Grade C3; and flat washers.

C. Post-Installed Anchors: Torque-controlled expansion anchors or chemical anchors.

1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, unless otherwise indicated.

2. Material for Exterior Locations and Where Stainless Steel is Indicated: Alloy Group 1 stainless-steel bolts, ASTM F 593, and nuts, ASTM F 594.

2.4 MISCELLANEOUS MATERIALS

A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal welded.

B. Shop Primers: Provide primers that comply with Division 9, Section 099113, “Exterior Painting, “Section 099123, “Interior Painting.”

C. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

D. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.

2.5 FABRICATION, GENERAL

A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

D. Form exposed work with accurate angles and surfaces and straight edges.

E. Weld corners and seams continuously to comply with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.

2. Obtain fusion without undercut or overlap.

3. Remove welding flux immediately.

4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

F. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.

G. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.

2.6 MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.

B. Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.

C. Galvanize miscellaneous framing and supports where indicated.

2.7 MISCELLANEOUS STEEL TRIM

A. Unless otherwise indicated, fabricate units from steel shapes, plates, and bars of profiles shown with continuously welded joints and smooth exposed edges. Miter corners and use concealed field splices where possible.

B. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work.

C. Where noted, provide hot-dip galvanized exterior miscellaneous steel trim.

D. Where noted, provide shop primer and finish painting that complies with Division 9, Section 099113, for exterior metal trim, or Section 099123, for interior painted metal trim.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.

B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.

C. Field Welding: Comply with the following requirements:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.

2. Obtain fusion without undercut or overlap.

3. Remove welding flux immediately.

4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction.

E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete or similar construction.

3.2 INSTALLING MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.

3.3 ADJUSTING AND CLEANING

A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

1. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.

B. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Division 9, Section 099113, “Exterior Painting,” and Section 099123, “Interior Painting.”

C. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

END OF SECTION 055000

SECTION 072100

THERMAL INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Concealed building insulation.

B. Related Sections include the following:

1. Division 9, Section 092900, “Gypsum Board” for installation in metal-framed assemblies of insulation specified by referencing this Section.

1.3 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.

1.4 SUBMITTALS

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

B. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency for insulation products.

1.5 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. Combustion Characteristics: ASTM E 136.

C. Insulation Labeling: The rated R-value shall be clearly identified by an identification mark applied by the manufacturer to each piece of building envelope insulation.

1.6 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. Products: Subject to compliance with requirements, provide one of the products specified.
2. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 WALL INSULATION SYSTEMS

A. Manufacturers:

1. CertainTeed Corporation.
2. Guardian Fiberglass, Inc.
3. Johns Manville.
4. Knauf Fiber Glass.
5. 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.

C. Where glass-fiber blanket insulation is indicated , provide blankets in batt or roll form to fill wall or roof framing cavity thicknesses with thermal resistances indicated:

1. 3-1/2 inches thick with a thermal resistance of R-13.

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.

1. Proceed with installation only after unsatisfactory conditions have been corrected.

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.

3.4 PROTECTION

A. Protect installed insulation and vapor retarders from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION 072100

SECTION 081100

STEEL DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Standard hollow-metal steel doors.
2. Standard hollow-metal steel frames.

B. Related Sections include the following:

1. Section 087100 “Door Hardware”
2. Section 099123 “Interior Painting”.

1.3 DEFINITIONS

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

1.4 SUBMITTALS

A. Product Data: Include construction details, material descriptions, core descriptions, label compliance, fire-resistance rating, and finishes for each type of steel door and frame specified.

B. Shop Drawings: In addition to requirements below, provide a schedule of standard steel doors and frames using same reference numbers for details and openings as those on Drawings:

1. Elevations of each door design.
2. Details of doors, including vertical and horizontal edge details.
3. Frame details for each frame type, including dimensioned profiles.
4. Details and locations of reinforcement and preparations for hardware.
5. Details of each different wall opening condition.
6. Details of anchorages, accessories, joints, and connections.
7. Details of glazing frames and stops showing glazing.
8. Details of conduit and preparations for electrified door hardware and controls.

1.5 QUALITY ASSURANCE

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

B. Source Limitations: Obtain standard steel doors and frames through one source from a single manufacturer.

1.6 DELIVERY, STORAGE, AND HANDLING

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

1. Provide additional protection to prevent damage to finish of factory-finished doors and frames.

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

C. Store doors and frames under cover at Project site. Place units in a vertical position with heads up, spaced by blocking, on minimum 4-inch high wood blocking. Avoid using nonvented plastic or canvas shelters that could create a humidity chamber.

1. If wrappers on doors become wet, remove cartons immediately. Provide minimum 1/4-inch space between each stacked door to permit air circulation.

1.7 PROJECT CONDITIONS

A. Field Measurements: Verify openings by field measurements before fabrication and indicate measurements on Shop Drawings.

1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish opening dimensions and proceed with fabricating standard steel frames without field measurements. Coordinate wall construction to ensure that actual opening dimensions correspond to established dimensions.

1.8 COORDINATION

A. Coordinate installation of anchorages for standard steel frames. 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. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

a. Amweld Building Products, LLC.
b. Ceco Door Products; an ASSA ABLOY Group Company.
c. CURRIES Company; an ASSA ABLOY Group Company.
d. Fleming Door Products Ltd.; an ASSA ABLOY Group Company.
e. Steelcraft; an Ingersoll-Rand Company.

2.2 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.

B. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.

C. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum A40 zinc-iron-alloy (galvannealed) coating designation.

D. Supports and Anchors: After fabricating, galvanize units to be built into exterior walls according to ASTM A 153/A 153M, Class B.

E. Inserts, Bolts, and Fasteners: Provide items to be built into exterior walls, hot-dip galvanized according to ASTM A 153/A 153M.

F. Glazing: Comply with requirements in Division 8 Section "Glazing."

2.3 STANDARD STEEL DOORS

A. General: Provide doors of design indicated, not less than thickness indicated; fabricated with smooth surfaces, without visible joints or seams on exposed faces, unless otherwise indicated. Comply with ANSI A250.8.

1. Design: Flush panel.

2. Core Construction: Manufacturer's standard kraft-paper honeycomb, polystyrene, polyurethane, mineral-board, or vertical steel-stiffener core that produces doors complying with ANSI A250.8.

3. Top and Bottom Edges: Closed with flush or inverted 0.042-inch thick end closures or channels of same material as face sheets.

4. Tolerances: Comply with SDI 117, "Manufacturing Tolerances for Standard Steel Doors and Frames."

B. Interior Doors: Face sheets fabricated from cold-rolled steel sheet, unless otherwise indicated to comply with exterior door requirements. Provide doors complying with requirements indicated below by referencing ANSI A250.8 for level and model and ANSI A250.4 for physical-endurance level:

1. Level 2 and Physical Performance Level B (Heavy Duty), Model 2 (Seamless).

C. Hardware Reinforcement: Fabricate reinforcement plates from same material as door face sheets to comply with the following minimum sizes:

1. Hinges: Minimum 0.123 inch thick by 1-1/2 inches wide by 6 inches longer than hinge, secured by not less than 6 spot welds.

2. Pivots: Minimum 0.167 inch thick by 1-1/2 wide by 6 inches longer than hinge, secured by not less than 6 spot welds.

3. Lock Face, Flush Bolts, Closers, and Concealed Holders: Minimum 0.067 inch thick.

4. All Other Surface-Mounted Hardware: Minimum 0.067 inch thick.

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

2.4 STANDARD STEEL FRAMES

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

B. Interior Frames: Fabricated from cold-rolled steel sheet, unless otherwise indicated to comply with exterior frame requirements.

1. Fabricate frames with mitered or coped and welded face corners and seamless face joints.
2. Frames for Level 2 Steel Doors: 0.053-inch thick steel sheet.

C. Hardware Reinforcement: Fabricate reinforcement plates from same material as frames to comply with the following minimum sizes:

1. Hinges: Minimum 0.123 inch thick by 1-1/2 inches wide by 6 inches longer than hinge, secured by not less than 6 spot welds.

2. Pivots: Minimum 0.167 inch thick by 1-1/2 inches wide by 6 inches longer than hinge, secured by not less than 6 spot welds.

3. Lock Face, Flush Bolts, Closers, and Concealed Holders: Minimum 0.067 inch thick.

4. All Other Surface-Mounted Hardware: Minimum 0.067 inch thick.

D. Supports and Anchors: Fabricated from electrolytic zinc-coated or metallic-coated steel sheet.

E. Jamb Anchors:

1. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch thick.

2. Compression Type for Slip-on Frames: Adjustable compression anchors.

3. Postinstalled Expansion Type for In-Place Concrete or Masonry: Minimum 3/8-inch diameter bolts with expansion shields or inserts. Provide pipe spacer from frame to wall, with throat reinforcement plate, welded to frame at each anchor location.

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

2.5 STOPS AND MOLDINGS

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

B. Fixed Frame Moldings: Formed integral with standard steel frames, minimum 5/8 inch high, unless otherwise indicated.

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

2.6 FABRICATION

A. General: Fabricate standard steel doors and frames 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. Standard Steel Doors:

1. Glazed Lites: Factory cut openings in doors.

C. Standard Steel 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.

2. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners, unless otherwise indicated.

3. Jamb Anchors: Provide number and spacing of anchors as follows:

   a. Stud-Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:

      1) Three anchors per jamb up to 60 inches in height.

      2) Four anchors per jamb from 60 to 90 inches in height.

      3) Five anchors per jamb from 90 to 96 inches in height.

      4) Five anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof more than 96 inches in height.

      5) Two anchors per head for frames more than 42 inches wide and mounted in metal-stud partitions.

4. Door Silencers: Except on weather-stripped doors, drill stops to receive door silencers as follows. Provide plastic plugs to keep holes clear during construction.

   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.

D. Hardware Preparation: Factory prepare standard steel doors and frames 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 8 Section "Door Hardware."

1. Reinforce doors and frames to receive nontemplated mortised and surface-mounted door hardware.

2. Comply with applicable requirements in ANSI A250.6 and ANSI/DHI A115 Series specifications for door and frame preparation for hardware. Locate hardware as indicated on Shop Drawings or, if not indicated, according to ANSI A250.8.

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

1. Single Glazed Lites: Provide fixed stops and moldings welded on secure side of door or frame.

2. Multiple Glazed Lites: Provide fixed and removable stops and moldings such that each glazed lite is capable of being removed independently.

3. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames.

4. Provide loose stops and moldings on inside of doors and frames.

5. Coordinate rabbet width between fixed and removable stops with type of glazing and type of installation indicated.

2.7 STEEL FINISHES

A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

1. Finish standard steel door and frames after assembly.

B. Steel Surface Preparation: Clean surfaces to comply with SSPC-SP 1, "Solvent Cleaning"; remove dirt, oil, grease, or other contaminants that could impair paint bond. Remove mill scale and rust, if present, from uncoated steel; comply with SSPC-SP 3, "Power Tool Cleaning," or SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."

C. Factory Priming for Field-Painted Finish: Apply shop primer specified below immediately after surface preparation and pretreatment. Apply a smooth coat of even consistency to provide a uniform dry film thickness of not less than 0.7 mils.

1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with ANSI A250.10 acceptance criteria; recommended by primer manufacturer for substrate; compatible with substrate and field-applied finish paint system indicated; and providing a sound foundation for field-applied topcoats 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 standard steel doors and frames.

1. Examine roughing-in for embedded and built-in anchors to verify actual locations of standard steel frame connections before frame installation.

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

3. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Remove welded-in shipping spreaders installed at factory.

B. Prior to installation and with installation spreaders in place, adjust and securely brace standard steel door frames for squareness, alignment, twist, and plumb to the following tolerances:

1. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.

2. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.

3. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.

4. Plumbness: Plus or minus 1/16 inch, 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: Provide doors and frames of sizes, thicknesses, and designs indicated. Install standard steel doors and frames plumb, rigid, properly aligned, and securely fastened in place; comply with Drawings and manufacturer's written instructions.

B. Standard Steel Frames: Install standard steel frames for doors and other openings, of size and profile indicated. Comply with SDI 105.

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. At fire-protection-rated openings, install frames according to NFPA 80.

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 plumb, squareness, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.

f. Apply bituminous coating to backs of frames that are filled with mortar, grout, and plaster containing antifreezing agents.

2. Metal-Stud Partitions: Solidly pack mineral-fiber insulation behind frames.

3. Installation Tolerances: Adjust standard steel door frames for squareness, alignment, twist, and plumb to the following tolerances:

a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.

b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.

c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.

d. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.

C. Standard Steel 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 plus or minus 1/16 inch.

b. Between Edges of Pairs of Doors: 1/8 inch plus or minus 1/16 inch.

c. Between Bottom of Door and Top of Threshold: Maximum 3/8 inch.

d. Between Bottom of Door and Top of Finish Floor (No Threshold): Maximum 3/4 inch.

D. Glazing: Comply with installation requirements in Division 8 Section "Glazing" and with standard steel door and frame manufacturer's written instructions.

1. Secure stops with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches o.c., and not more than 2 inches o.c. from each corner.

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 standard steel doors or frames that are warped, bowed, or otherwise unacceptable.

B. Clean grout and other bonding material off standard steel doors and frames 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 primer.

D. Galvannealed Surfaces: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.

END OF SECTION 081100

SECTION 087100

DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Commercial door hardware for the following:

a. Swinging doors.

B. Related Sections include the following:

1. Division 8 Section "Hollow Metal Doors and Frames".

C. Products furnished, but not installed, under this Section include the following. Coordinating, purchasing, delivering, and scheduling remain requirements of this Section.

1.3 SUBMITTALS

A. Product Data: Include construction and installation details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Maintenance Data: For each type of door hardware to include in maintenance manuals. Include final hardware and keying schedule.

C. Warranty: Special warranty specified in this Section.

D. Other Action Submittals:

1. Door Hardware Sets: Prepared by or under the supervision of Architectural Hardware Consultant, detailing fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final door hardware sets with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.

a. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule." Double space entries, and number and date each page.

b. Format: Use same scheduling sequence and format and use same door numbers as in the Contract Documents. List each door separately.

c. Content: Include the following information:

1) Identification number, location, hand, fire rating, and material of each door and frame.

2) Type, style, function, size, quantity, and finish of each door hardware item.

3) Complete designations of every item required for each door or opening including name and manufacturer.

4) Fastenings and other pertinent information.

5) Location of each door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.

6) Explanation of abbreviations, symbols, and codes contained in schedule.

7) Mounting locations for door hardware.

8) Door and frame sizes and materials.

9) List of related door devices specified in other Sections for each door and frame.

d. Submittal Sequence: Submit the final door hardware sets at earliest possible date, particularly where approval of the door hardware sets must precede fabrication of other work that is critical in Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the door hardware sets.

e. Submittal Sequence: Submit initial draft of final schedule along with essential Product Data to facilitate the fabrication of other work that is critical in Project construction schedule. Submit the final door hardware sets after Samples, Product Data, coordination with Shop Drawings of other work, delivery schedules, and similar information has been completed and accepted.

1.4 QUALITY ASSURANCE

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

1. Supplier's responsibilities include supplying door hardware and providing a qualified Architectural Hardware Consultant available during the course of the Work to consult with Contractor, Architect, and Owner about door hardware and keying.

2. Supplier shall have warehousing facilities in Project's vicinity.

3. Scheduling Responsibility: Preparation of door hardware and keying schedules.

B. Architectural Hardware Consultant Qualifications: A person who is currently certified by DHI as an Architectural Hardware Consultant and who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project.

C. Source Limitations: Obtain each type and variety of door hardware from a single manufacturer, unless otherwise indicated.

1. Provide electrified door hardware from same manufacturer as mechanical door hardware, unless otherwise indicated. Manufacturers that perform electrical modifications and that are listed by a testing and inspecting agency acceptable to authorities having jurisdiction are acceptable.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Inventory door hardware on receipt and provide secure lock-up for door hardware delivered to Project site.

B. Tag each item or package separately with identification related to the final door hardware sets, and include basic installation instructions, templates, and necessary fasteners with each item or package.

1.6 COORDINATION

A. Coordinate layout and installation of recessed pivots & floor closers with floor construction. Cast anchoring inserts into concrete. Concrete, reinforcement, and formwork requirements are specified in Division 3.

B. Templates: Distribute door hardware templates for doors, frames, and other work specified to be factory prepared for installing 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.

C. Electrical System Roughing-in: Coordinate layout and installation of electrified door hardware with connections to power supplies fire alarm system and detection devices access control system security system building control system.

1.7 WARRANTY

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

1. Failures include, but are not limited to, the following:

a. Structural failures including excessive deflection, cracking, or breakage.

b. Faulty operation of operators and door hardware.

c. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use.

B. Warranty Period: Three years from date of Substantial Completion, except as follows:

1. Exit Devices: Three years from date of Substantial Completion.
2. Manual Closers: 10 years from date of Substantial Completion.

1.8 MAINTENANCE SERVICE

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.

B. Maintenance Service: Beginning at Substantial Completion, provide twelve months' full maintenance by skilled employees of door hardware Installer. Include quarterly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper door hardware operation. Provide parts and supplies same as those used in the manufacture and installation of original products.

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

A. General: Provide door hardware for each door to comply with requirements in this Section and door hardware sets indicated in Part 3 "Door Hardware Sets" Article.

1. Door Hardware Sets: Provide quantity, item, size, finish or color indicated, and named manufacturers' products.

2. Sequence of Operation: Provide electrified door hardware function, sequence of operation, and interface with other building control systems indicated.

B. Designations: Requirements for design, grade, function, finish, size, and other distinctive qualities of each type of door hardware are indicated in Part 3 "Door Hardware Sets" Article. Products are identified by using door hardware designations, as follows:

1. Named Manufacturers' Products: Manufacturer and product designation are listed for each door hardware type required for the purpose of establishing minimum requirements. Manufacturers' names are abbreviated in Part 3 "Door Hardware Sets" Article.

2. References to BHMA Standards: Provide products complying with these standards and requirements for description, quality, and function.

2.2 HINGES, GENERAL

A. Quantity: Provide the following, unless otherwise indicated:

1. Two Hinges: For doors with heights up to 60 inches (1524 mm).

2. Three Hinges: For doors with heights 61 to 90 inches (1549 to 2286 mm).

3. Four Hinges: For doors with heights 91 to 120 inches (2311 to 3048 mm).

4. For doors with heights more than 120 inches (3048 mm), provide 4 hinges, plus 1 hinge for every 30 inches (750 mm) of door height greater than 120 inches (3048 mm).

B. Template Requirements: Except for hinges and pivots to be installed entirely (both leaves) into wood doors and frames, provide only template-produced units.

C. Hinge Weight: Unless otherwise indicated, provide the following:

1. Entrance Doors: Heavy-weight hinges.
2. Doors with Closers: Antifriction-bearing hinges.
3. Interior Doors: Standard-weight hinges.

D. Hinge Base Metal: Unless otherwise indicated, provide the following:

1. Exterior Hinges: Brass, with stainless-steel pin body and brass protruding heads or as noted.

2. Interior Hinges: Steel, with steel pin.

3. Hinges for Fire-Rated Assemblies: Steel, with steel pin.

E. Hinge Options: Where indicated in door hardware sets or on Drawings:

1. Hospital Tips: Slope ends of hinge barrel.

2. Nonremovable Pins: Provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for outswinging exterior doors and outswinging corridor doors with locks.

3. Corners: Square.

F. Fasteners: Comply with the following:

1. Machine Screws: For metal doors and frames. Install into drilled and tapped holes.

2. Wood Screws: For wood doors and frames.

3. Threaded-to-the-Head Wood Screws: For fire-rated wood doors.

4. Screws: Phillips flat-head; machine screws (drilled and tapped holes) for metal doors wood screws for wood doors and frames. Finish screw heads to match surface of hinges.

2.3 HINGES

A. Butts and Hinges: BHMA A156.1.

B. Template Hinge Dimensions: BHMA A156.7.

C. Manufacturers:

1. Bommer Industries, Inc. (BI).
2. Lawrence Brothers, Inc. (LB).
3. McKinney Products Company; an ASSA ABLOY Group company (MCK).
4. Stanley Commercial Hardware; Div. of The Stanley Works (STH).
5. Security Door Controls (SDC), for power transfer locations

2.4 LATCHSETS, GENERAL

A. Accessibility Requirements: Where indicated to comply with accessibility requirements, comply with the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines for Buildings and Facilities (ADAAG)."

1. Provide operating devices that do not require tight grasping, pinching, or twisting of the wrist and that operate with a force of not more than 5 lbf (22 N).

B. Latches of Egress Doors: Comply with NFPA 101. Latches shall not require more than 15 lbf (67 N) to release the latch

C. Strikes: Manufacturer's standard strike with strike box for each latchbolt with curved lip extended to protect frame, finished to match door hardware set.

2.5 CLOSERS

A. Accessibility Requirements: Where handles, pulls, latches, locks, and other operating devices are indicated to comply with accessibility requirements, comply with the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines for Buildings and Facilities (ADAAG)."

1. Comply with the following maximum opening-force requirements:

a. Interior, Non-Fire-Rated Hinged Doors: 5 lbf (22.2 N) applied perpendicular to door.

B. Door Closers for Means of Egress Doors: Comply with NFPA 101. Door closers shall not require more than 30 lbf (133 N) to set door in motion and not more than 15 lbf (67 N) to open door to minimum required width.

C. Closer Holder Release Devices: BHMA A156.15. Listed under Category C in BHMA's "Certified Product Directory."

1. Life-Safety Type: On release of hold open, door becomes self-closing. Automatic release is activated by loss of power.
2. Manufacturers:

a. Corbin Russwin Architectural Hardware; an ASSA ABLOY Groups Company (CR).

b. Norton Door Controls; an ASSA ABLOY Group company (NDC).

c. Rixson Specialty Door Controls; an ASSA ABLOY Group company (RIX).

2.6 STOPS AND HOLDERS

A. Stops and Bumpers: BHMA A156.16**,** Grade 1

1. Provide floor stops for doors unless wall or other type stops are scheduled or indicated. Do not mount floor stops where they will impede traffic. Where floor or wall stops are not appropriate, provide overhead holders.

B. Manufacturers:

1. Rixson Specialty Door Controls; an ASSA ABLOY Group company (RIX).
2. Architectural Builders Hardware Mfg., Inc. (ABH).
3. Glynn-Johnson; an Ingersoll-Rand Company (GJ).
4. IVES Hardware; an Ingersoll-Rand Company (IVS).
5. Rockwood Manufacturing Company (RM).

2.7 DOOR GASKETING

A. Standard: BHMA A156.22. Listed under Category J in BHMA's "Certified Product Directory."

B. General: Provide continuous weather-strip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated or scheduled. Provide noncorrosive fasteners for exterior applications and elsewhere as indicated.

1. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.

2. Automatic Door Bottoms: Apply to bottom of door, surface mounted, plunger activated drop bar neoprene seal, forming seal with threshold or floor when door is closed.

C. Air Leakage: Not to exceed 0.50 cfm per foot (0.000774 cu. m/s per m) of crack length for gasketing other than for smoke control, as tested according to ASTM E 283.

D. Smoke-Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke-control ratings indicated, based on testing according to UL 1784.

1. Provide smoke-labeled gasketing on 20-minute-rated doors and on smoke-labeled doors.

E. Fire-Labeled Gasketing: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to UBC Standard 7-2.

1. Test Pressure: After 5 minutes into the test, neutral pressure level in furnace shall be established at 40 inches (1016 mm) or less above the sill.

F. Sound-Rated Gasketing: Assemblies that are listed and labeled by a testing and inspecting agency, for sound ratings indicated, based on testing according to ASTM E 1408.

G. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.

H. Gasketing Materials: ASTM D 2000 and AAMA 701/702.

I. Manufacturers:

1. Pemko Manufacturing Co. (PEM).
2. National Guard Products (NGP).
3. Reese Enterprises (RE).

2.8 FABRICATION

A. Manufacturer's Nameplate: Do not provide products that have manufacturer's name or trade name displayed in a visible location except in conjunction with required fire-rated labels and as otherwise approved by Architect.

1. Manufacturer's identification is permitted on rim of lock cylinders only.

B. Base Metals: Produce door hardware units of base metal, fabricated by forming method indicated, using manufacturer's standard metal alloy, composition, temper, and hardness. Furnish metals of a quality equal to or greater than that of specified door hardware units and BHMA A156.18. Do not furnish manufacturer's standard materials or forming methods if different from specified standard.

C. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to commercially recognized industry standards for application intended, except aluminum fasteners are not permitted. Provide Phillips flat-head screws with finished heads to match surface of door hardware, unless otherwise indicated.

1. Concealed Fasteners: For door hardware units that are exposed when door is closed, except for units already specified with concealed fasteners. Do not use through bolts for installation where bolt head or nut on opposite face is exposed unless it is the only means of

securely attaching the door hardware. Where through bolts are used on hollow door and frame construction, provide sleeves for each through bolt.

2. Steel Machine or Wood Screws: For the following fire-rated applications:

   a. Mortise hinges to doors.
   b. Strike plates to frames.
   c. Closers to doors and frames.

3. Steel Through Bolts: For the following fire-rated applications unless door blocking is provided:

   a. Surface hinges to doors.
   b. Closers to doors and frames.
   c. Surface-mounted exit devices.

4. Spacers or Sex Bolts: For through bolting of hollow-metal doors.

2.9 FINISHES

A. Standard: BHMA A156.18, as indicated in door hardware sets.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.

B. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Steel Doors and Frames: Comply with DHI A115 Series.

1. Surface-Applied Door Hardware: Drill and tap doors and frames according to ANSI A250.6.

3.3 INSTALLATION

A. Mounting Heights: Mount door hardware units at heights indicated as follows unless otherwise indicated or required to comply with governing regulations.

1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."

B. Install each door hardware item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.

1. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.

2. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.

C. Boxed Power Supplies: Locate power supplies as indicated or, if not indicated, above accessible ceilings or in equipment room verify location with Architect.

1. Configuration: Provide the least number of power supplies required to adequately serve doors with electrified door hardware.

D. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."

3.4 FIELD QUALITY CONTROL

A. Independent Architectural Hardware Consultant: Owner will engage a qualified independent Architectural Hardware Consultant to perform inspections and to prepare inspection reports.

1. Independent Architectural Hardware Consultant will inspect door hardware and state in each report whether installed work complies with or deviates from requirements, including whether door hardware is properly installed and adjusted.

3.5 ADJUSTING

A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

1. Spring Hinges: Adjust to achieve positive latching when door is allowed to close freely from an open position of 30 degrees.

2. Electric Strikes: Adjust horizontal and vertical alignment of keeper to properly engage lock bolt.

3. Door Closers: Unless otherwise required by authorities having jurisdiction, adjust sweep period so that, from an open position of 70 degrees, the door will take at least 3 seconds to move to a point 3 inches (75 mm) from the latch, measured to the leading edge of the door.

B. Occupancy Adjustment: Approximately three months after date of Substantial Completion, Installer's Architectural Hardware Consultant shall examine and readjust, including adjusting operating forces, each item of door hardware as necessary to ensure function of doors, door hardware, and electrified door hardware.

3.6 CLEANING AND PROTECTION

A. Clean adjacent surfaces soiled by door hardware installation.

B. Clean operating items as necessary to restore proper function and finish.

C. Provide final protection and maintain conditions that ensure that door hardware is without damage or deterioration at time of Substantial Completion.

3.7 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain door hardware and door hardware finishes. Refer to Division 1 Section "Demonstration and Training."

3.8 DOOR HARDWARE SETS

HW1

4 ea	Hinges TA2714 26D 5 x 4 1/2 NRP
1 ea	Latchset ML2010 LWA 630
1 ea	Automatic Door Bottom 4301CRL with end plates
1 ea	Wall Stop 404 626
1 ea	Gasket S88D

3.9 DOOR HARDWARE GROUP LEGEND

DOOR #	Hardware Group
1109	1

END OF SECTION 087100

SECTION 095100

ACOUSTICAL PANEL CEILINGS

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 acoustical panels and exposed suspension systems for ceilings.

B. Products furnished, but not installed under this Section, include anchors, clips, and other ceiling attachment devices to be cast in concrete at ceilings.

1.3 DEFINITIONS

A. AC: Articulation Class.

B. CAC: Ceiling Attenuation Class.

C. LR: Light Reflectance coefficient.

D. NRC: Noise Reduction Coefficient.

1.4 SUBMITTALS

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

1.5 QUALITY ASSURANCE

A. Acoustical Testing Agency Qualifications: An independent testing laboratory, or an NVLAP-accredited laboratory, with the experience and capability to conduct the testing indicated. NVLAP-accredited laboratories must document accreditation, based on a "Certificate of Accreditation" and a "Scope of Accreditation" listing the test methods specified.

B. Source Limitations:

1. Acoustical Ceiling Panel: Obtain each type through one source from a single manufacturer.
2. Suspension System: Obtain each type through one source from a single manufacturer.

C. Source Limitations: Obtain each type of acoustical ceiling panel and supporting suspension system through one source from a single manufacturer.

D. Fire-Test-Response Characteristics: Provide acoustical panel ceilings that comply with the following requirements:

1. Fire-Resistance Characteristics: Where indicated, provide acoustical panel ceilings identical to those of assemblies tested for fire resistance per ASTM E 119 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.

2. Surface-Burning Characteristics: Provide acoustical panels with the following surface-burning characteristics complying with ASTM E 1264 for Class A materials as determined by testing identical products per ASTM E 84:

a. Smoke-Developed Index: 450 or less.

E. Seismic Standard: Provide acoustical panel ceilings designed and installed to withstand the effects of earthquake motions according to the following:

1. Standard for Ceiling Suspension Systems Requiring Seismic Restraint: Comply with ASTM E 580.

2. CISCA's Recommendations for Acoustical Ceilings: Comply with CISCA's "Recommendations for Direct-Hung Acoustical Tile and Lay-in Panel Ceilings--Seismic Zones 0-2."

3. CISCA's Guidelines for Systems Requiring Seismic Restraint: Comply with CISCA's "Guidelines for Seismic Restraint of Direct-Hung Suspended Ceiling Assemblies--Seismic Zones 3 & 4."

4. UBC Standard 25-2, "Metal Suspension Systems for Acoustical Tile and for Lay-in Panel Ceilings."

5. ASCE 7, "Minimum Design Loads for Buildings and Other Structures": Section 9, "Earthquake Loads."

F. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver acoustical panels, suspension system components, and accessories to Project site in original, unopened packages and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.

B. Before installing acoustical panels, permit them to reach room temperature and a stabilized moisture content.

C. Handle acoustical panels carefully to avoid chipping edges or damaging units in any way.

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Do not install acoustical panel ceilings until spaces are enclosed and weatherproof, wet work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

1. Pressurized Plenums: Operate ventilation system for not less than 48 hours before beginning acoustical panel ceiling installation.

1.8 COORDINATION

A. Coordinate layout and installation of acoustical panels and suspension system with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system, and partition assemblies.

1.9 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. Acoustical Ceiling Panels: Full-size panels equal to 5.0 percent of quantity installed.

PART 2 - PRODUCTS

2.1 ACOUSTICAL PANELS, GENERAL

A. Acoustical Panel Standard: Provide manufacturer's standard panels of configuration indicated that comply with ASTM E 1264 classifications as designated by types, patterns, acoustical ratings, and light reflectances, unless otherwise indicated.

1. Mounting Method for Measuring NRC: Type E-400; plenum mounting in which face of test specimen is 15-3/4 inches away from test surface per ASTM E 795.

B. Acoustical Panel Colors and Patterns: Match appearance characteristics indicated for each product type.

1. Where appearance characteristics of acoustical panels are indicated by referencing pattern designations in ASTM E 1264 and not manufacturers' proprietary product designations, provide products selected by Architect from each manufacturer's full range that comply with requirements indicated for type, pattern, color, light reflectance, acoustical performance, edge detail, and size.

2.2 ACOUSTICAL PANELS FOR ACOUSTICAL PANEL CEILING

A. Basis-of-Design Product: Subject to compliance with requirements, provide Armstrong World Industries, Inc., Clean Room MYLAR, lay-in, 15/16 grid face, item number 1716 (field) and 1721 (border), or a comparable product by one of the following:

1. BPB USA.
2. Chicago Metallic Corporation.
3. Ecophon CertainTeed, Inc.
4. USG Interiors, Inc.

B. Color: White.

C. LR: Not less than 0.79.

D. NRC: Not less than 0.55.

E. CAC: Not less than 35.

F. Edge/Joint Detail: Square lay-in, exposing bottom finished face of suspension system members.

G. Thickness: 5/8 inch minimum.

H. Modular Size: 24 by 48 inches.

2.3 METAL SUSPENSION SYSTEMS, GENERAL

A. Metal Suspension System Standard: Provide manufacturer's standard direct-hung metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable requirements in ASTM C 635.

B. Finishes and Colors, General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes. Provide manufacturer's standard factory-applied finish for type of system indicated.

C. Attachment Devices: Size for five times the design load indicated in ASTM C 635, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.

D. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:

1. Zinc-Coated, Carbon-Steel Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper.

2. Size: Select wire diameter so its stress at 3 times hanger design load (ASTM C 635, Table 1, "Direct Hung") will be less than yield stress of wire, but provide not less than 0.106-inch diameter wire.

E. Seismic Stabilizer Bars: Manufacturer's standard perimeter stabilizers designed to accommodate seismic forces.

F. Seismic Struts: Manufacturer's standard compression struts designed to accommodate seismic forces.

G. Seismic Clips: Manufacturer's standard seismic clips designed and spaced to secure acoustical panels in-place.

2.4 METAL SUSPENSION SYSTEM FOR ACOUSTICAL PANEL CEILING

A. Basis-of-Design Product: Subject to compliance with requirements, provide Armstrong World Industries, Inc. , Prelude XL 15/16 exposed tee, or a comparable product by one of the following:

1. BPB USA.
2. Chicago Metallic Corporation.
3. Ecophon CertainTeed, Inc..
4. USG Interiors, Inc..

B. Wide-Face, Single-Web, Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet electrolytically zinc coated, with prefinished flanges of width indicated.

1. Structural Classification: Heavy-duty system.
2. Face Finish: Painted white.

2.5 METAL EDGE MOLDINGS AND TRIM

A. Roll-Formed, Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that comply with seismic design requirements; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension system runners.

1. Provide manufacturer's standard edge moldings that fit acoustical panel edge details and suspension systems indicated and that match width and configuration of exposed runners, unless otherwise indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, including structural framing to which acoustical panel ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical panel ceilings.

1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders, and comply with layout shown on reflected ceiling plans.

3.3 INSTALLATION

A. General: Install acoustical panel ceilings to comply with ASTM C 636 and seismic design requirements indicated, per manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."

B. Suspend ceiling hangers from building's structural members and as follows:

1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.

2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.

3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.

4. Secure wire hangers to ceiling suspension members and to supports above with a minimum of three tight turns. Connect hangers directly either to structures or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.

5. Space hangers not more than 48 inches o.c. along each member supported directly from hangers, unless otherwise indicated; provide hangers not more than 8 inches from ends of each member.

6. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.

C. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels.

D. Install suspension system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.

E. Install acoustical panels with undamaged edges and fit accurately into suspension system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide a neat, precise fit.

1. Paint cut edges of panel remaining exposed after installation; match color of exposed panel surfaces using coating recommended in writing for this purpose by acoustical panel manufacturer.

2. Install hold-down clips in areas indicated, in areas required by authorities having jurisdiction, and for fire-resistance ratings; space as recommended by panel manufacturer's written instructions, unless otherwise indicated.

3.4 CLEANING

A. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension system members. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 095100

SECTION 097000

PREFINISHED GYPSUM BOARD

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Interior gypsum board.
2. Sound Isolation Assembly.

B. Related Sections include the following:

1. Division 7, Section 072100, “Thermal Insulation” for insulation and vapor retarders installed in assemblies that incorporate gypsum board.

2. Division 9, Section 054000, “Cold Formed Metal Framing” for structural and non-structural framing and suspension systems that support gypsum board.

C. Environmental Limitations: Do not install gypsum board until spaces are enclosed and weatherproof, wet work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained. Comply with ASTM C 840 requirements or gypsum board manufacturer's written recommendations, whichever are more stringent.

1.3 SUBMITTALS

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

1.4 STORAGE AND HANDLING

A. Store materials inside under cover and keep them dry and protected against damage from weather, condensation, direct sunlight, construction traffic, and other causes. Stack panels flat to prevent sagging.

1.5 PROJECT CONDITIONS

A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written recommendations, whichever are more stringent.

B. Do not install interior products until installation areas are enclosed and conditioned.

C. Do not install panels that are wet, those that are moisture damaged, and those that are mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 PANELS, GENERAL

A. Recycled Content: Provide gypsum panel products with recycled content such that postconsumer recycled content plus one-half of preconsumer recycled content constitutes a minimum of 10% (MR 4.1) or 20% (MR4.2) percent by weight.

B. Size: Provide in maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

2.2 INTERIOR GYPSUM BOARD

A. Basis-of-Design Product: Subject to compliance with requirements, provide Durasan Gypsum Board by National Gypsum Company, ASTM C 1396, or a comparable product pre-approved by Battelle Architect.

B. Performance Requirements:

1. Provide UL listed materials with fire hazard classification of wall panel as determined by ASTM E 84, as follows:
   a. Flame spread not more than 25.
   b. Smoke developed of not more than 50.
2. Thickness: ½”
3. Width: 4 ft.
4. Length: continuous as required to fit floor to ceiling.
5. Edges: Beveled
6. Panel Covering: 0.006” thick vinyl film without backing, from Group 1 manufacturer’s standard color range, as selected by Battelle Architect.

2.3 TRIM ACCESSORIES

A. Matching Interior Top Cap Trim:

1. Material: Galvanized or aluminum-coated steel sheet or rolled zinc.
2. Shapes:
   a. Rectangular at top cap, surface mounted, from steel retainer and matching snap-on facing.
   b. Angle at inside and outside corners, surface mounted, from steel retainer and matching snap-on facing.

B. Clips:

1. Concealed mounting, from stamped or formed edge clips.

C. Steel Drill Screws:

1. Use screws complying with ASTM C 954 or ASTM C 1002 for fastening panels to steel members from 0.033 to 0.112 inch thick.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames and framing, for compliance with requirements and other conditions affecting performance.

B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLYING AND FINISHING PANELS, GENERAL

A. Comply with manufacturer’s written installation instruction..

B. Panels shall be continuous from floor to ceiling, unless specified otherwise.

C. Install panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.

3.3 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.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.

2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 097000

SECTION 099113

EXTERIOR PAINTING

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 surface preparation and the application of paint systems on the following exterior substrates:

1. Steel.
2. Galvanized metal.

B. Related Sections include the following:

1. Division 9, Section 099123, “Interior Painting” for surface preparation and the application of paint systems on interior substrates.

1.3 SUBMITTALS

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

B. Samples for Verification: For each type of paint system and each color and gloss of topcoat indicated.

1. Submit Samples on rigid backing, 8 inches square.
2. Step coats on Samples to show each coat required for system.
3. Label each coat of each Sample.
4. Label each Sample for location and application area.

C. Product List: For each product indicated, include the following:

1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.
2. Printout of current “MPI Approved Products List” for each product category specified in Part 2, with the proposed product highlighted.

1.4 QUALITY ASSURANCE

A. MPI Standards:

1. Products: Complying with MPI standards indicated and listed in “MPI Approved Products List.”

2. Preparation and Workmanship: Comply with requirements in "MPI Architectural Painting Specification Manual" for products and paint systems indicated.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.6 PROJECT CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.

B. Do not apply paints in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

1.7 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 1 gal. of each material and color applied.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide Columbia Paints or comparable product by one of the following:

1. Benjamin Moore & Co.
2. Dunn-Edwards Corporation.
3. PPG Architectural Finishes, Inc.
4. Sherwin-Williams Company

2.2 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.

2.3 EXTERIOR CONDUITS

A. Primer/Bonding Primer: None

B. Interior Epoxy Top Coats (Semi-gloss): DTM Alkyd Enamel

1. 2 coats over primed substrates.
2. Color: Red brick in color to closely match masonry wall color.

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. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.

C. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.

1. Beginning coating application constitutes Contractor's acceptance of substrates and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in “MPI Architectural Painting Specification Manual” applicable to substrates and paint systems indicated.

B. Remove plates, machined surfaces, and similar items already in place that are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.

2. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.

C. 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.

D. Steel Substrates: Remove rust and loose mill scale. Clean using methods recommended in writing by paint manufacturer.

E. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal fabricated from coil stock by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

3.3 APPLICATION

A. Apply paints according to manufacturer's written instructions.

1. Use applicators and techniques suited for paint and substrate indicated.

2. Paint surfaces behind movable items same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed items with prime coat only.

B. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

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.

3.4 FIELD QUALITY CONTROL

A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure at any time and as often as Owner deems necessary during the period when paints are being applied:

1. Owner may engage the services of a qualified testing agency to sample paint materials being used. Samples of material delivered to Project site will be taken, identified, sealed, and certified in presence of Contractor.

2. Testing agency will perform tests for compliance of paint materials with product requirements.

3. Owner may direct Contractor to stop applying paints if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying-paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

3.5 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Battelle Construction Manager, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

END OF SECTION 099113

SECTION 099123

INTERIOR PAINTING

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 surface preparation and the application of paint systems on the following interior substrates:

1. Steel.
2. Galvanized metal.
3. Gypsum board.

B. Related Sections include the following:

1. Section 081100 “Steel Doors and Frames” for surface preparation and the application of paint systems on exterior substrates.

2. Section 05xxxx “Metal Fabrications”

1.3 SUBMITTALS

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

B. Samples for Verification: For each type of paint system and in each color and gloss of topcoat indicated.

1. Submit Samples on rigid backing, 8 inches square.
2. Step coats on Samples to show each coat required for system.
3. Label each coat of each Sample.
4. Label each Sample for location and application area.

C. Product List: For each product indicated, include the following:

1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.

2. Printout of current Master Painters Institute (MPI) “MPI Approved Products List” for each product category specified in Part 2, with the proposed product highlighted.

1.4 QUALITY ASSURANCE

A. MPI Standards:

1. Products: Complying with MPI standards indicated and listed in “MPI Approved Products List.”

2. Preparation and Workmanship: Comply with requirements in “MPI Architectural Painting Specification Manual” for products and paint systems indicated.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.6 PROJECT CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.

B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

1.7 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 1 gal. of each material and color applied.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide Columbia Paints or comparable product by one of the following:

1. Benjamin Moore & Co.
2. Dunn-Edwards Corporation.
3. PPG Architectural Finishes, Inc.
4. Sherwin-Williams Company .

2.2 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.
5. Flat Topcoat Paints: VOC content of not more than 50 g/L.
6. Nonflat Topcoat Paints: VOC content of not more than 150 g/L.
7. Anti-Corrosive and Anti-Rust Paints Applied to Ferrous Metals: VOC not more than 250 g/L.
8. Floor Coatings: VOC not more than 100 g/L.
9. Primers, Sealers, and Undercoaters: VOC content of not more than 200 g/L.

C. Chemical Components of Field-Applied Interior Paints and Coatings: Provide topcoat paints and anti-corrosive and anti-rust paints applied to ferrous metals that comply with the following chemical restrictions; these requirements do not apply to paints and coatings that are applied in a fabrication or finishing shop:

1. Aromatic Compounds: Paints and coatings shall not contain more than 1.0 percent by weight of total aromatic compounds (hydrocarbon compounds containing one or more benzene rings).

2. Restricted Components: Paints and coatings shall not contain any of the following:
   a. Acrolein.
   b. Acrylonitrile.
   c. Antimony.
   d. Benzene.
   e. Butyl benzyl phthalate.
   f. Cadmium.
   g. Di (2-ethylhexyl) phthalate.
   h. Di-n-butyl phthalate.
   i. Di-n-octyl phthalate.
   j. 1,2-dichlorobenzene.
   k. Diethyl phthalate.
   l. Dimethyl phthalate.
   m. Ethylbenzene.
   n. Formaldehyde.
   o. Hexavalent chromium.
   p. Isophorone.
   q. Lead.
   r. Mercury.
   s. Methyl ethyl ketone.
   t. Methyl isobutyl ketone.
   u. Methylene chloride.
   v. Naphthalene.
   w. Toluene (methylbenzene).

x. 1,1,1-trichloroethane.
y. Vinyl chloride.

2.3 METAL DOORS AND FRAMES

A. Interior Latex Primer/Sealer: None (factory primer)

B. Interior Latex Top Coats (Semi-gloss): Master Piece Interior Acrylic Semi-Gloss, 02-042

1. 2 coats over primed substrates.
2. Color: Battelle Standard EMSL Red, paint color code - AXX-3.5 B-1.5 L-20

2.4 METAL FABRICATIONS

A. Interior Latex Primer/Bonding Primer: Pro Shield Waterborne Primer, 05-208

1. 1 coat over prepared substrates.

B. Interior EpoxyTop Coats (Semi-gloss): Industrial Heavy Duty Water Based Epoxy, Semi-Gloss, 05-930

1. 2 coats over primed substrates.
2. Color: Battelle Standard China White, paint color code - AXX-3.5 B-1.5 L-20

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. Steel: 0 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.

1. Beginning coating application constitutes Contractor's acceptance of substrates and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in “MPI Architectural Painting Specification Manual” applicable to substrates indicated.

B. Remove plates, machined surfaces, and similar items already in place that are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.

2. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.

C. 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.

D. Steel Substrates: Remove rust and loose mill scale. Clean using methods recommended in writing by paint manufacturer.

E. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal fabricated from coil stock by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

F. Gypsum Board Substrates: Do not begin paint application until finishing compound is dry and sanded smooth.

3.3 APPLICATION

A. Apply paints according to manufacturer's written instructions.

1. Use applicators and techniques suited for paint and substrate indicated.

2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.

3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.

B. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

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: Mechanical and electrical items, equipment or components shall not receive field applied paint.

3.4 FIELD QUALITY CONTROL

A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure at any time and as often as Owner deems necessary during the period when paints are being applied:

1. Owner may engage the services of a qualified testing agency to sample paint materials being used. Samples of material delivered to Project site will be taken, identified, sealed, and certified in presence of Contractor.

2. Testing agency will perform tests for compliance with product requirements.

3. Owner may direct Contractor to stop applying paints if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying-paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

3.5 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Battelle Construction Manager, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

END OF SECTION 099123

SECTION 200500

COMMON WORK RESULTS FOR MECHANICAL PIPING & HVAC

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Piping materials and installation instructions common to most piping systems.
2. Transition fittings.
3. Dielectric fittings.
4. Sleeves.
5. Escutcheons.
6. Mechanical demolition.
7. Equipment installation requirements common to equipment sections.
8. Fire Stopping
9. Painting and finishing.
10. Supports and anchorages.
11. Welding and weld inspection.
12. Brazing and braze joint inspection.
13. Soldering and solder joint inspection.

With regards to all mechanical piping systems. Requirements for specific types of systems are identified in applicable sections.

1.2 DEFINITIONS

A. Finished Spaces: Spaces other than mechanical (including plumbing) and electrical equipment rooms, furred spaces, pipe and duct shafts/chases, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.

B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.

C. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.

D. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in duct shafts.

E. Where it is stated in the specifications to submit to Architect or Engineer for review, refer to Architectural General and Special Conditions for proper procedures.

F. “PROVIDE” means to “Furnish” and “Install”.

G. “INSTALL” means to join, unite, fasten, link, attach, set up or otherwise connect together before testing and turning over to Owner, complete and ready for regular operation.

H. “FURNISH” means to supply all materials, labor, equipment, testing apparatus, controls, tests, accessories and all other items customarily required for the proper and complete application.

I. “AS DIRECTED” means as directed by the Engineer, or the Engineer’s Representative.

J. “CONCEALED” means embedded in masonry or other construction, installed behind wall furring or within double partitions, or installed within hung ceilings.

K. “SUBMIT” means submit to the Engineer for review.

L. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.

M. The following are industry abbreviations for plastic materials:

1. CPVC: Chlorinated polyvinyl chloride plastic

N. The following are industry abbreviations for rubber materials:

1. EPDM: Ethylene-propylene-diene terpolymer rubber.
2. NBR: Acrylonitrile-butadiene rubber.

1.3 SUBMITTALS

A. Qualified Welding Procedures (QWPs) and Certified Procedure Qualification Records (PQRs) for each type of weld listed in plan for welding;

B. All pressure testing or other documentation called for in this specification or on the drawings.

1.4 QUALITY ASSURANCE

A. Carbon Steel Shapes and Plate Welding: Qualify processes and welders according to AWS D1.1/D1.1M , "Structural Welding Code--Steel."

1. Verify that each welder has passed AWS qualification tests for welding processes used and that qualifications are current.

2. Fabricate per AWS D1.1/D1.1M (statically loaded).

3. Inspection: No inspection required.

B. Carbons Steel Pipe Welding: Qualify processes and welders according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."

1. Verify that each welder has passed ASME qualification tests for welding processes used and that qualifications are current.

2. Fabricate per ASME B31.9, Building Services Piping.

3. Inspection: No inspection required.

C. Copper Tube/Pipe Brazing: Qualify processes and brazers according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications," or AWS B2.2, "Standard for Brazing Procedure and Performance Qualification."

1. Verify that each brazer has passed ASME or AWS qualification tests for brazing processes used and that qualifications are current.

2. Fabricate per ASME B31.9, Building Services Piping.

3. Inspection: No inspection required.

D. Electrical Characteristics for Mechanical Equipment: Equipment of superior electrical characteristics may be furnished provided such proposed equipment is approved in writing and connecting electrical services, circuit breakers, and conduit sizes are appropriately modified. Where minimum energy ratings or efficiencies are specified, equipment shall comply with requirements.

E. Mechanical Equipment, systems and materials shall:

1. Meet or exceed ASHRAE 90.1 efficiencies and performance criteria.
2. Electrical equipment and devices shall be UL or CSA listed and Labled.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.

B. Store plastic pipes protected from direct sunlight. Support to prevent sagging and bending.

1.6 COORDINATION

A. Arrange for pipe spaces, chases, slots, and openings in building structure during progress of construction, to allow for mechanical installations.

B. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components as they are constructed.

C. Coordinate requirements for access panels and doors for mechanical items requiring access that are concealed behind finished surfaces. Access panels and doors are specified in Division 8 Section "Access Doors and Frames."

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. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

2.2 PIPE, TUBE, AND FITTINGS

A. Refer to individual Division 21, 22, and 23 piping Sections for pipe, tube, and fitting materials and joining methods.

B. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

2.3 JOINING MATERIALS

A. Refer to individual Division 21, 22, and 23 piping Sections for special joining materials not listed below

B. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.

1. ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch maximum thickness unless thickness or specific material is indicated.

a. Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.
b. Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.

2. AWWA C110, rubber, flat face, 1/8 inch thick, unless otherwise indicated; and full-face or ring type, unless otherwise indicated.

C. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.

D. Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.

E. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813. Proprietary, lead-free alloys are also acceptable.

F. Brazing Filler Metals: For all services except fuel gases: AWS A5.8, BCuP-5, copper alloy.

G. Welding Filler Metals: Comply with AWS D10.12.

H. Solvent Cements for Joining Plastic Piping:

1. CPVC Piping: Comply with ASTM F 493.

2.4 TRANSITION FITTINGS

A. AWWA Transition Couplings: Same size as, and with pressure rating at least equal to and with ends compatible with, piping to be joined.

1. Manufacturers:

a. Cascade Waterworks Mfg. Co.
b. Dresser Industries, Inc.; DMD Div.
c. Ford Meter Box Company, Incorporated (The); Pipe Products Div.
d. JCM Industries.
e. Smith-Blair, Inc.
f. Viking Johnson.

2. Aboveground Pressure Piping: Pipe fitting.

B. Plastic-to-Metal Transition Fittings: CPVC one-piece fitting with manufacturer's Schedule 80 equivalent dimensions; one end with threaded brass insert, and one solvent-cement-joint end.

1. Manufacturers:

a. Eslon Thermoplastics.

C. Plastic-to-Metal Transition Adaptors: One-piece fitting with manufacturer's SDR 11 equivalent dimensions; one end with threaded brass insert, and one solvent-cement-joint end.

1. Manufacturers:

a. Thompson Plastics, Inc.

D. Plastic-to-Metal Transition Unions: MSS SP-107, CPVC four-part union. Include brass end, solvent-cement-joint end, rubber O-ring, and union nut.

1. Manufacturers:

a. NIBCO INC.
b. NIBCO, Inc.; Chemtrol Div.

2.5 DIELECTRIC FITTINGS

A. Description: Combination fitting of copper alloy and ferrous materials with threaded, solder-joint, plain, or weld-neck end connections that match piping system materials.

B. Insulating Material: Suitable for system fluid, pressure, and temperature.

C. Dielectric Unions: Factory-fabricated, union assembly, for 250-psig minimum working pressure at 180 deg F.

1. Manufacturers:

    a. Capitol Manufacturing Co.
    b. Central Plastics Company.
    c. Eclipse, Inc.
    d. Epco Sales, Inc.
    e. Hart Industries, International, Inc.
    f. Watts Industries, Inc.; Water Products Div.
    g. Zurn Industries, Inc.; Wilkins Div.

D. Dielectric Flanges: Factory-fabricated, companion-flange assembly, for 150- or 300-psig minimum working pressure as required to suit system pressures.

1. Manufacturers:

    a. Capitol Manufacturing Co.
    b. Central Plastics Company.
    c. Epco Sales, Inc.
    d. Watts Industries, Inc.; Water Products Div.

E. Dielectric-Flange Kits: Companion-flange assembly for field assembly. Include flanges, full-face- or ring-type neoprene or phenolic gasket, phenolic or polyethylene bolt sleeves, phenolic washers, and steel backing washers.

1. Manufacturers:

    a. Advance Products & Systems, Inc.
    b. Calpico, Inc.
    c. Central Plastics Company.
    d. Pipeline Seal and Insulator, Inc.

2. Separate companion flanges and steel bolts and nuts shall have 150- or 300-psig minimum working pressure where required to suit system pressures.

F. Dielectric Nipples: Electroplated steel nipple with inert and noncorrosive, thermoplastic lining; plain, threaded, or grooved ends; and 300-psig minimum working pressure at 225 deg F.

1. Manufacturers:

    a. Perfection Corp.
    b. Precision Plumbing Products, Inc.
    c. Sioux Chief Manufacturing Co., Inc.
    d. Victaulic Co. of America.

2.6 SLEEVES

A. Galvanized-Steel Sheet: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.

B. Steel Pipe: ASTM A 53, Type E, Grade B, Schedule 40, galvanized, plain ends.

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

D. Stack Sleeve Fittings: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring and bolts and nuts for membrane flashing.

1. Underdeck Clamp: Clamping ring with set screws.

E. Molded CPVC: Permanent, with nailing flange for attaching to wooden forms.

F. CPVC Pipe: ASTM D 1785, Schedule 40.

G. Molded PE: Reusable, PE, tapered-cup shaped, and smooth-outer surface with nailing flange for attaching to wooden forms.

2.7 ESCUTCHEONS

A. Description: Manufactured wall and ceiling escutcheons and floor plates, with an ID to closely fit around pipe, tube, and insulation of insulated piping and an OD that completely covers opening.

B. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass with polished chrome-plated finish.

C. One-Piece, Cast-Brass Type: With set screw.

1. Finish: Polished chrome-plated.

D. Split-Casting, Cast-Brass Type: With concealed hinge and set screw.

1. Finish: Polished chrome-plated.

E. One-Piece, Stamped-Steel Type: With set screw or spring clips and chrome-plated finish.

F. Split-Plate, Stamped-Steel Type: With concealed hinge, set screw or spring clips, and chrome-plated finish.

G. One-Piece, Floor-Plate Type: Cast-iron floor plate.

H. Split-Casting, Floor-Plate Type: Cast brass with concealed hinge and set screw.

2.8 FIRE STOPPING

A. Fire stopping of fire rated barriers/floors shall be supported by an approved detail. The installation of the fire stop assembly shall be in accordance with the approved detail.

PART 3 - EXECUTION

3.1 MECHANICAL DEMOLITION

A. Refer to Division 01 Section "Cutting and Patching" and Division 02 Section "Selective Structure Demolition" for general demolition requirements and procedures.

B. Disconnect, demolish, and remove plumbing systems, equipment, and components indicated to be removed.

1. Piping to Be Removed: Remove portion of piping indicated to be removed and cap remaining piping with same or compatible piping material.

2. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material.

3. Equipment to Be Removed: Disconnect and cap services and remove equipment.

4. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.

5. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.

C. If pipe, insulation, or equipment to remain is damaged in appearance or is unserviceable, remove damaged or unserviceable portions and replace with new products of equal capacity and quality.

3.2 PIPING SYSTEMS - COMMON REQUIREMENTS

A. Install piping according to the following requirements and Division 20, 21, 22, and 23 Sections specifying piping systems.

B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless major deviations to layout are approved by the PNNL Engineer.

C. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.

D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

F. Install piping to permit valve servicing.

G. Install piping at indicated slopes.

H. Install piping free of sags and bends.

I. Install fittings for changes in direction and branch connections.

J. Install piping to allow application of insulation.

K. Select system components with pressure rating equal to or greater than system operating pressure.

L. Install escutcheons for penetrations of walls and floors according to the following:

1. Piping:

a. Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep-pattern type.

b. Insulated Piping: One-piece, stamped-steel type with spring clips.

c. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, stamped-steel type.

M. Permanent sleeves are not required for holes formed by removable PE sleeves.

N. Install sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, and concrete floor and roof slabs.

1. Cut sleeves to length for mounting flush with both surfaces.

2. Install sleeves in new walls and slabs as new walls and slabs are constructed.

3. Install sleeves that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation. Use the following sleeve materials:

4. Seal annular space between sleeve and pipe or pipe insulation, using joint sealants appropriate for size, depth, and location of joint. Refer to Division 7 Section "Joint Sealants" for materials and installation.

O. Verify final equipment locations for roughing-in.

P. Refer to equipment specifications and approved submittals in other Sections of these Specifications for roughing-in requirements.

3.3 PIPING JOINT CONSTRUCTION

A. Join pipe and fittings according to the following requirements and Division 20, 21, 22, and 23 Sections specifying piping systems.

B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

D. Pressed Joints: Copper press joints shall be made in accordance with the manufacturer's installation instructions. The pipe shall be fully inserted into the fitting and the pipe marked at the shoulder of the fitting. The fitting alignment shall be checked against the mark on the pipe to assure the pipe is fully engaged (inserted) into the fitting. The joint shall be pressed using the tool approved by the manufacturer.

E. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.

2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

F. Welded Joints: Construct joints according to ASME AWS D10.12, using qualified processes and welders according to Part 1 "Quality Assurance" Article.

G. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

H. Plastic Piping Solvent-Cement Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:

1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.

2. CPVC Pressure Piping: Join schedule number ASTM D 1785, CPVC pipe and CPVC socket fittings according to ASTM D 2672. Join other-than-schedule-number CPVC pipe and socket fittings according to ASTM D 2855.

I. Plastic Pressure Piping Gasketed Joints: Join according to ASTM D 3139.

3.4 PIPING CONNECTIONS

A. Make connections according to the following, unless more stringent provisions are indicated:

1. Install unions, in piping NPS 2 and smaller, adjacent to each valve and at final connection to each piece of equipment.

2. Install flanges, in piping NPS 2-1/2 and larger, adjacent to flanged valves and at final connection to each piece of equipment.

3. Dry Piping Systems: Install dielectric unions and flanges to connect piping materials of dissimilar metals.

4. Wet Piping Systems: Install dielectric coupling and nipple fittings to connect piping materials of dissimilar metals.

3.5 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

A. Install equipment to allow maximum possible headroom unless specific mounting heights are indicated.

B. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.

C. Install mechanical equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations. Extend grease fittings to accessible locations.

D. Install equipment to allow right of way for piping installed at required slope.

3.6 PAINTING

A. Painting of mechanical systems, equipment, and components is specified in Division 9 Section 099113 and 099123.

B. Damage and Touchup: Repair marred and damaged factory-painted finishes with materials and procedures to match original factory finish.

3.7 ERECTION OF METAL SUPPORTS AND ANCHORAGES

A. Refer to Division 5 Section "Metal Fabrications" for structural steel.

B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor mechanical materials and equipment.

C. Field Welding: See Paragraph 1.4.

END OF SECTION 200500

SECTION 200513

COMMON MOTOR REQUIREMENTS FOR MECHANICAL EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes general requirements for single-phase and polyphase, general-purpose, horizontal, small and medium, squirrel-cage induction motors for use on ac power systems up to 600 V and installed at equipment manufacturer's factory or shipped separately by equipment manufacturer for field installation.

B. See individual Sections for application of motors and reference to specific motor requirements for motor-driven equipment.

1.2 SUBMITTALS

A. Qualification Data: For testing agency.

B. Product Data.

1.3 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: UL listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Comply with NFPA 70.

C. 1-HP and larger motors shall meet minimum energy efficiency requirements contained in ASHRAE 90.1.

1.4 COORDINATION

A. Coordinate features of motors, installed units, and accessory devices and features that comply with the following:

1. Compatible with the following:

a. Magnetic controllers.
b. Multispeed controllers.
c. Reduced-voltage controllers.
d. Torque, speed, and horsepower requirements of the load.
e. Ratings and characteristics of supply circuit and required control sequence.
f. Ambient and environmental conditions of installation location.

2. Designed and labeled for use with variable frequency controllers, and suitable for use throughout speed range without overheating.

3. Matched to torque and horsepower requirements of the load.

4. Matched to ratings and characteristics of supply circuit and required control sequence.

B. Coordinate motor support with requirements for driven load; access for maintenance and motor replacement; installation of accessories, belts, belt guards; and adjustment of sliding rails for belt tensioning.

PART 2 - PRODUCTS

2.1 GENERAL MOTOR REQUIREMENTS

A. Comply with requirements in this Section except when stricter requirements are specified in mechanical equipment schedules or Sections.

B. Comply with NEMA MG 1, part 31 inverter duty.

2.2 MOTOR CHARACTERISTICS

A. Motors 1 HP and Larger: Three phase.

B. Frequency Rating: 60 Hz.

C. Voltage Rating: NEMA standard voltage selected to operate on nominal circuit voltage to which motor is connected.

D. Service Factor: 1.15 for open drip-proof motors; 1.0 for totally enclosed motors.

E. Duty: Continuous duty at ambient temperature of 105º F and at altitude of 3300 feet above sea level.

F. Capacity and Torque Characteristics: Sufficient to start, accelerate, and operate connected loads at designated speeds, at installed altitude and environment, with indicated operating sequence, and without exceeding nameplate ratings or considering service factor.

2.3 3-PHASE MOTORS

A. Description: NEMA MG 1, Design B, medium induction motor.

B. Efficiency: As stated in the ASHRA 90.1.

C. Stator: Copper windings, unless otherwise indicated.

1. Multispeed motors shall have separate winding for each speed.

D. Rotor: Squirrel cage, unless otherwise indicated.

E. Bearings: Double-shielded, prelubricated ball bearings suitable for radial and thrust loading.

F. Temperature Rise: Match insulation rating, unless otherwise indicated.

G. Insulation: Class F, unless otherwise indicated.

H. Code Letter Designation:

1. Motors 15 HP and Larger: NEMA starting Code F or Code G.
2. Motors Smaller Than 15 HP: Manufacturer's standard starting characteristic.

I. Enclosure: Cast iron for motors 7.5 hp and larger; rolled steel for motors smaller than 7.5 hp.

1. Finish: Standard Manufacturer’s Color.

2.4 3-PHASE MOTORS WITH ADDITIONAL REQUIREMENTS

A. Motors Used with Variable Frequency Drives: Ratings, characteristics, and features coordinated with and approved by controller manufacturer.

1. Designed with critical vibration frequencies outside operating range of drive output.

2. Temperature Rise: Matched to rating for Class B insulation.

3. Insulation: Class H.

4. Thermal Protection: Comply with NEMA MG 1 requirements for thermally protected motors.

B. Source Quality Control for Field-Installed Motors: Perform the following tests on each motor according to NEMA MG 1:

1. Measure winding resistance.
2. Read no-load current and speed at rated voltage and frequency.
3. Measure locked rotor current at rated frequency.
4. Perform high-potential test.

PART 3 - EXECUTION

3.1 FIELD-INSTALLED MOTOR INSTALLATION

A. Anchor each motor assembly to base, adjustable rails, or other support, arranged and sized according to manufacturer's written instructions. Attach by bolting. Level and align with load transfer link.

B. Install motors on concrete bases complying with Division 3.

C. Comply with mounting and anchoring requirements specified in Division 15 Section "Mechanical Vibration and Seismic Controls."

3.2 FIELD QUALITY CONTROL FOR FIELD-INSTALLED MOTORS

A. Prepare for acceptance tests.

1. Align motors, bases, shafts, pulleys, and belts. Tension belts according to manufacturer's written instructions.

2. Verify bearing lubrication.

3. Run each motor with its controller. Demonstrate correct rotation, alignment, and speed at motor design load.

4. Test interlocks and control and safety features for proper operation.

5. Verify that current and voltage for each phase comply with nameplate rating and NEMA MG 1 tolerances.

B. Perform the following field tests and inspections and prepare test reports:

1. Perform electrical tests and visual and mechanical inspections except optional tests and inspections stated in NETA ATS on factory- and field-installed motors. Certify compliance with test parameters.

2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

END OF SECTION 200513

SECTION 200519

METERS AND GAGES FOR MECHANICAL PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following meters and gages for mechanical systems:

1. Thermometers.
2. Pressure Gages.
3. Test plugs.
4. Flowmeters.
5. Differential Pressure Indicators.

1.2 SUBMITTALS

A. Product Data: Thermometers, Pressure Gages and Flow Meters

B. Product certificates of calibration.

C. Operation and maintenance data.

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 THERMOMETERS

A. Bimetallic-Actuated Dial Thermometers:

1. Manufacturers:

a. Ashcroft Commercial Instrument Operations; Dresser Industries; Instrument Div.
b. Trerice, H. O. Co.
c. Weiss Instruments, Inc.
d. Weksler Instruments Operating Unit; Dresser Industries; Instrument Div.

2. Description: 3.5” Stainless Steel Case, Direct Mounted Dial Thermometer, Bimetallic-actuated, Adjustable Angle.

3. Case: Stainless Steel

4. Window: Clear Glass

5. Connector: Bottom, ¼” NPT.

6. Stem: Stainless Steel, for thermowell installation and of length to suit temperature range requirements.

7. Accuracy: +/- 1 Scale Division

8. Temperature Range: 0°F to 100°F

B. Thermowells:

1. Manufacturers: Same as manufacturer of thermometer being used.

2. Description: Copper, Pressure-tight, socket-type metal fitting made for insertion into piping and of type, diameter, and length required to hold thermometer.

2.3 PRESSURE GAGES

A. Manufacturers:

1. Ashcroft Commercial Instrument Operations; Dresser Industries; Instrument Div.
2. Trerice, H. O. Co.
3. Weiss Instruments, Inc.
4. Weksler Instruments Operating Unit; Dresser Industries; Instrument Div.

B. Direct-Mounting, Dial-Type Pressure Gages: Indicating-dial type complying with ASME B40.100.

1. Case: Liquid-filled type, drawn steel or cast aluminum, 4-1/2-inch diameter.

2. Pressure-Element Assembly: Bourdon tube, unless otherwise indicated.

3. Pressure Connection: Brass, NPS 1/4, bottom-outlet type unless back-outlet type is indicated.

4. Movement: Mechanical, with link to pressure element and connection to pointer.

5. Dial: Satin-faced, nonreflective aluminum with permanently etched scale markings.

6. Pointer: Red or other dark-color metal.

7. Window: Glass or plastic.

8. Ring: Stainless steel.

9. Accuracy: Grade A, plus or minus 1 percent of middle half scale.

10. Vacuum-Pressure Range: 30-in. Hg of vacuum to 15 psig of pressure.

11. Range for Fluids under Pressure: Two times operating pressure.

C. Pressure-Gage Fittings:

1. Valves: NPS 1/4 brass or stainless-steel needle type.

2. Syphons: NPS 1/4 coil of brass tubing with threaded ends.

3. Snubbers: ASME B40.5, NPS 1/4 brass bushing with corrosion-resistant, porous-metal disc of material suitable for system fluid and working pressure.

2.4 TEST PLUGS

A. Manufacturers:

1. Flow Design, Inc.
2. MG Piping Products Co.
3. National Meter, Inc.
4. Peterson Equipment Co., Inc.
5. Sisco Manufacturing Co.
6. Trerice, H. O. Co.
7. Watts Industries, Inc.; Water Products Div.

B. Description: Corrosion-resistant brass or stainless-steel body with core inserts and gasketed and threaded cap, with extended stem for units to be installed in insulated piping.

C. Minimum Pressure and Temperature Rating: 500 psig at 200 deg F.

D. Core Inserts: One or two self-sealing rubber valves.

1. Insert material for air, water, oil, or gas service at 20 to 200 deg F shall be CR.
2. Insert material for air or water service at minus 30 to plus 275 deg F shall be EPDM.

E. Test Kit: Furnish one test kit(s) containing one pressure gage and adaptor, two thermometer(s), and carrying case. Pressure gage, adapter probes, and thermometer sensing elements shall be of diameter to fit test plugs and of length to project into piping.

1. Pressure Gage: Small bourdon-tube insertion type with 2- to 3-inch- diameter dial and probe. Dial range shall be 0 to 200 psig.

2. Low-Range Thermometer: Small bimetallic insertion type with 1- to 2-inch- diameter dial and tapered-end sensing element. Dial ranges shall be 25 to 125 deg F.

3. High-Range Thermometer: Small bimetallic insertion type with 1- to 2-inch- diameter dial and tapered-end sensing element. Dial ranges shall be 0 to 220 deg F.

4. Carrying case shall have formed instrument padding.

2.5 FLOWMETERS

A. Turbine Flowmeters

1. Manufacturer:

a. ONICON Incorporated.

2. Model: F-1211 Dual Turbine Insertion Flowmeter with isolated analog output.

3. Flow meters shall be sized to meet system pipe size and flow rate.

PART 3 - EXECUTION

3.1 THERMOMETER APPLICATIONS

A. Install thermometers as indicated in the drawings.

B. Provide the following temperature ranges for thermometers:
1. Process Water: 0 to 160 deg F, with 2-degree scale divisions.
2. Injection Water: 0 to 100 deg F, with 2-degree scale divisions.

3.2 GAGE APPLICATIONS

A. Install pressure gages at suction and discharge of each pump, use multi-port pressure gage as indicated.

3.3 INSTALLATIONS

A. Install direct-mounting thermometers and adjust vertical and tilted positions.

B. Install thermowells with socket extending one-third of diameter of pipe and in vertical position in piping tees where thermometers are indicated.

C. Install direct-mounting pressure gages in piping tees with pressure gage located on pipe at most readable position. Provide an isolation valve between gage and pipe connection. See Section 200523 for valves.

D. Install needle-valve “gage cock” and snubber fitting in piping for each pressure gage for fluids (except steam).

E. Install test plugs “Threadolets” in tees in piping.

F. Assemble and install connections, tubing, and accessories between flow-measuring elements and flowmeters as prescribed by manufacturer's written instructions.

G. Install flowmeter elements in accessible positions in piping systems.

H. Install flowmeter elements with at least minimum straight lengths of pipe upstream and downstream from element as prescribed by manufacturer's written instructions.

I. Install connection fittings for attachment to portable indicators in accessible locations.

J. Install turbine type flowmeter as indicated on drawings.

K. Install meters and gages adjacent to machines and equipment to allow service and maintenance for meters, gages, machines, and equipment.

L. Calibrate meters according to manufacturer's written instructions, after installation.

M. Adjust faces of meters and gages to proper angle for best visibility.

END OF SECTION 200519

SECTION 200523

GENERAL DUTY VALVES FOR MECHANICAL PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following general duty valves all mechanical applications unless specified for a certain service type :

1. Ball valves.
2. Butterfly valves.

B. See Division 21, 22 and 23 piping Sections for specialty valves applicable to those Sections only.

C. See Division 23 Section 230900 "HVAC Instrumentation and Controls" for control valves and actuators.

1.2 SUBMITTALS

A. Product Data: For each type of valve indicated. Include body, seating, and trim materials; valve design; pressure and temperature classifications; end connections; arrangement; dimensions; and required clearances. Include list indicating valve and its application. Include rated capacities; furnished specialties; and accessories.

1.3 QUALITY ASSURANCE

A. ASME Compliance: ASME B31.9 for building services piping valves.

B. ASME Compliance for Ferrous Valves: ASME B16.10 and ASME B16.34 for dimension and design criteria.

PART 2 - PRODUCTS

2.1 VALVES, GENERAL

A. Refer to Part 3 "Valve Applications" Article for applications of valves.

B. Bronze Ball Valves: NPS 2 and Smaller: Threaded ends, unless otherwise indicated.

C. Butterfly Valves NPS 2-1/2 and Larger: Flanged ends, unless otherwise indicated.

D. Valve Pressure and Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.

E. Valve Sizes: Same as upstream pipe, unless otherwise indicated.

F. Valve Actuators:

1. Handwheel: For valves other than quarter-turn types.
2. Lever Handle: For quarter-turn valves NPS 4 and smaller, except plug valves.
3. Gear Operator: For quarter-turn valves larger than NPS 4.

G. Extended Valve Stems: On insulated valves.

H. Valve Flanges: ASME B16.1 for cast-iron valves, ASME B16.5 for steel valves, and ASME B16.24 for bronze valves.

I. Valve Grooved Ends: AWWA C606.

J. Solder Joint: With sockets according to ASME B16.18.

1. Caution: Use solder with melting point below 840 deg F for angle, check, gate, and globe valves; below 421 deg F for ball valves.

K. Threaded: With threads according to ASME B1.20.1.

L. Valve Bypass and Drain Connections: MSS SP-45.

2.2 BALL VALVES

A. Up to and including 2": Bronze Ball: Bronze body, cap, stem and ball. Full Port, one-quarter turn handle, two piece construction, PTFE-N seats, packing and O-rings, 600 PSIG WOG / 150 PSIG SWP, Milwaukee BA Series, or approved equal.

2.3 BUTTERFLY VALVES

A. Over 2": Milwaukee "C" Series, or equivalent by Hammond or Nibco. 250 psig "dead end service for 150 PSI, bubble-tight shutoff, EPDM liner, cast iron body", full lug style.

2.4 VALVES SPECIFIED ELSEWHERE

A. Provide special valves such as motor operated valves, relief valves, as indicated on the drawings.

PART 3 - EXECUTION

3.1 VALVE INSTALLATION

A. Piping installation requirements are specified in other Division 23 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.

C. Locate valves for easy access and provide separate support where necessary.

D. Install valves in horizontal piping with stem at or above center of pipe.

E. Install valves in position to allow full stem movement.

F. Install check valves for proper direction of flow and as follows:

1. Swing Check Valves: In horizontal position with hinge pin level.

3.2 JOINT CONSTRUCTION

A. Refer to Division 20 Section "Common Work Results for Mechanical Piping & HVAC" for basic piping joint construction.

B. Grooved Joints: Assemble joints with keyed coupling housing, gasket, lubricant, and bolts according to coupling and fitting manufacturer's written instructions.

C. Soldered Joints: Use ASTM B 813, water-flushable, lead-free flux; ASTM B 32, lead-free-alloy solder; and ASTM B 828 procedure, unless otherwise indicated.

3.3 ADJUSTING

A. Adjust or replace valve packing after piping systems have been tested and put into service but before final adjusting and balancing. Replace valves if persistent leaking occurs.

END OF SECTION 200523

SECTION 200529

HANGERS AND SUPPORTS FOR MECHANICAL PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Steel pipe hangers and supports.
2. Trapeze pipe hangers.
3. Metal framing systems.
4. Thermal-hanger shield inserts.
5. Fastener systems.
6. Pipe stands.
7. Equipment supports.

B. See Division 23 Section(s) "Metal Ducts” for duct hangers and supports.

1.2 DEFINITIONS

A. Terminology: As defined in MSS SP-90, "Guidelines on Terminology for Pipe Hangers and Supports."

1.3 PERFORMANCE REQUIREMENTS

A. Design supports for multiple pipes capable of supporting combined weight of supported systems, system contents, and test water.

B. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.

1.4 SUBMITTALS

A. Product Data: For the following:

1. Steel pipe hangers and supports.
2. Thermal-hanger shield inserts.
3. Powder-actuated fastener systems.

1.5 QUALITY ASSURANCE

A. Welding: See Section 200500.

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 STEEL PIPE HANGERS AND SUPPORTS

A. Description: MSS SP-58 and 69, Types 1 through 58, factory-fabricated components. Refer to Part 3 "Hanger and Support Applications" Article for where to use specific hanger and support types.

B. Manufacturers:

1. Anvil International (formerly Grinnell)
2. B-Line Systems, Inc.; a division of Cooper Industries.
3. ERICO/Michigan Hanger Co.

C. Galvanized, Metallic Coatings: Pregalvanized or hot dipped.

D. Nonmetallic Coatings: Plastic coating, jacket, or liner.

E. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion for support of bearing surface of piping.

2.3 TRAPEZE PIPE HANGERS

A. Description: MSS SP-69, Type 59, shop- or field-fabricated pipe-support assembly made from structural-steel shapes with MSS SP-58 hanger rods, nuts, saddles, and U-bolts.

2.4 METAL FRAMING SYSTEMS

A. Description: MFMA-3, shop- or field-fabricated pipe-support assembly made of steel channels and other components.

B. Manufacturers:

1. B-Line Systems, Inc.; a division of Cooper Industries.
2. ERICO/Michigan Hanger Co.; ERISTRUT Div.
3. Power-Strut Div.; Tyco International, Ltd.
4. Thomas & Betts Corporation.

C. Coatings: Framing channel above raised floor shall be painted per Division 9.

D. Nonmetallic Coatings: Plastic coating, jacket, or liner.

2.5 THERMAL-HANGER SHIELD INSERTS

A. Description: 100-psig- minimum, compressive-strength insulation insert encased in sheet metal shield.

B. Manufacturers:

1. Carpenter & Paterson, Inc.
2. ERICO/Michigan Hanger Co.
3. PHS Industries, Inc.
4. Pipe Shields, Inc.
5. Rilco Manufacturing Company, Inc.

C. Insulation-Insert Material for Cold Piping: Water-repellent treated, ASTM C 533, Type I calcium silicate with vapor barrier.

D. For Trapeze or Clamped Systems: Insert and shield shall cover entire circumference of pipe.

E. For Clevis or Band Hangers: Insert and shield shall cover entire circumference of pipe.

F. Insert Length: Extend 2 inches beyond sheet metal shield for piping operating below ambient air temperature.

2.6 FASTENER SYSTEMS

A. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

1. Manufacturers:

a. Hilti, Inc.
b. ITW Ramset/Red Head.
c. Masterset Fastening Systems, Inc.
d. MKT Fastening, LLC.
e. Powers Fasteners.

B. Mechanical-Expansion Anchors: Insert-wedge-type stainless steel, for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

1. Manufacturers:

a. B-Line Systems, Inc.; a division of Cooper Industries.
b. Empire Industries, Inc.
c. Hilti, Inc.
d. ITW Ramset/Red Head.

e. MKT Fastening, LLC.
f. Powers Fasteners.

2.7 EQUIPMENT SUPPORTS

A. Description: Welded, shop- or field-fabricated equipment support made from structural-steel shapes.

2.8 MISCELLANEOUS MATERIALS

A. Structural Steel: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.

PART 3 - EXECUTION

3.1 HANGER AND SUPPORT APPLICATIONS

A. Specific hanger and support requirements are specified in Sections specifying piping systems and equipment.

B. Comply with MSS SP-69 for pipe hanger selections and applications that are not specified in piping system Sections.

C. Use hangers and supports with galvanized, metallic coatings for piping and equipment that will not have field-applied finish.

D. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.

E. Use padded hangers for piping that is subject to scratching.

F. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated stationary pipes, NPS 1/2 to NPS 30.

2. Carbon- or Alloy-Steel, Double-Bolt Pipe Clamps (MSS Type 3): For suspension of pipes, NPS 3/4 to NPS 24, requiring clamp flexibility and up to 4 inches of insulation.

3. Steel Pipe Clamps (MSS Type 4): For suspension of cold and hot pipes, NPS 1/2 to NPS 24, if little or no insulation is required.

4. Pipe Hangers (MSS Type 5): For suspension of pipes, NPS 1/2 to NPS 4, to allow off-center closure for hanger installation before pipe erection.

5. Adjustable, Steel Band Hangers (MSS Type 7): For suspension of noninsulated stationary pipes, NPS 1/2 to NPS 8.

6. Adjustable Band Hangers (MSS Type 9): For suspension of noninsulated stationary pipes, NPS 1/2 to NPS 8.

7. U-Bolts (MSS Type 24): For support of heavy pipes, NPS 1/2 to NPS 30.

8. Pipe Saddle Supports (MSS Type 36): For support of pipes, NPS 4 to NPS 36, with steel pipe base stanchion support and cast-iron floor flange.

9. U-Bolts (MSS Type 24): For support of heavy pipes, NPS 1/2 to NPS 30.

10. Clips (MSS Type 26): For support of insulated pipes not subject to expansion or contraction.

11. Pipe Saddle Supports (MSS Type 36): For support of pipes, NPS 4 to NPS 36, with steel pipe base stanchion support and cast-iron floor flange.

12. Pipe Stanchion Saddles (MSS Type 37): For support of pipes, NPS 4 to NPS 36, with steel pipe base stanchion support and cast-iron floor flange and with U-bolt to retain pipe.

13. Adjustable Pipe Saddle Supports (MSS Type 38): For stanchion-type support for pipes, NPS 2-1/2 to NPS 36, if vertical adjustment is required, with steel pipe base stanchion support and cast-iron floor flange.

G. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers, NPS 3/4 to NPS 20.
2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers, NPS 3/4 to NPS 20, if longer ends are required for riser clamps.

H. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches for heavy loads.
2. Steel Clevises (MSS Type 14): For 120 to 450 deg F piping installations.

I. Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.

2. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.

3. Welded Beam Attachments (MSS Type 22): For attaching to bottom of beams if loads are considerable and rod sizes are large.

4. C-Clamps (MSS Type 23): For structural shapes.

5. Welded-Steel Brackets: For support of pipes from below, or for suspending from above by using clip and rod. Use one of the following for indicated loads:

   a. Light (MSS Type 31): 750 lb.
   b. Medium (MSS Type 32): 1500 lb.
   c. Heavy (MSS Type 33): 3000 lb.

6. Side-Beam Brackets (MSS Type 34): For sides of steel or wooden beams.

7. Plate Lugs (MSS Type 57): For attaching to steel beams if flexibility at beam is required.

J. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.

2. Protection Shields (MSS Type 40): Of length recommended in writing by manufacturer to prevent crushing insulation.

3. Thermal-Hanger Shield Inserts: For supporting insulated pipe.

K. Spring Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Spring Cushions (MSS Type 48): For light loads if vertical movement does not exceed 1-1/4 inches.

2. Spring-Cushion Roll Hangers (MSS Type 49): For equipping Type 41 roll hanger with springs.

3. Variable-Spring Base Supports (MSS Type 52): Preset to indicated load and limit variability factor to 25 percent to absorb expansion and contraction of piping system from base support.

L. Comply with MSS SP-69 for trapeze pipe hanger selections and applications that are not specified in piping system Sections.

M. Comply with MFMA-102 for metal framing system selections and applications that are not specified in piping system Sections.

N. Use powder-actuated fasteners instead of building attachments where required in concrete construction.

3.2 HANGER AND SUPPORT INSTALLATION

A. Steel Pipe Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from building structure. Support of piping from equipment, other piping, or other system supports is prohibited.

B. Trapeze Pipe Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Arrange for grouping of parallel runs of horizontal piping and support together on field-fabricated trapeze pipe hangers.

1. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified above for individual pipe hangers.

2. Field fabricate from ASTM A 36/A 36M, steel shapes selected for loads being supported. Weld steel according to Section 15050.

C. Metal Framing System Installation: Arrange for grouping of parallel runs of piping and support together on field-assembled metal framing systems.

D. Thermal-Hanger Shield Installation: Install in pipe hanger or shield for insulated piping.

E. Fastener System Installation:

1. Install powder-actuated fasteners in concrete after concrete is placed and completely cured. Use operators that are licensed by powder-actuated tool manufacturer. Install fasteners according to powder-actuated tool manufacturer's operating manual.

2. Install mechanical-expansion anchors in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.

F. Pipe Stand Installation:

1. Pipe Stand Types except Curb-Mounting Type: Assemble components and mount on smooth roof surface. Do not penetrate roof membrane.

2. Curb-Mounting-Type Pipe Stands: Assemble components or fabricate pipe stand and mount on permanent, stationary roof curb. Refer to Division 7 Section "Roof Accessories" for curbs.

G. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers, and other accessories.

H. Equipment Support Installation: Fabricate from welded-structural-steel shapes.

I. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.

J. Install lateral bracing with pipe hangers and supports to prevent swaying.

K. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, NPS 2-1/2 and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.

L. Load Distribution: Install hangers and supports so piping live and dead loads and stresses from movement will not be transmitted to connected equipment.

M. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and so maximum pipe deflections allowed by ASME B31.9 (for building services piping) are not exceeded.

N. Insulated Piping: Comply with the following:

1. Attach clamps and spacers to piping.

    a. Piping Operating above Ambient Air Temperature: Clamp may project through insulation.

    b. Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.

    c. Do not exceed pipe stress limits according to ASME B31.9 for building services piping.

2. Install MSS SP-58, Type 39, protection saddles if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.

3. Install MSS SP-58, Type 40, protective shields on cold piping with vapor barrier. Shields shall span an arc of 180 degrees.

4. Shield Dimensions for Pipe: Not less than the following:

    a. NPS 1/4 to NPS 3-1/2: 12 inches long and 0.048 inch thick.
    b. NPS 4: 12 inches long and 0.06 inch thick.
    c. NPS 5 and NPS 6: 18 inches long and 0.06 inch thick.
    d. NPS 8 to NPS 14: 24 inches long and 0.075 inch thick.
    e. NPS 16 to NPS 24: 24 inches long and 0.105 inch thick.

5. Pipes NPS 8 and Larger: Include wood inserts.

6. Insert Material: Length at least as long as protective shield.

7. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.

3.3 EQUIPMENT SUPPORTS

A. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.

B. Grouting: Place grout under supports for equipment and make smooth bearing surface.

C. Provide lateral bracing, to prevent swaying, for equipment supports.

3.4 METAL FABRICATIONS

A. Cut, drill, and fit miscellaneous metal fabrications for trapeze pipe hangers and equipment supports.

B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.

C. Field Welding: Comply with Section 200500 for shielded metal arc welding, appearance and quality of welds, and methods used in correcting welding work, and with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.

2. Obtain fusion without undercut or overlap.

3. Remove welding flux immediately.

4. Finish welds at exposed connections so no roughness shows after finishing and contours of welded surfaces match adjacent contours.

3.5 ADJUSTING

A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

3.6 PAINTING

A. Paint Per Division 9Touch Up: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately.

1. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils.

END OF SECTION 200529

SECTION 200553

IDENTIFICATION FOR MECHANICAL PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following mechanical identification materials and their installation:

1. Equipment labels.
2. Hazard labels.
3. Pipe labels.
4. Duct labels.
5. Valve labels.

1.2 QUALITY ASSURANCE

A. ASME and PNNL Labeling Standard ADM-CM-064 (available electronically by request) Compliance: Unless stated otherwise in this Section or on the drawings, comply with ASME A13.1 and ADM-CM-064, "Scheme for the Identification of Piping Systems," for letter size, length of color field, colors, and viewing angles of identification devices for piping.

1.3 COORDINATION

A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

B. Coordinate installation of identifying devices with location of access panels and doors.

C. Install identifying devices before installing acoustical ceilings and similar concealment.

D. For items with Equipment Identification Numbers that require labeling, the labels will be made by Battelle and installed by the contractor. The Battelle Construction Manager shall coordinate the making of the labels with installation of their associated equipment.

PART 2 - PRODUCTS

2.1 MISCELLANEOUS LABELS

A. Equipment Labels for Indoor Locations: Self-adhesive vinyl type, for permanent attachment on equipment. If there is not adequate flat space on equipment for attachment of label, provide a metal backing plate for label. When this section conflicts with the drawings, the drawings shall take precedence.

1. Metal Backing Material: 0.032-inch- thick aluminum.
2. Data (per equipment schedule or Battelle representative):

    a. Alphanumeric identifier (i.e. MPS-019-GSB).
    b. Noun description (i.e. Medium Pressure Steam Boiler).

3. Location: Accessible and visible.
4. Lettering: 1/2-inch- Helvetica.
5. Size: 4-inch x 4 1/2:
6. Color:
    a. Equipment handling flammable, hazardous and/or toxic material (includes laboratory vacuum and vacuum air sampling): Yellow background with black lettering.
    b. Equipment handling gases: Blue background with white lettering.
    c. Equipment handling liquids: Green background with white lettering.

7. Metal Backing Attachment (if used): Brass wire-link, beaded chain or S-hook.

B. Access Panel and Door Labels: 1/16-inch- thick, engraved laminated plastic, with abbreviated terms and numbers corresponding to identification. Provide 1/8-inch center hole for attachment.

1. Fasteners: Self-tapping, stainless steel screws or contact-type, permanent adhesive.
2. Color: Blue background with white lettering.

2.2 PIPE LABELS

A. Manufactured Pipe Markers, General: Preprinted, color-coded, with lettering indicating service, and showing direction of flow.

1. Colors: Comply with the following.

    a. Flammable or Explosive Materials: Yellow field with black lettering.
    b. Radioactive, Chemically Active or Toxic Materials: Yellow field with black lettering.
    c. Liquids and/or Gases with temperatures in excess of 120ºF: Yellow field with black lettering.
    d. Liquids and/or Gases with pressures in excess of 100 PSIG: Yellow field with black lettering.
    e. Laboratory Vacuum and Vacuum Air Sampling systems: Blue field with white lettering.
    f. Liquids with pressures less than 100 PSIG and/or temperatures less than 120ºF: Green field with white lettering.
    g. Gases with pressures less than 100 PSIG and/or temperatures less than 120ºF: Blue field with white lettering.
    h. Fire sprinkler: Red field with white lettering -“Fire”.

2. Lettering: Use piping system terms indicated on drawing legend.

3. Pipes with OD, including insulation, less than ¾-inch: Flexible, vinyl film tape with pressure sensitive backing and printed markings.
4. Pipes with OD, including insulation, ¾-inch to 6 inches: Full-band pipe markers extending 360 degrees around pipe at each location.
5. Pipes with OD, including insulation, 6 inches and larger: Strip-type pipe markers at least three times letter height and of length required for label.
6. Arrows: Integral with piping system service lettering to accommodate both directions; or as separate unit on each pipe marker to indicate direction of flow.

B. Pretensioned Pipe Markers: Precoiled semirigid plastic formed to cover full circumference of pipe and to attach to pipe without adhesive.

2.3 VALVE LABELS

A. Labels for Indoor and Outdoor Locations: Self-adhesive vinyl type on metal backing for permanent attachment on equipment.

1. Metal backing: 0.032-inch- thick aluminum.
2. Data (per drawings or Battelle representative):

   a. Alphanumeric identifier (i.e. MPS-019-VLV).

3. Location: Attach direct to valve body.
4. Lettering: 5/16-inch- Helvetica.
5. Size: 1-inch x 3-1/2 inch.
6. Valve-Label Attachment: Brass wire-link or beaded chain; or S-hook.
7. Color to match connecting piping color scheme

PART 3 - EXECUTION

3.1 APPLICATIONS, GENERAL

A. Products specified are for applications referenced in other mechanical sections. If more than single-type material, device, or label is specified for listed applications, selection is Installer's option.

3.2 MISCELLANEOUS LABEL INSTALLATION

A. Install indoor equipment labels on or near each major item of mechanical equipment.

B. Install hazard labels as designated on drawings.

C. Install access panel markers with screws on equipment access panels.

3.3 PIPE LABEL INSTALLATION

A. Do not use pipe markers and tapes for bare pipes conveying fluids at temperatures of 125º F or higher.

B. Install manufactured pipe labels indicating service on each piping system. Install with flow indication arrows showing direction of flow.

1. Pipes with OD, including insulation, less than 3/4-inch: Flexible, vinyl film tape with pressure sensitive backing and printed markings.

2. Pipes with OD, including insulation, 3/4-inch to less than 6 Inches: Pretensioned pipe markers. Use size to ensure a tight fit.

3. Pipes with OD, including insulation, 6-inches and larger: Strip type, self-adhesive pipe markers. Use color-coded, self-adhesive plastic tape, at least 1-1/2 inches wide, lapped at least 3 inches at both ends of pipe marker, and covering full circumference of pipe.

C. Locate pipe labels and color bands where piping is exposed in finished spaces; equipment rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior nonconcealed locations as follows:

1. Near each valve and control device.
2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
3. Near penetrations through walls, floors, ceilings, and nonaccessible enclosures.
4. At access doors, manholes, and similar access points that permit view of concealed piping.
5. Near scheduled equipment items and other points of origination and termination.
6. Spaced at maximum intervals of 25 feet along each run.

3.4 VALVE LABEL INSTALLATION

A. Install tags on valves as indicated on the drawings.

3.5 ADJUSTING

A. Relocate mechanical identification materials and devices that have become visually blocked by other work.

3.6 CLEANING

A. Clean faces of mechanical identification devices.

END OF SECTION 15075

SECTION 200700

MECHANANICAL PIPING INSULATION

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes piping insulation, duct insulation, insulating cements, field-applied jackets, accessories and attachments, and sealing compounds.

1.2 SUBMITTALS

A. Product data and color chart.

1.3 APPLICABLE STANDARDS

A. Fire-Test-Response Characteristics: Pipe insulation and related materials shall have fire-test-response characteristics indicated, as determined by testing identical products per ASTM E 84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, and cement material containers, with appropriate markings of applicable testing and inspecting agency.

B. Insulation Installed Indoors: UL listed flame-spread index of 25 or less, and smoke-developed index of 50 or less.

C. Pipe insulation thicknesses shall meet minimum requirements contained in the Washington State Energy Code (WSEC).

1.4 QUALITY ASSURANCE

A. Provide insulation manufactured specifically for the service specified

PART 2 - PRODUCTS

2.1 PIPE INSULTAION

A. Acceptable Manufacturers:

1. CertainTeed Manson.
2. Owens-Corning Fiberglas Corp.
3. Johns Manville, Inc.

B. Glass Fiber, All-Purpose Jacket (850 F Temp. Limit): Preformed glass fiber, one piece, with vapor barrier jacket, thermal conductivity less than .25 at 100° F. Schuller Micro-Lok AP-T Plus.

C. Glass Fiber, Blanket: One pound density, with vapor barrier jacket. Schuller with "FSK" jacket.

D. Preformed Pipe Coverings: One-piece heavy-duty PVC insulated pipe jacketing and pipe fitting covers; Schuller Zeston 2000/300 PVC assembled with Perma Weld solvent, or approved equal.

2.2 PRESSURE SENSITIVE TAPE

A. Acceptable Manufacturers: Where Nashua tapes are indicated, equivalent products by other insulation manufacturers specified in this section are acceptable.

B. Pipe Insulation:

1. Glass fiber, all-purpose jacket: Nashua Type 357.
2. Glass fiber blanket: Nashua type FSK.
3. Preformed pipe covering: Nashua type ASJ

PART 3 - EXECUTION

3.1 PIPE INSULATION

A. Applied Locations:

1. Chilled Water Supply and Return Pipe (exposed above the raised floor) Insulation: Thickness of 1.0 inches on piping greater than 1.5 inches in diameter, and 1.5 inches on piping 2 inches and greater in diameter. Exposed piping shall have dark blue PVC jacketing.
2. Process Cooling Water Supply and Return Pipe Insulation (exposed above raised floor): Thickness of 1.5 inches on piping. Exposed piping shall have dark green PVC jacketing.
3. Process Cooling Water Supply and Return Piping located below the raised floor shall be un-insulated

B. Installation, Piping Insulation:

1. General Requirements:

a. Installed in accordance with manufacturer's recommendations. Install insulation over clean, dry surfaces only.
b. Insulation kits shall be installed with all joints butted tightly to minimize crevices.
c. Install pre-formed PVC pipe covering on all interior insulation wherever piping is not enclosed in a wall or ceiling cavity.

2. Piping: Butt side and end joints tightly and paste factory applied jacket at longitudinal and circumferential joints. Finish and seal exposed ends neatly with the jacket material, glass cloth and mastic, or use preformed pipe coverings.
3. Application:

a. Slip pipe insulation onto pipe and seal butt joints.
b. Where slip on technique is not possible, slit insulation, apply to pipe, and seal seam and joints.

c. Piping Specialties above the raised floor: Fully insulate all components of all piping systems. Items requiring access for service or repair (pumps, valves, strainers, etc.) shall be provided with removable, reusable, insulation pads, EJ Bartells, or equal.
d. Removable, Replaceable Blanket Insulation: ASTM F683. Manufacturers: Ohio Valley Industrial Services, Paco Inc., Coverflex Manufacturing or approved equal. Product shall be constructed of Teflon coated fiberglass as the inner and outer material layers with 2" Armaflex sandwiched in between, with hooks, eyes or similar means of fastening and removal. Product shall be specifically designed, configured and shaped for each application.
e. Removable, Replaceable Blanket Application: Install removable, replaceable blankets per manufacturer's recommendations. Provide for valves, pump bodies, and other piping specialties requiring removal of insulation for service.

3.2 FIELD QUALITY CONTROL

A. Field Tests: Testing of systems shall have been completed and systems approved prior to applying insulation.

B. Existing Systems:

1. Repair existing insulation damaged during installation of work.
2. Make neat connections where new and existing insulation meet.
3. Where existing piping, ductwork or equipment is removed, cover existing surfaces neatly to match existing.

C. Accessibility: Provide removable insulation sections to cover parts of equipment which must be opened periodically for maintenance; including metal vessel covers, fasteners, valves, flanges, frames, and accessories. Do not insulate boiler manholes, handholes, cleanouts, ASME stamp, and manufacturer's nameplates. Provide neatly beveled edge at interruptions of insulation

END OF SECTION 200700

SECTION 230900

INSTRUMENTATION AND CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

A. All work of this Division shall be coordinated and provided by the single Building Management System (BMS) Contractor.

B. Furnish all labor, materials, equipment, service and training as required by the Specifications, Point Schedules and Drawings to provide a complete, fully functioning, and commissioned Building Management System, whether noted or omitted herein or on drawings.

C. Furnish all labor, materials, equipment, service and training necessary to integrate the Building Management System into the existing Facility Management and Control System (FMCS). The existing FMCS is a JCI extended architecture system

1.2 DEFINITIONS

A. Building Management System (BMS): The total integrated system of fully operational and functional elements, including equipment, software, programming, and associated materials, to be provided by this Division BMS Contractor and to be interfaced to the associated work of other related trades.

B. Furnish: The term “Furnish” and its derivatives when used in this Division shall mean supply at the BMS Contractor’s cost to the designated third party trade contractor for installation. BMS Contractor shall connect furnished items to the BMS, calibrate, test, commission, warrant and document.

C. The following abbreviations and acronyms may be used in describing the work of this Division:

ADC	Analog to Digital Converter
AI	Analog Input
AN	Application Node
ANSI	American National Standards Institute
AO	Analog Output
ASCII	American Standard Code for Information Interchange
ASHRAE	American Society of Heating, Refrigeration and Air Conditioning Engineers
AWG	American Wire Gauge
BMS	Building Management System
CPU	Central Processing Unit
DAC	Digital to Analog Converter
DDC	Direct Digital Control
DI	Digital Input
DO	Digital Output
EEPROM	Electronically Erasable Programmable Read Only Memory
EMI	Electromagnetic Interference
FAS	Fire Alarm Detection and Annunciation System
GUI	Graphical User Interface
HOA	Hand-Off-Auto
ID	Identification

IEEE	Institute of Electrical and Electronics Engineers
I/O	Input/Output
LAN	Local Area Network
LCD	Liquid Crystal Display
LED	Light Emitting Diode
MCC	Motor Control Center
NC	Normally Closed
NIC	Not In Contract
NO	Normally Open
OWS	Operator Workstation
OAT	Outdoor Air Temperature
PC	Personal Computer
RAM	Random Access Memory
RF	Radio Frequency
RFI	Radio Frequency Interference
RH	Relative Humidity
ROM	Read Only Memory
RTD	Resistance Temperature Device
SPDT	Single Pole Double Throw
SPST	Single Pole Single Throw
XVGA	Extended Video Graphics Adapter
TBA	To Be Advised
TCP/IP	Transmission Control Protocol/Internet Protocol
TTD	Thermistor Temperature Device
UPS	Uninterruptible Power Supply
VAC	Volts, Alternating Current
VAV	Variable Air Volume
VDC	Volts, Direct Current
VFD	Variable Frequency Drive
WAN	Wide Area Network

1.3 RELATED DOCUMENTS

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

B. Section 200519 – “Meters and Gages for Mech Piping”.

C. Section 200523 – “General Duty Mech Valves”.

D. Section 230593 – “Testing Adjusting and Balancing”.

E. Section 230800 –“Commissioning of Mechanical Systems”.

F. Section 230993 –“Sequence of Operation for Building Controls”.

G. Section 232116 – “Hydronic Piping Specialties”.

H. Section 260523 – “Control Voltage Electric Power Cables”.

I. Section 260553 – “Identification for Electrical Systems”.

1.4 BMS DESCRIPTION

A. The Building Management System (BMS) shall be a complete system designed to control and monitor the HVAC systems as described in Section 230993 “Sequence of Operations for Building Controls”. The BMS shall interface with a JCI extended architecture PC based Central Site, handling both analog and binary inputs/outputs on a

"stand-alone" basis. The objective of this control concept is to provide a control system with a maximum level of flexibility and reliability by distributing control requirements over a network of small microprocessor-based control modules. The BMS system shall include all required network communication interface modules to the existing PNNL NAE, PLCs, and the BMS system. Operations personnel shall be able to access the BMS System via lap-top computer. All BMS devices residing on the automation network shall be fully compatible devices that mount and communicate directly on the IT infrastructure in the facility. Contractor shall be responsible for coordination with PNNL to ensure that the BMS performs in the owner's environment without disruption to any of the other activities taking place on that LAN.

B. The primary point of interface will be a standard Web Browser. All points of user interface shall be on standard PCs that do not require the purchase of any special software from the BMS manufacturer for use as a building operations terminal.

C. The BMS work shall consist of the provision of all labor, materials, tools, equipment, software, software licenses, software configurations and database entries, interfaces, wiring, conduit, installation, labeling, engineering, calibration, documentation, samples, submittals, testing, commissioning, training services, permits and licenses, transportation, shipping, handling, administration, supervision, management, insurance, temporary protection, cleaning, cutting and patching, warranties, services, and items, even though these may not be specifically mentioned in these Division documents which are required for the complete, fully functional and commissioned BMS.

D. The BMS as provided shall incorporate, at minimum, the following integrated features, functions and services:

1. Operator information, alarm management and control functions.
2. Enterprise-level information and control access.
3. Information management including monitoring, transmission, archiving, retrieval, and reporting functions.
4. Diagnostic monitoring and reporting of BMS functions.
5. Offsite monitoring and management access.
6. Energy management

1.5 QUALIFICATION

A. General:

1. The Building Management System Contractor shall be the primary manufacturer-owned branch office that is regularly engaged in the engineering, programming, installation and service of total integrated Building Management Systems.
2. The BMS Contractor shall be a recognized national manufacturer, installer and service provider of BMS.
3. The BMS Contractor shall have a branch facility within a 150-mile radius of the job site supplying complete maintenance and support services on a 24 hour, 7-day-a-week basis.
4. As evidence and assurance of the contractor's ability to support the Owner's system with service and parts, the contractor must have been in the BMS business for at least the last ten (10) years and have successfully completed total projects of at least 10 times the value of this contract in each of the preceding five years.

5. The Building Management System architecture shall consist of the products of a manufacturer regularly engaged in the production of Building Management Systems, and shall be the manufacturer's latest standard of design at the time of bid.

1.6 QUALITY ASSURANCE

A. All work, materials, and equipment shall comply with the rules and regulations of all codes and ordinances of the local, state, and federal authorities. Such codes, when more restrictive, shall take precedence over these plans and specifications. As a minimum, the installation shall comply with the current editions in effect 30 days prior to receipt of bids for all of the Codes and Standards listed in Section 1.2 of this specification.

B. Performance criteria for components, collections of components, communications, and system performance are described in Section 2.0 Products.

C. Key quality assurance programs shall include the following which are described in Section 3.0, Execution.

1. Startup Testing
2. Performance Verification Testing
3. System Performance Testing

1.7 REFERENCES

A. All work shall conform to the following Codes and Standards, as applicable

1. National Electric Code (NEC).
2. Underwriters Laboratories (UL) listing and labels.
3. UL 916 Energy Management
4. American Society of Heating, Refrigeration and air-conditioning (ASHRAE)
   a. ASHRAE 135-2010 BACnet Standard
5. National Electrical Manufacturers Association (NEMA)

B. In the case of conflicts or discrepancies, the more stringent requirement shall apply.

1.8 SUBMITTALS (Shop Drawings, Product Data, and Samples)

A. The BMS contractor shall submit a list of all shop drawings with submittals dates within 30 days of contract award.

B. Each package shall be complete and shall only reference itself and previously submitted packages. The packages shall be as approved by the Engineer for Contract compliance.

C. Allow 5 working days for the review of each package by the Engineer in the scheduling of the total BMS work. Shop drawings shall be approved before any equipment is installed.

D. Prepare an index of all submittals and shop drawings for the installation. Index shall include a shop drawing identification number, Contract Documents reference and item description.

E. The BMS Contractor shall correct any errors or omissions noted.

F. At a minimum, submit the following:

1. BMS network architecture diagram
    a. This is a riser diagram that shall show the IP layer and all of the field bus layers.
    b. It shall show each computer, printer, router, repeater, controller, and protocol translator that is connected to either the IP layer or any of the field busses.
    c. This diagram shall include the existing control system that is to be integrated into the common enterprise level system.
    d. Each component that is shown shall have a name that is representative of how it will be identified in the completed database and the manufacturer's name and model number.
    e. The physical relationship of one component to another component shall reflect the proposed installation. Example: If AHU1 controller is the closest controller to the Building Controller on the field bus, then this device shall be shown as the first device on the riser diagram just below the Building Controller.
    f. This diagram shall show location of all End of Line (EOL) resistors and there resistance value (Ohms).
    g. This diagram shall not include power supplies, sensors or end devices.
2. Systems, schematics, sequences and flow diagrams.
3. Points schedule for each point in the BMS, including: Point Type, Object Name, Expanded ID, Display Units, Controller type, and Address.
4. Samples of Graphic Display screen types and associated menus. Submit a sample graphic page for each type of system in specification and drawings including any integrated systems.
5. Detailed Bill of Materials list for each system or application, identifying quantities, part numbers, descriptions, and optional features.
6. Control Valve Schedules including a separate line for each valve provided under this section and a column for each of the valve attributes: Code Number, Configuration, Fail Position, Pipe Size, Valve Size, Body Configuration, Close-off Pressure, Capacity, Valve CV, Design Pressure, and Actuator Type.
7. Details of all BMS interfaces and connections to the work of other trades.
8. Layout Design Drawing for each control panel:
    a. The layout drawing shall be to scale with all devices shown in their proposed positions.
    b. All control devices shall be identified by name.
    c. All terminal strips and wire channels shall be shown.
    d. All control transformers shall be shown.
    e. All 120 VAC receptacles shall be shown.
    f. All IP connection points shall be shown
9. Wiring Design Diagram for each control panel.

a. The control voltage wiring diagram shall clearly designate devices powered by each control transformer. If the control devices use half wave power, the diagram shall clearly show the consistent grounding of the appropriate power connection. All wire identification numbers shall be annotated on the diagram.

b. The Field Bus wiring diagram shall clearly show the use of the daisy chain wiring concept, the order in which the devices are connected to the Field Bus, and the location of end of segment termination devices. All wire identification numbers shall be annotated on the diagram.

c. If shielded communication wiring is used, the grounding of the shield shall be shown.

d. The terminal strip wiring diagram shall identify all connections on both sides of the terminal strip. Wiring label numbers for all wiring leaving the control panel shall be annotated on the diagram.

10. Wiring Design Diagram for individual components (controllers, protocol translators, etc.): The wiring diagram for each component shall identify all I/O, power, and communication wiring and the locations on the terminal blocks to which the wires are landed. Example: Fan Status sensor is wired from terminals 5/6 on the controller to terminals 17 and 18 on the terminal strip.

11. Installation Design Detail for each I/O device.

    a. A drawing of the wiring details for each sensor and/or end device.

    b. For devices with multiple quantities, a standard detail may be submitted.

12. Product data sheets or marked catalog pages including part number, photo and description for all products including software. When a manufacturer's data sheet refers to a series of devices rather than a specific model, the data specifically applicable to the project shall be highlighted or clearly indicated by other means.

13. BACnet Compliance Documentation:

    a. The Protocol Implementation Conformance Statement for each component/controller.

    b. The Protocol Implementation Conformance Statement for the Work Station.

14. Binding Map

    a. A list of the device to device data flow. This shall not include the flow of data from devices to the presentation system.

    b. Include:

        1) Description of the variable.
        2) Sending device.
        3) Receiving device.

1.9 RECORD DOCUMENTATION

A. Operation and Maintenance Manuals:

1. Three (3) copies of the Operation and Maintenance Manuals shall be provided to the Owner's Representative upon completion of the project. The entire Operation

and Maintenance Manual shall be furnished on Compact Disc media, and include the following for the BMS provided:

a. Table of contents.

b. As-built system record drawings. Computer Aided Drawings (CAD) record drawings shall represent the as-built condition of the system and incorporate all information supplied with the approved submittal.

c. Manufacturer's product data sheets or catalog pages for all products including software.

d. System Operator's manuals.

e. Archive copy of all site-specific databases and sequences.

f. BMS network diagrams.

g. Binding Map

h. Interfaces to all third-party products and work by other trades.

2. The Operation and Maintenance Manual CD shall be self-contained, and include all necessary software required to access the product data sheets. A logically organized table of contents shall provide dynamic links to view and print all product data sheets. Viewer software shall provide the ability to display, zoom, and search all documents.

1.10 WARRANTY

A. Standard Material and Labor Warranty:

1. The BMS contractor shall warrant that all systems, subsystems, component parts, software, and programming are free from defective design, materials, equipment, and workmanship for a period of two (2) years from the date of final acceptance. If within twenty four (24) months from the date of acceptance of product, upon written notice from the owner, it is found to be defective in operation, workmanship or materials, it shall be replaced, repaired or adjusted at the option of the BMS Contractor at no cost to the owner.

2. Maintain an adequate supply of materials within 150 mile radius of the Project site such that replacement of key parts and labor support, including programming. Warranty work shall be done during normal business hours, 8:00 a.m. through 5:00 p.m. Monday through Friday.

3. The BMS Contractor shall provide for guaranteed maximum on premises response time of ten (10) hours for major system failures (emergency service) and 24 hours for minor repairs (routine service) during the warranty period. Provide spare parts stock at no cost to Owner to allow immediate repair of components subject, to multiple or repetitive failures.

4. Include a minimum of forty (40) hours additional programming for control routine changes as directed by Battelle during the warranty period.

PART 2 - PRODUCTS

2.1 GENERAL DESCRIPTION

A. The Building Management System (BMS) shall use BACnet architecture and fully support a multi-vendor environment. To accomplish this effectively, the BMS shall support open communication protocol standards and integrate a wide variety of third-party devices and applications. The system shall be designed for use on the Internet, or intranets using off the shelf, industry standard technology compatible with other owner provided networks.

B. The Building Management System shall consist of the following:

1. Standalone Network Automation Engine(s)
2. Field Equipment Controller(s)
3. Input/Output Module(s)
4. Local Display Device(s)
5. Portable Operator's Terminal(s) – (Existing terminals to be utilized)
6. Distributed User Interface(s) – (Existing interfaces to be utilized)
7. Network processing, data storage and communications equipment
8. Other components required for a complete and working BMS

C. The DDC system shall be designed and installed with a minimum of 25% space capacity for future expandability without the need for additional central software or hardware.

D. System architectural design shall eliminate dependence upon any single device for alarm reporting and control execution.

1. The failure of any single component or network connection shall not interrupt the execution of control strategies at other operational devices.
2. The System shall maintain all settings and overrides through a system reboot.

E. Basis-of-Design Product: Subject to compliance with requirements, provide Alerton (BACnet native with tie in to existing Johnson Controls system) or a comparable product by one of the following:

1. Automated Logic (BACnet native with tie in to existing Johnson Controls system)

2.2 BMS ARCHITECTURE

A. Automation Network:

1. The automation network shall be based on a PC industry standard of Ethernet TCP/IP. Where used, LAN controller cards shall be standard "off the shelf" products available through normal PC vendor channels.
2. All BMS devices on the automation network shall be capable of operating at a communication speed of 100 Mbps, with full peer-to-peer network communication.
3. Network Automation Engines (NAE) shall reside on the automation network.
4. The automation network will be compatible with other enterprise-wide networks. Where indicated, the automation network shall be connected to the enterprise network and share resources with it by way of standard networking devices and practices.

B. Control Network:

1. Network Automation Engines (Main controller or field controller) or similar device shall provide supervisory control over the control network and shall support all three (3) of the following communication protocols:
   a. BACnet Standard MS/TP Bus Protocol
      1) The NAE shall be BACnet Testing Labs (BTL) certified and carry the BTL Label.
      2) The NAE shall be tested and certified as a BACnet Building Controller (B-BC).
   b. LonWorks enabled devices using the Free Topology Transceiver (FTT-10a).
   c. The Johnson Controls N2 Field Bus.
2. Control networks shall provide either "Peer-to-Peer," Master-Slave, or Supervised Token Passing communications, and shall operate at a minimum communication speed of 9600 baud.
3. DDC Controllers shall reside on the control network.
   a. Control network communication protocol shall be BACnet Standard MS/TP Bus Protocol
4. A BACnet Protocol Implementation Conformance Statement (PICS) shall be provided for each controller device (master or slave) that will communicate on the BACnet Bus.
5. The PICS shall be submitted 10 days prior to bidding.

C. Integration:

1. BACnet Protocol Integration - BACnet
   a. The neutral protocol used between systems will be BACnet over Ethernet and comply with the ASHRAE BACnet standard 135-2010.
   b. A complete Protocol Implementation Conformance Statement (PICS) shall be provided for all BACnet system devices.
   c. The ability to command, share point object data, change of state (COS) data and schedules between the host and BACnet systems shall be provided.

2.3 USER INTERFACE

A. Existing interface devices are to be utilized NETWORK AUTOMATION ENGINES (NAE). This will be the interface to the existing EMSL Building control network

1. Network Automation Engine (NAE 5510-U)
   a. Owner provided Network Automation Engine (NAE 5510-U) is to be utilized. Existing unit is installed in room **1119**.

2.4 LOCAL CONTROL PANELS:

1. All control panels shall be factory constructed, incorporating the BMS manufacturer's standard designs and layouts. All control panels shall be UL inspected and listed as an assembly and carry a UL 508 label listing compliance. Control panels shall be fully enclosed, with perforated sub-panel, hinged door, and slotted flush latch.

2. In general, the control panels shall consist of the DDC controller(s), display module as specified and indicated on the plans, and I/O devices—such as relays, transducers, and so forth—that are not required to be located external to the control panel due to function. Where specified the display module shall be flush mounted in the panel face unless otherwise noted.
3. All I/O connections on the DDC controller shall be provide via removable or fixed screw terminals.
4. Low and line voltage wiring shall be segregated. No line voltage connections are allowed inside of the control panels. All provided terminal strips and wiring shall be UL-listed, 300-volt service and provide adequate clearance for field wiring.
5. Transformer shall have dedicated panel installed next to control panel. When breakers are provided with transformers all line voltage connection will be finger safe and enclosure shall be labeled finger safe.
6. All wiring shall be neatly installed in plastic trays or tie-wrapped.
7. A convenience 120 VAC duplex receptacle shall be provided in each enclosure, fused on/off power switch, and required transformers. No power terminations of more than 50 Volts may be left exposed in the control cabinets.
8. Power Supplies:
    a. DC power supplies shall be sized for the connected device load. Total rated load shall not exceed 75% of the rated capacity of the power supply.
    b. Input: 120 VAC +10%, 60Hz.
    c. Output: 24 VDC.
    d. Line Regulation: +0.05% for 10% line change.
    e. Load Regulation: +0.05% for 50% load change.
    f. Ripple and Noise: 1 mV rms, 5 mV peak to peak.
    g. An appropriately sized fuse and fuse block shall be provided and located next to the power supply.
    h. A power disconnect switch shall be provided next to the power supply.

2.5 DDC SYSTEM CONTROLLERS

A. Field Equipment Controller

1. The Field Controller shall be a fully user-programmable, digital controller that communicates via BACnet protocol.
    a. The Field Controller shall support BACnet Standard MS/TP Bus Protocol on the controller network.
        1) The Field Controller shall be BACnet Testing Labs (BTL) certified and carry the BTL Label.
        2) The Field Controller shall be tested and certified as a BACnet Application Specific Controller (B-ASC).
        3) A BACnet Protocol Implementation Conformance Statement shall be provided for the Field Controller.
        4) The Conformance Statement shall be submitted 10 days prior to bidding.

b. The Field Controller shall accommodate the direct wiring of analog and binary I/O field points.

c. The Field Controller shall support the required types of inputs and outputs as identified in sequence of operations.

d. The Field Controller shall have the ability to reside on a Field Controller Bus (FC Bus).

1) The FC Bus shall be a Master-Slave/Token-Passing Bus supporting BACnet Standard protocol.
2) The FC Bus shall support communications between the FECs and the NAE.
3) The FC Bus shall also support Input/Output Module (IOM) communications with the Field Controller and with the NAE.

e. The FEC shall have the ability to monitor and control a network of sensors and actuators over a Sensor-Actuator Bus (SA Bus).

1) The SA Bus shall be a Master-Slave/Token-Passing Bus supporting BACnet Standard Protocol.
2) The SA Bus shall support a minimum of 10 devices per trunk.

f. The Field Controller shall have the capability to execute complex control sequences involving direct wired I/O points as well as input and output devices communicating over the FC Bus or the SA Bus.

1) Built-up air handling units for special applications.
2) Terminal units.
3) Special programs as required for systems control.
4) Heat Recovery Chiller application.

g. The Field Controller shall support a Local Controller Display either as an integral part of the Field Controller or as a remote device communicating over the SA Bus.

1) The Display shall use a BACnet
2) Master-Slave/Token-Passing protocol.
3) The Display shall allow the user to view monitored points without logging into the system.
4) The Display shall allow the user to view and change setpoints, modes of operation, and parameters.
5) The Display shall provide password protection with user adjustable password timeout.
6) The Display shall be menu driven with separate paths for:

a) Input/Output.
b) Parameter/Setpoint.
c) Overrides.

7) The Display shall use easy-to-read English text messages.
8) The Display shall allow the user to select the points to be shown and in what order.

9) The Display shall support a back lit Liquid Crystal Display (LCD) with adjustable contrast and brightens and automatic backlight brightening during user interaction.
10) The display shall be a minimum of 4 lines and a minimum of 20 characters per line.
11) The Display shall have a keypad with no more than 6 keys.
12) The Display shall be panel mountable.

2.6 FIELD DEVICES

A. Input/Output Module

1. The Input/Output Module (IOM) provides additional inputs and outputs for use in the Field Controller.
2. The IOM shall communicate with the Field Controller over the FC Bus or the SA Bus.
3. The IOM shall support BACnet Standard MS/TP Bus Protocol on the controller network.
    a. The IOM shall be BACnet Testing Labs (BTL) certified and carry the BTL Label.
    b. The IOM shall be tested and certified as a BACnet Application Specific Controller (B-ASC).
    c. A BACnet Protocol Implementation Conformance Statement shall be provided for the Field Controller.

2.7 SYSTEM TOOLS

A. System Configuration Tool (SCT):

1. The Configuration Tool shall be a software package enabling a computer platform to be used as a stand-alone engineering configuration tool for the controllers.
2. The configuration tool shall provide an archive database for the configuration and application data.
3. The configuration tool shall have the same look-and-feel at the User Interface (UI) regardless of whether the configuration is being done online or offline.
4. The configuration tool shall include the following features:
    a. Basic system navigation tree for connected networks
    b. Integration of site’s existing Metasys, LonWorks, and BACnet enabled devices
    c. Customized user navigation trees
    d. Point naming operating parameter setting
    e. Graphic diagram configuration
    f. Alarm and event message routing
    g. Graphical logic connector tool for custom programming
    h. Downloading, uploading, and archiving databases
5. The configuration tool shall have the capability to automatically discover field devices on connected buses and networks. Automatic discovery shall be available for the following field devices:
    a. BACnet Devices
    b. LonWorks devices

c. N2 Bus devices
d. Metasys networks

6. The configuration tool shall be capable of programming the Field Controllers.
   a. The configuration tool shall provide the capability to configure, simulate, and commission the Field Controllers.
   b. The configuration tool shall allow the Field Controllers to be run in Simulation Mode to verify the applications.
   c. The configuration tool shall contain a library of standard applications to be used for configuration.
7. The configuration tool shall be capable of programming the field devices.
   a. The configuration tool shall provide the capability to configure, simulate, and commission the field devices.
   b. The configuration tool shall allow the field devices to be run in Simulation Mode to verify the applications.
   c. The configuration tool shall contain a library of standard applications to be used for configuration

2.8 INPUT DEVICES

A. General Requirements:
   1. Installation, testing, and calibration of all sensors, transmitters, and other input devices shall be provided to meet the system requirements.

B. Temperature Sensors:
   1. General Requirements:
      a. Sensors and transmitters shall be provided, as outlined in the input/output summary and sequence of operations.
      b. The temperature sensor shall be of the resistance type, and shall be either two-wire 1000 ohm nickel RTD, or two-wire 1000 ohm platinum RTD.
      c. The following point types (and the accuracy of each) are required, and their associated accuracy values include errors associated with the sensor, lead wire, and A to D conversion:

Point Type	Accuracy
Hydronic Water	$\pm$ 0.3°F.
Room Temp	$\pm$ 0.5°F.
All Others	$\pm$ 0.75°F.

   2. Room Temperature Sensors with Integral Display
      a. Room sensors shall be constructed for either surface or wall box mounting.
      b. Room sensors shall have an integral LCD display and four button keypad with the following capabilities:
         1) Display room and outside air temperatures.
         2) Display and adjust room comfort setpoint.
         3) Display and adjust fan operation status.

4) Timed override request push button with LED status for activation of after-hours operation.
5) Display controller mode.
6) Password selectable adjustment of setpoint and override modes.

3. Thermowells
   a. Thermowells are required at all senors. The sensor and well shall be supplied as a complete assembly, including wellhead and Greenfield fitting.
   b. Thermowells shall be pressure rated and constructed in accordance with the system working pressure.
   c. Thermowells and sensors shall be mounted in a threadolet or 1/2” FNPT saddle and allow easy access to the sensor for repair or replacement.
   d. Thermowells shall be constructed of 316 stainless steel.
4. Averaging Sensors
   a. For ductwork greater in any dimension that 48 inches and/or where air temperature stratification exists, an averaging sensor with multiple sensing points shall be used.
   b. For plenum applications, such as mixed air temperature measurements, a string of sensors mounted across the plenum shall be used to account for stratification and/or air turbulence. The averaging string shall have a minimum of 4 sensing points per 12-foot long segment.
   c. Capillary supports at the sides of the duct shall be provided to support the sensing string.
5. Acceptable Manufacturers: Johnson Controls, Setra, or approved equal.

C. Differential Pressure Transmitters:
1. General Air and Water Pressure Transmitter Requirements:
   a. Pressure transmitters shall be constructed to withstand 100% pressure over-range without damage, and to hold calibrated accuracy when subject to a momentary 40% over-range input.
   b. Pressure transmitters shall transmit a 0 to 5 VDC, 0 to 10 VDC, or 4 to 20 mA output signal.
   c. Differential pressure transmitters used for flow measurement shall be sized to the flow sensing device, and shall be supplied with Tee fittings and shut-off valves in the high and low sensing pick-up lines to allow the balancing Contractor and Owner permanent, easy-to-use connection.
   d. A minimum of a NEMA 1 housing shall be provided for the transmitter. Transmitters shall be located in accessible local control panels wherever possible.
2. Low Differential Water Pressure Applications (0” - 20” w.c.)
   a. The differential pressure transmitter shall be of industrial quality and transmit a linear, 4 to 20 mA output in response to variation of flow meter differential pressure or water pressure sensing points.

b. The differential pressure transmitter shall have non-interactive zero and span adjustments that are adjustable from the outside cover and meet the following performance specifications:

1) .01-20" w.c. input differential pressure range.
2) 4-20 mA output.
3) Maintain accuracy up to 20 to 1 ratio turndown.
4) Reference Accuracy: +0.2% of full span.

c. Acceptable Manufacturers: Setra and Mamac.

3. Medium to High Differential Water Pressure Applications (Over 21" w.c.)

a. The differential pressure transmitter shall meet the low pressure transmitter specifications with the following exceptions:

1) Differential pressure range 10" w.c. to 300 psi.
2) Reference Accuracy: ±1% of full span (includes non-linearity, hysteresis, and repeatability).

b. Standalone pressure transmitters shall be mounted in a bypass valve assembly panel. The panel shall be constructed to NEMA 1 standards. The transmitter shall be installed in the panel with high and low connections piped and valved. Air bleed units, bypass valves, and compression fittings shall be provided.

c. Acceptable Manufacturers: Setra and Mamac.

4. Building Differential Air Pressure Applications (-1" to +1" w.c.)

a. The differential pressure transmitter shall be of industrial quality and transmit a linear, 4 to 20 mA output in response to variation of differential pressure or air pressure sensing points.

b. The differential pressure transmitter shall have non-interactive zero and span adjustments that are adjustable from the outside cover and meet the following performance specifications:

1) -1.00 to +1.00 w.c. input differential pressure ranges. (Select range appropriate for system application)
2) 4-20 mA output.
3) Maintain accuracy up to 20 to 1 ratio turndown.
4) Reference Accuracy: +0.2% of full span.

c. Acceptable Manufacturers: Johnson Controls and Setra.

5. Low Differential Air Pressure Applications (0" to 5" w.c.)

a. The differential pressure transmitter shall be of industrial quality and transmit a linear, 4 to 20 mA output in response to variation of differential pressure or air pressure sensing points.

1) The differential pressure transmitter shall have non-interactive zero and span adjustments that are adjustable from the outside cover and meet the following performance specifications:
2) (0.00 - 1.00" to 5.00") w.c. input differential pressure ranges. (Select range appropriate for system application.)
3) 4-20 mA output.

4) Maintain accuracy up to 20 to 1 ratio turndown.
5) Reference Accuracy: +0.2% of full span.

b. Acceptable Manufacturers: Johnson Controls and Setra.

D. Flow Monitoring

1. Air Flow Stations are provided with the MAU-1 (two supply fans) and the exhaust fan (EF-1). Coordinate with manufacture.

2. Water Flow Monitoring

1) Water flow meters shall be electromagnetic type with integral microprocessor-Based electronics. The meter shall have an accuracy of 0.25%.
2) Acceptable manufacturers: Onicon or approved equal.

E. Status and Safety Switches:

1. General Requirements:

a. Switches shall be provided to monitor equipment status, safety conditions, and generate alarms at the BMS when a failure or abnormal condition occurs. Safety switches shall be provided with two sets of contacts and shall be interlock wired to shut down respective equipment.

2. Current Sensing Switches:

a. The current sensing switch shall be self-powered with solid-state circuitry and a dry contact output. It shall consist of a current transformer, a solid state current sensing circuit, adjustable trip point, solid state switch, SPDT relay, and an LED indicating the on or off status. A conductor of the load shall be passed through the window of the device. It shall accept over-current up to twice its trip point range.

b. Current sensing switches shall be used for run status for fans, pumps, and other miscellaneous motor loads.

c. Current sensing switches shall be calibrated to show a positive run status only when the motor is operating under load. A motor running with a broken belt or coupling shall indicate a negative run status.

d. Acceptable manufacturers: Veris Industries

3. Air Filter Status Switches:

a. Differential pressure switches used to monitor air filter status shall be of the automatic reset type with SPDT contacts rated for 2 amps at 120VAC.

b. A complete installation kit shall be provided, including: static pressure tops, tubing, fittings, and air filters.

c. Provide appropriate scale range and differential adjustment for intended service.

d. Acceptable manufacturers: Alterton Control or approved equal.

4. Water Flow Switches

a. Water flow switches shall be equal to Alerton Controls

5. Low Temperature Limit Switches

a. The low temperature limit switch shall be of the manual reset type with Double Pole/Single Throw snap acting contacts rated for 16 amps at 120VAC.

b. The sensing element shall be a minimum of 15 feet in length and shall react to the coldest 18-inch section. Element shall be mounted horizontally across duct in accordance with manufacturers recommended installation procedures.

c. For large duct areas where the sensing element does not provide full coverage of the air stream, additional switches shall be provided as required to provide full protection of the air stream.

d. The low temperature limit switch shall be Johnson Controls A70 or equal.

2.9 OUTPUT DEVICES

A. Actuators

1. General Requirements:

a. Damper and valve actuators shall be electronic, as specified in the System Description section.

2. Electronic Damper Actuators:

a. Electronic damper actuators shall be direct shaft mount.

b. Modulating and two-position actuators shall be provided as required by the sequence of operations. Damper sections shall be sized Based on actuator manufacturer's recommendations for face velocity, differential pressure and damper type. The actuator mounting arrangement and spring return feature shall permit normally open or normally closed positions of the dampers, as required. All actuators (except terminal units) shall be furnished with mechanical spring return unless otherwise specified in the sequences of operations. All actuators shall have external adjustable stops to limit the travel in either direction and a gear release to allow manual positioning.

c. Modulating actuators shall accept 24 VAC or VDC power supply, consume no more than 15 VA, and be UL listed. The control signal shall be 0-10 VDC or 4-20 mA, and the actuator shall provide a clamp position feedback signal of 0-10 VDC. The feedback signal shall be independent of the input signal and may be used to parallel other actuators and provide true position indication. The feedback signal of one damper actuator for each separately controlled damper shall be wired back to a terminal strip in the control panel for trouble-shooting purposes.

d. Acceptable manufacturers: Belimo or approved equal.

3. Electronic Valve Actuators:

a. Electronic valve actuators shall be manufactured by the valve manufacturer.

b. Each actuator shall have current limiting circuitry incorporated in its design to prevent damage to the actuator.

c. Modulating and two-position actuators shall be provided as required by the sequence of operations. Actuators shall provide the minimum torque required for proper valve close-off against the system pressure for the

required application. The valve actuator shall be sized based on valve manufacturer's recommendations for flow and pressure differential. All actuators shall fail in the last position unless specified with mechanical spring return in the sequence of operations. The spring return feature shall permit normally open or normally closed positions of the valves, as required. All direct shaft mount rotational actuators shall have external adjustable stops to limit the travel in either direction.

d. Modulating Actuators shall accept 24 VDC power supply and be UL listed. The control signal shall be 0-10 VDC or 4-20 mA and the actuator shall provide a clamp position feedback signal of 0-10 VDC. The feedback signal shall be independent of the input signal, and may be used to parallel other actuators and provide true position indication. The feedback signal of each valve actuator (except terminal valves) shall be wired back to a terminal strip in the control panel for trouble-shooting purposes.

e. Two-position or open/closed actuators shall accept 24 VAC or VDC power supply and be UL listed. Butterfly isolation and other valves, as specified in the sequence of operations, shall be furnished with adjustable end switches to indicate open/closed position or be hard wired to start/stop the associated pump or chiller.

f. Acceptable manufacturers: Belimo or approved equal.

B. Control Relays:

1. Control Pilot Relays:

a. Control pilot relays shall be of a modular plug-in design with retaining springs or clips.

b. Mounting Bases shall be snap-mount.

c. DPDT, 3PDT, or 4PDT relays shall be provided, as appropriate for application.

d. Contacts shall be rated for 10 amps at 120VAC.

e. Relays shall have an integral indicator light and check button.

f. Acceptable manufacturers: Johnson Controls, Lectro, or approved equal.

2.10 MISCELLANEOUS DEVICES

A. Variable Frequency Motor Speed Control Drives:

1. Variable Frequency Motor Speed Control Drives shall be furnished as specified elsewhere. See Electrical Equipment Connection Schedule. All wiring shall be provided under Division 26, Section 260523, "Control-Voltage Electrical Power Cables."

2.11 QUALIFICATIONS

A. The supplier of the assembly shall be the manufacturer of the electromechanical power components used within the assembly, such as bypass contactors, power distribution circuit breakers, when specified. These parts, when specified, shall have a commonality with other manufacturer's products.

B. For the equipment specified herein, the manufacturer shall be ISO 9002 certified.

C. The supplier of this equipment shall have produced similar electrical equipment for a minimum period of ten (10) years. When requested by the Engineer, an acceptable list of installations with similar equipment shall be provided demonstrating compliance with this requirement.

D. Adjustable Frequency Drives shall be in accordance with Division 26, Section 262923, "Variable-Frequency Motor Controllers."

2.12 DELIVERY, STORAGE, AND HANDLING

A. Equipment shall be handled and stored in accordance with manufacturer's instructions. One (1) copy of these instructions shall be included with the equipment at time of shipment.

2.13 OPERATION AND MAINTENANCE MANUALS

A. Five (5) copies of the equipment operation and maintenance manuals shall be provided.

B. Operation and maintenance manuals shall include the following information:

1. Instruction books.
2. Recommended renewal parts list.
3. Drawings and information.

C. Software needed for operating and maintaining system software.

PART 3 - EXECUTION

3.1 FACTORY TESTING

A. The following standard factory tests shall be performed on the equipment provided under this section. All tests shall be in accordance with the latest version of UL and NEMA standards.

1. All printed circuit boards shall be functionally tested via automatic test equipment prior to unit installation.

B. The manufacturer shall provide three (3) certified copies of factory test reports.

C. All testing and manufacturing procedures shall be ISO 9002 certified.

3.2 FIELD QUALITY CONTROL

A. Provide the services of a qualified manufacturer's employed Field Service Engineer or authorized service representative to assist the Contractor in installation and start-up of the equipment specified under this section. The manufacturer's service representative shall provide technical direction and assistance to the Contractor in general assembly of the equipment, installation as specified in manufacturer's installation instructions, wiring, application dependent adjustments, and verification of proper VSD operation.

B. The following minimum work shall be performed by the Contractor under the technical direction of the manufacturer's service representative.

1. Inspection and final adjustments.
2. Operational and functional checks of VFDs and spare parts.
3. The contractor shall certify that he has read the drive manufacturer's installation instructions and has set up the VFD in accordance with those instructions.

C. The Contractor shall provide a copy of the manufacturer's field start-up report before final payment is made.

3.3 TRAINING

A. The training shall be conducted by the manufacturer's qualified representative.

B. The training program shall consist of the following:

1. Instructions on the proper operation of the equipment.
2. Instructions on the proper maintenance of the equipment.

PART 4 - PERFORMANCE / EXECUTION

4.1 BMS SPECIFIC REQUIREMENTS

A. General Programming: Software code shall be made efficient by removal of all un-required statement lines or blocks that may have been included by a question and answer method of construction code or use of copied code from other projects. Only code that meets the direct required sequence of operations shall be used.

B. Graphic Displays

1. Provide a color graphic system flow diagram display for each system with all points as indicated on the point list. All terminal unit graphic displays shall be from a standard design library.
2. User shall access the various system schematics via a graphical penetration scheme and/or menu selection to integrate with the existing control system graphics.

C. Trend Configuration. Operator shall be able to configure trend sample or change of value (COV) interval, start time, and stop time for each system data object and shall be able to retrieve data for use in spreadsheets and standard database programs. Controller shall sample and store trend data and shall be able to archive data to the hard disk.

D. Custom Reports. Operator shall be able to create custom reports that retrieve data, including archived trend data, from the system, that analyze data using common algebraic calculations, and that presents results in tabular or graphical format. Reports shall be launched from the operator interface.

E. Programming into existing Servers.

1. BMS contractor to provide coordination and support of all programming to be incorporated into existing control system hardware and building control system.

F. Control contractor shall determine all set point

G. Actuation / Control Type

1. Primary Equipment
   a. Controls shall be provided by equipment manufacturer as specified herein.
   b. All damper and valve actuation shall be electric.
2. Air Handling Equipment
   a. All air handers shall be controlled with a HVAC-DDC Controller.
   b. All damper and valve actuation shall be electric.

4.2 INSTALLATION PRACTICES

A. BMS Wiring: Provided by division 26.

1. All wiring shall comply with the requirements of applicable portions of Division 26 and all local and national electric codes, unless specified otherwise in this section. Coordinate with GC for required under-slab conduit prior to placing concrete.
2. Twist shield, and ground control devices to prevent electromagnetic interference of other devices.
3. BMS wiring materials and installation methods shall comply with BMS manufacturer recommendations.
4. The sizing, type and provision of cable, conduit, cable trays, and raceways shall be the design responsibility of the Contractor. If complications arise, however, due to the incorrect selection of cable, cable trays, raceways and/or conduit by the Contractor, the Contractor shall be responsible for all costs incurred in replacing the selected components.
5. Class 2 Wiring
    a. All Class 2 (24VAC or less) wiring shall be installed in conduit unless otherwise specified.
6. Class 2 signal wiring and 24VAC power can be run in the same conduit. Power wiring 120VAC and greater shall not share the same conduit with Class 2 signal wiring.
7. Ensure complete grounding of all applicable signal and communications cables, panels and equipment so as to ensure system integrity of operation. Ground cabling and conduit at the panel terminations. Avoid grounding loops.

B. BMS Line Voltage Power Source: Provided by division 26.

1. 120-volt AC circuits used for the Building Management System shall be taken from panel boards and circuit breakers provided by Division 26.
2. Circuits used for the BMS shall be dedicated to the BMS and shall not be used for any other purposes.
3. DDC panel and controller enclosure shall be finger safe.

C. BMS Raceway: Provided by division 26.

1. All wiring shall be installed in conduit or raceway. Minimum control wiring conduit size 1/2”.
2. Where it is not possible to conceal raceways in finished locations, surface raceway (Wiremold) may be used as approved by the Architect.
3. All conduits and raceways shall be installed level, plumb, at right angles to the building lines and shall follow the contours of the surface to which they are attached.
4. Flexible Metal Conduit shall be limited to 3 feet in length when terminating to equipment. Flexible Metal Conduit may be used within partition walls. Flexible Metal Conduit shall be UL listed.

D. Penetrations:

1. Provide fire stopping for all penetrations used by dedicated BMS conduits and raceways.
2. All openings in fire proofed or fire stopped components shall be closed by using approved fire resistive sealant.
3. All wiring passing through penetrations, including walls shall be in conduit or enclosed raceway.
4. Penetrations of floor slabs shall be by core drilling. All penetrations shall be plumb, true, and square.

E. BMS Identification Standards:

1. Node Identification. All nodes shall be identified by a permanent label fastened to the enclosure. Labels shall be suitable for the node location.
2. Cable types specified in Item A shall be color coded for easy identification and troubleshooting.
    a. BMS Panel Installation:
        1) The BMS panels and cabinets shall be located as indicated at an elevation of not less than 2 feet from the bottom edge of the panel to the finished floor. Each cabinet shall be anchored per the manufacturer's recommendations.
        2) The BMS contractor shall be responsible for coordinating panel locations with other trades and electrical and mechanical contractors.
    b. Input Devices:
        1) All Input devices shall be installed per the manufacturer recommendation.
        2) Locate components of the BMS in accessible local control panels wherever possible.
    c. HVAC Input Devices – Genera1:
        1) All Input devices shall be installed per the manufacturer recommendation
        2) Locate components of the BMS in accessible local control panels wherever possible.
        3) The mechanical contractor shall install all in-line devices such as temperature wells, pressure taps, airflow stations, etc.
        4) Input Flow Measuring Devices shall be installed in strict compliance with ASME guidelines affecting non-standard approach conditions.
        5) Water Differential Pressure Sensors
            a) Differential pressure transmitters used for flow measurement shall be sized to the flow-sensing device.
            b) Differential pressure transmitters shall be supplied with tee fittings and shut-off valves in the high and low sensing pick-up lines.
            c) The transmitters shall be installed in an accessible location wherever possible.

6) Medium to High Differential Water Pressure Applications (Over 21" w.c.):
   a) Air bleed units, bypass valves and compression fittings shall be provided.
7) Building Differential Air Pressure Applications (-1" to +1" w.c.):
   a) Transmitters exterior sensing tip shall be installed with a shielded static air probe to reduce pressure fluctuations caused by wind.
   b) The interior tip shall be inconspicuous and located as shown on the drawings.
8) Air Duct Temperature Sensors:
   a) Duct mount sensors shall mount in an electrical box through a hole in the duct and be positioned so as to be easily accessible for repair or replacement.
   b) The sensors shall be insertion type and constructed as a complete assembly including lock nut and mounting plate.
   c) For ductwork greater in any dimension than 48 inches or where air temperature stratification exists such as a mixed air plenum, utilize an averaging sensor.
   d) The sensor shall be mounted to suitable supports using factory approved element holders.
9) Space Sensors:
   a) Shall be mounted per ADA requirements.
   Provide lockable tamper-proof covers in public areas and/or where indicated on the plans.
10) Low Temperature Limit Switches:
   a) Install on the discharge side of the first water or steam coil in the air stream.
   b) Mount element horizontally across duct in a serpentine pattern insuring each square foot of coil is protected by 1 foot of sensor.
   c) For large duct areas where the sensing element does not provide full coverage of the air stream, provide additional switches as required to provide full protection of the air stream.
11) Air Differential Pressure Status Switches:
   a) Install with static pressure tips, tubing, fittings, and air filter.
12) Water Differential Pressure Status Switches:
   a) Install with shut off valves for isolation.

d. HVAC/Hydronic Output Devices

1) All output devices shall be installed per the manufacturers recommendation. The mechanical contractor shall install all in-line devices such as control valves, dampers, airflow stations, pressure wells, etc.
2) Actuators: All control actuators shall be sized capable of closing against the maximum system shut-off pressure. The actuator shall modulate in a smooth fashion through the entire stroke. When any pneumatic actuator is sequenced with another device, pilot positioners shall be installed to allow for proper sequencing.

3) Control Dampers: Shall be opposed blade for modulating control of airflow. Parallel blade dampers shall be installed for two position applications.
4) Control Valves: Shall be sized for proper flow control with equal percentage valve plugs. The maximum pressure drop for water applications shall be 5 PSI
5) Electronic Signal Isolation Transducers: Whenever an analog output signal from the Building Management System is to be connected to an external control system as an input (such as a chiller control panel), or is to receive as an input a signal from a remote system, provide a signal isolation transducer. Signal isolation transducer shall provide ground plane isolation between systems. Signals shall provide optical isolation between systems

4.3 CONTROL SYSTEM DEMONSTRATION AND ACCEPTANCE

A. Demonstration: Prior to acceptance, perform the following performance tests to demonstrate system operation and compliance with specification after and in addition to tests specified in Control System Checkout and Testing. Provide Engineer with log documenting completion of startup tests.

1. Engineer will be present to observe and review system demonstration. Notify PNNL Construction Manager at least 10 days before system demonstration begins.
2. Demonstration shall follow process submitted and approved under Division 23, Section 230993, “Sequence of Operations for Building Controls.” Complete approved checklists and forms for each system as part of system demonstration.
3. Demonstrate actual field operation of each sequence of operation as specified in Division 23, Section 230993, “Sequence of Operations for Building Controls.” Provide at least two persons equipped with two-way communication. Demonstrate calibration and response of any input and output points required by the commissioning plan Division 23, Section 230800, “Commissioning of Mechanical Systems.” Provide and operate test equipment required to prove proper system operation.
4. Demonstrate compliance with sequences of operation through each operational mode.
5. Demonstrate complete operation of operator interface.
6. Demonstrate each of the following.
    a. DDC loop response. Supply graphical trend data output showing each DDC loop’s response to a setpoint change representing an actuator position change of at least 25% of full range. Trend sampling rate shall be from 10 seconds to 3 minutes, depending on loop speed. Each sample’s trend data shall show setpoint, actuator position, and controlled variable values. Engineer will require further tuning of each loop that displays unreasonably under- or over-damped control.
    b. Demand limiting. Supply trend data output showing demand-limiting algorithm action. Trend data shall document action sampled each minute

over at least a 30-minute period and shall show building kW, demand-limiting setpoint, and status of setpoints and other affected equipment parameters.

c. Building fire alarm system interface. Demonstrate Make-Up Air Unit and Exhaust Fan shut down upon alarm initiation.

d. Trend logs for each system. Trend data shall indicate setpoints, operating points, valve positions, and other data as specified in the points list provided with each sequence of operation in Division 23, Section 230993, "Sequence of Operations for Building Controls." Each log shall cover three 48-hour periods and shall have a sample frequency not less than 10 minutes or as specified on its points list. Logs shall be accessible through system's operator interface and shall be retrievable for use in other software programs as specified in Trend Configuration.

7. Tests that fail to demonstrate proper system operation shall be repeated after Contractor makes necessary repairs or revisions to hardware or software to successfully complete each test.

B. Acceptance:

1. After tests described in this specification are performed to the satisfaction of both Engineer and Owner, Engineer will accept control system as meeting completion requirements. Engineer may exempt tests from completion requirements that cannot be performed due to circumstances beyond Contractor's control. Engineer will provide written statement of each exempted test. Exempted tests shall be performed as part of warranty.
2. System shall not be accepted until completed demonstration forms and checklists are submitted and approved as required in the Submittals.

4.4 TRAINING

A. Provide training for a designated staff of Owner's representatives. Training shall be provided via self-paced training, web-based or computer-based training, classroom training, or a combination of training methods.

B. Training shall enable students to accomplish the following objectives.

1. Proficiently operate system
2. Demonstrate control system architecture and configuration
3. Review DDC system components
4. Demonstrate system operation, including DDC system control and optimizing routines (algorithms)
5. Operate workstation and peripherals
6. Log on and off system
7. Access graphics, point reports, and logs
8. Adjust and change system setpoints, time schedules, and holiday schedules
9. Review how to recognize common mechanical system malfunctions by observing system graphics, trend graphs, and other system tools
10. Review system drawings and Operation and Maintenance manual
11. Review job layout and location of control components
12. Access data from DDC controllers

13. Operate portable operator's terminals
14. Create and change system graphics
15. Create, delete, and modify alarms, including configuring alarm reactions
16. Create, delete, and modify point trend logs (graphs) and multi-point trend graphs
17. Configure and run reports
18. Add, remove, and modify system's physical points
19. Create, modify, and delete application programming
20. Add operator interface stations
21. Add a new controller to system
22. Download firmware and advanced applications programming to a controller
23. Configure and calibrate I/O points
24. Maintain software and prepare backups
25. Interface with job-specific, third-party operator software
26. Add new users and understand password security procedures

C. Divide presentation of objectives into three sessions (1-13, 14-23, and 24-26). Participants will attend one or more of sessions, depending on knowledge level required.

1. Day-to-day Operators (objectives 1-13)
2. Advanced Operators (objectives 1-13 and 14-23)
3. System Managers and Administrators (objectives 1-13 and 24-26)

D. Provide course outline and materials according to Division 23, Section 230993 "Sequence of Operations for Building Controls". Provide one copy of training material per student.

E. Instructors shall be factory-trained and experienced in presenting this material.

F. Perform classroom training using a network of working controllers representative of installed hardware.

G. See specification Division 23, Section 230993, "Sequence of Operations for Building Controls."

H. Points lists are integrated the specification Division 23, Section 230993, "Sequence of Operations for Building Controls."

4.5 COMMISSIONING

A. Fully commission all aspects of the Building Management System work. Coordinate with the building commissioning agent (CxA) for verification of all controls.

B. Acceptance Check Sheet

1. Prepare a check sheet that includes all points for all functions of the BMS as indicated on the point list included in this specification.
2. Submit the check sheet to the CxA for approval
3. The CxA or Engineer will use the check sheet as the basis for acceptance with the BMS Contractor.

C. Promptly rectify all listed deficiencies and submit to the CxA or Engineer that this has been done.

END OF SECTION 230900

SECTION 230993

SEQUENCE OF OPERATIONS FOR BUILDING CONTROLS

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 control sequences for HVAC systems, Hydronic systems, and selected, subsystems, and equipment.

B. Related Sections include the following:

1. Division 23, Section 230900, “Instrumentation and Control” for control equipment and devices and for submittal requirements.

1.3 DEFINITIONS

A. DDC: Direct digital control.

B. BMS: Building Management System

1.4 SEQUENCES OF OPERATION FOR HYDRONIC AND HVAC SYSTEMS

A. General

1. Point lists provided in following sections are minimum required points. Provide additional points to comply with sequence and Drawing requirements. The points listed in each section apply to the BMS specified in Division 23, Section 230900, “Instrumentation and Controls”. The BMS shall trend every 15 minutes (initial setting) for each point identified in the point list to be trended.
2. All set points shall be adjustable. Set points shall also be adjustable from graphics. All set points shall be determined by the Contractor and approved by the Engineer.
3. All alarms shall be active only when the units are enabled and a time delay shall be provided at the start-up prior to enabling the alarms.
4. All HVAC and controlled equipment, system schedules, operating parameter values, and setpoint values shall be clearly displayed and labeled by the graphics interface and maintenance staff adjustable, including but not limited to (as applicable): schedule mode, room temperature, discharge air and water temperature. Chilled door fan status, filter status, control valve(s) position. Chilled water supply and return temperatures, process loop water supply and return temperatures, alarms, injection and primary pump status, and setpoints, current sensors, pressure sensors, and flow switches.
5. VFDs: VFDs are called out on the mechanical drawings and provided under the electrical contract. Coordinate control communication requirements with electrical contractor and VFD vendor. All inputs to VFD’s shall be hard wired to VFD and alarm points shall be hard wired to BMS.

1.5 HYDRONIC PUMPS

A. Including: Process Water Pump (P-41 and P-42)

B. System Operation:

1. The Process water pumps shall operate at all times.

2. Upon initial startup the process pump shall be started and run until the process loop temperature stabilizes. The process pump shall modulate to maintain a pressure differential of 15 PSI (adjustable).

3. Once the process loop temperature stabilizes the injection control valve shall modulate to maintain the process loop supply temperature (75°F, adjustable).

4. To prevent short cycling, pumps shall run for and be off for a minimum of 10 minutes (both adjustable).

5. Lead/Lag:

   a. The BMS shall totalize the runtime of each pump in a lead/lag pump pair.

   b. Tuesday at 8:00 am (adjustable), the pump with the most runtime shall be re-assigned as the lag pump.

   c. During the weekly changeover, if only one pump is operating, the new lead pump shall start and ramp up slowly until its speed matches the other pump. Once both pumps have been confirmed as operational, the old lead pump shall ramp down.

   d. If the lead pump fails or alarms, then the lead/lag order shall switch and an alarm shall be generated.

   e. If the lead pumps speed is 100% for more than 2 minutes, or the static pressure is 5 psi below setpoint for more than 2 minutes, the lag pump shall start and ramp up slowly until its speed matches the lead pump speed signal. The lag pump shall track the speed signal of the lead pump.

   f. If both pumps are operating and both pump speeds are below 30% for more than 5 minutes and the differential pressure is within 5 psi of setpoint, the lag pump shall slowly ramp down and stop.

C. Alarms:

1. Alarm BMS at +/- 2 PSI from setpoint.

2. Process loop temperature Alarm: If the process loop supply water temperature sensor is 77 degrees F or above, an alarm at the BMS indicating high temperature shall notify the operator.

D. Sensors

a. A flow meter and supply/return temperature sensors (Onicon BTU Meter) shall be installed in the injecting water supply and return piping to/from the process system. The BTU meter shall be connected to the BACnet controller for monitoring.

b. Process Chilled Water:

   1) High chilled water supply temperature: If Process chilled water supply temperature is 5°F above setpoint (adjustable).

2) Low chilled water supply temperature: If process chilled water supply temperature is 5°F less than setpoint (adjustable).

3) Sudden drop in water pressure, indicating pipe breakage, shall shut down pumps and alarm BMS.

	Hardware Points				Software Points					
Point Name	**AI**	**AO**	**DI**	**DO**	**AV**	**BV**	**Sched**	**Trend**	**Alarm**	**Show On Graphic**
Process Water line differential pressure	x							x	x	x
Process Loop Supply Water Temperature	x							x	x	x
Process Loop Return Water Temperature	x							x	x	x
Process Chilled Water Flow Rate (GPM)	x							x		x
Process Loop Supply Temperature	x									x
Process Water Pump (P-41 and P-42) Status			x					x		x
Proccess Water Temperature Setpoint					x			x		x
Process Water Pump (P-41 and P-42) Start/Stop				x				x		x
Process Water Pump (P-41 and P-42) Failure			x						x	x
Process Water Pump (P-41 and P-42) Running in Hand			x						x	x
Process Water Flow Rate (GPM)	x							x		x
Injection Loop Supply Water Temperature	x							x		x
Control Valve		x						x		x
Injection Loop Return Water Temperature	x							x		x
Process Water Pump (P-41 and P-42)- VFD Speed		x						x		x
Process Water Pump (P-41 and P-42)- VFD Fault			x						x	x

1.6 Automatic Control Valve

A. Modulate control valve to maintain a LWT at TT-2 of 70°F.

1.7 Existing Re-Heat Terminal Unit (Provide BACnet Controller on existing re-heat terminal unit):

1. Unit shall run according to user definable time schedule.
   a. Occupied Mode, Unit shall maintain:
      1) 80° F (adjustable) cooling setpoint.
      2) 68°F (adjustable) heating setpoint
   b. Alarms shall be provided as follows:
      1) High Zone Temp: If zone temperature is greater than cooling setpoint by user definable amount (adjustable).
      2) Low Zone Temp: If zone temperature is less than heating setpoint by user definable amount (adjustable).
2. Heating Coil Valve: Controller shall measure zone temperature and modulate existing heating coil valve to maintain heating setpoint. Heating shall be enabled whenever:
   a. Zone temperature is below heating setpoint.
3. Provide discharge Air Temperature: Controller shall monitor discharge air temperature.

1.8 Supply Air BTU/H: An algorithm shall be programmed into the controls system to calculate the supply air BTU/H using the provided supply air temperature sensor, return air temperature sensor and supply air flow meter.

1. (Return Air Temperature – Supply Air Supply Air Temperature)(Supply Air Volume)(1.08) = BTU/H

	Hardware Points				**Software Points**					
Point Name	**AI**	**AO**	**DI**	**DO**	**AV**	**BV**	**Sched**	**Trend**	**Alarm**	**Show On Graphic**
Zone Temp	x							x		x
Zone Setpoint Adjust	x							x		x
Discharge Air Temp	x							x		x
Heating Coil Valve		x						x		x
Schedule						x	x	x		x
Cooling Setpoint					x			x		x
Heating Setpoint					x			x		x
High Zone Temp								x	x	x
Low Zone Temp								x	x	x

	Hardware Points				Software Points					
Point Name	**AI**	**AO**	**DI**	**DO**	**AV**	**BV**	**Sched**	**Trend**	**Alarm**	**Show On Graphic**
Low Discharge Air Temp								x	x	x

2. Chilled Door PLC Interface (MS/TP): Provide communication and interface with the following devices and sensors to achieve the specified requirements for sequence of operations and monitoring.

   a. Analog Variables

BMS Address	Description	Default	UOM	Min	Max	Read/Write	Variable name
1	Air Outlet temp (supply)	0	°C/°F	-999.9	999.9	R	Air Out Temp
2	Outlet Air Temp set point (supply)	0	°C/°F	-99.9	99.9	R/W	Setpt AirOut
3	Air Out Control band	0.2	°C/°F	0.2	99.9	R/W	Setdiff AirOut
4	0-10v output to the fans	0	V	-99.9	99.9	R	Fan output signal
5	Water Outlet temp of coil	0	°C/°F	0	200	R	Water Out Temp
6	Water Outlet Temp set point	0	°C/°F	-99.9	99.9	R/W	Setpt_Water Out
7	Water Out Control band	0	°C/°F	0	99.9	R/W	SetDiff_WaterOut
8	0-10v output to the Valve	0	V	-99.9	99.9	R	Valve_output_signal
9	Room Temperature	0	°C/°F	0	9.9	R	Room_Temp_output
10	Calibrate B1 Air out probe	0	°C/°F	-9.9	9.9	R/W	Calibrate_B1
11	Calibrate B3 Room probe	0	°C/°F	-9.9	9.9	R/W	Calibrate_B3
12	Calibrate B2 Water probe	0	°C/°F	-9.9	9.9	R/W	Calibrate_B2
13	High room temp alarm threshold	0	°C/°F	-99.9	99.9	R/W	SetAlm_HighRoom
14	Low room temp alarm	0	°C/°F	-99.9	99.9	R/W	SetAlm_Low Room

	threshold						

Integer Variables

BMS Address		Default		Read/Write		Variable name	
1	Minimum fan speed %	10	%	10	100	R/W	Min_Fan_Speed
2	Fan alarm activation delay	0	s	0	32000	R/W	Fan_Alarm_Delay
3	Time for PI temp control	0	s	0	999	R/W	Intergral_Time
4	Time for PI Valve control	0	s	0	999	R/W	Intergral_Time_Valve
5	Minimum valve opening %	10	%	0	100	R/W	Min_Valve_Open
6	High temp alarm setpt (Diff above	0	°C/°F	-99.9	99.9	R/W	SetAlm_HighAir
7	High air temp alarm delay	0	s	-999	999	R/W	SetDelay_HighAir
8	High Water alarm setpt (Diff above	0	°C/°F	-99.9	99.9	R/W	SetAlm_HighWater
9	High water temp alarm delay	0	s	-999	999	R/W	SetDelay_HighWater
10	Low water temp setpoint = alarm	0	°C/°F	-99.9	99.9	R/W	SetAlm_LowWater
11	Low water temp alarm delay	0	s	-999	999	R/W	SetDelay_LowWater
12	High room temp alarm delay	0	s	-32768	32767	R/W	SetDelay_HighRoom
13	Low room temp alarm delay	0	s	-32768	32767	R/W	SetDelay_LowRoom
14	Fan 1 rpm read and store	0	rpm	-32768	32767	R	Fan1_rpm_last
15	Fan 2 rpm read and store	0	rpm	-32768	32767	R	Fan2_rpm_last
16	Fan 3 rpm	0	rpm	-32768	32767	R	Fan3_rpm_la

	read and store						st
17	Fan 4 rpm read and store	0	rpm	-32768	32767	R	Fan4_rpm_last
18	Fan 5 rpm read and store	0	rpm	-32768	32767	R	Fan5_rpm_last

3. MECHANICAL EQUIPMENT START-UP SEQUENCE

   a. The DDC shall be provided for staggered starting of all motors with 1-5 second(s) separation between start-ups.

PART 2 – **PRODUCTS**

a. Not Applicable.

PART 3 – **EXECUTION**

a. Not Applicable.

END OF SECTION 230993

SECTION 232113

HYDRONIC PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes pipe and fitting materials and joining methods for the following:

1. Chilled-water piping.
2. Process-water piping.
3. Air-vent piping.
4. Pressure Test

B. See Division 20 Section "Common Work Results for Mechanical Piping and HVAC" for general piping materials and installation requirements.

C. See Division 20 Section “Piping Insulation” for pipe insulation.

1.2 SUBMITTALS

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

B. Field quality-control test reports.

1.3 QUALITY ASSURANCE

A. Welding and Fabrication: See Section 200500.

B. ASME Compliance: Comply with ASME B31.9, "Building Services Piping," for materials, products, and installation. Safety valves and pressure vessels shall bear the appropriate ASME label. Fabricate and stamp air separators and expansion tanks to comply with the ASME Boiler and Pressure Vessel Code, Section VIII, Division 1.

1.4 COORDINATION

A. Coordinate piping installation with below floor curbs, raised floor supports, equipment supports, and floor and roof penetrations.

B. Coordinate pipe fitting pressure classes with products specified in related Sections.

PART 2 - PRODUCTS

2.1 COPPER TUBE AND FITTINGS

A. DWV Copper Tubing: ASTM B 306, Type DWV.

B. Grooved, Mechanical-Joint, Wrought-Copper Fittings: ASME B16.22.

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. Anvil International, Inc.
b. Victaulic Company.

2. Grooved-End Copper Fittings: ASTM B 75, copper tube or ASTM B 584, bronze casting.

3. Grooved-End-Tube Couplings: Rigid pattern unless otherwise indicated; gasketed fitting. Ductile-iron housing with keys matching pipe and fitting grooves, prelubricated EPDM gasket rated for minimum 230 deg F for use with housing, and steel bolts and nuts.

C. Wrought-Copper Unions: ASME B16.22.

2.2 STEEL PIPE AND FITTINGS

A. Steel Pipe: ASTM A 53/A 53M, black steel with plain ends; welded and seamless, Grade B, and wall thickness as indicated in "Piping Applications" Article.

B. Malleable-Iron Threaded Fittings: ASME B16.3, Classes 150 and 300 as indicated in "Piping Applications" Article.

C. Malleable-Iron Unions: ASME B16.39; Classes 150, 250, and 300 as indicated in "Piping Applications" Article.

D. Wrought Cast- and Forged-Steel Flanges and Flanged Fittings: ASME B16.5, including bolts, nuts, and gaskets of the following material group, end connections, and facings:

1. Material Group: 1.1.
2. End Connections: Butt welding.
3. Facings: Raised face.

E. Grooved Mechanical-Joint Fittings and Couplings:

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

a. Anvil International, Inc.
b. Victaulic Company.

2. Joint Fittings: ASTM A 536, Grade 65-45-12 ductile iron; ASTM A 47/A 47M, Grade 32510 malleable iron; ASTM A 53/A 53M, Type F, E, or S, Grade B fabricated steel; or ASTM A 106/A 106M, Grade B steel fittings with grooves or shoulders constructed to accept grooved-end couplings; with nuts, bolts, locking pin, locking toggle, or lugs to secure grooved pipe and fittings.

3. Couplings: Ductile- or malleable-iron housing and EPDM gasket of central cavity pressure-responsive design; with nuts, bolts, locking pin, locking toggle, or lugs to secure grooved pipe and fittings.

2.3 Copper Tubing: ASTM B88, Type L, hard drawn.

A. Fittings: ASME B16.18, cast brass, or ASME B16.22, solder wrought copper or Veiga Pro-Press

B. Joints: Solder, lead free, ASTM B32, 95-5 tin-antimony, or tin and silver, with melting range 430º F to 535º F or Veiga Pro-Press.

2.4 CPVC PIPE AND FITTINGS

A. CPVC Plastic Pipe: CPVC Schedule 40 pipe shall be manufactured from a Type IV, Grade I Chlorinated Polyvinyl Chloride (CPVC) compound with a minimum Cell Classification of 23447 per ASTM D1784. The pipe shall be manufactured in strict compliance to ASTM F441, consistently meeting the Quality Assurance test requirements of this standard with regard to material, workmanship, burst pressure, flattening, and extrusion quality. The pipe shall be produced in the USA using domestic materials, by an ISO 9001 certified manufacturer, and shall be stored indoors after production, at the manufacturing site, until shipped from factory. The pipe shall have a Flame Spread rating < 25 and a Smoke Development rating < 50 when tested and listed for Surface Burning Characteristics in accordance with CAN/ULC-S102-2-M88 or equivalent. Pipe shall be manufactured by GF Harvel or approved equal.

B. CPVC Plastic Pipe Fittings: Socket-type pipe fittings, ASTM D 2466 for Schedule 40 pipe

C. CPVC Solvent Cement: ASTM F439 – 11-12.

2.5 JOINING MATERIALS

A. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.

1. ASME B16.21, nonmetallic, flat, asbestos free, 1/8-inch maximum thickness unless otherwise indicated.

a. Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.
b. Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.

B. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.

C. Welding Filler Metals: Comply with AWS D10.12M/D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

D. Gasket Material: Thickness, material, and type suitable for fluid to be handled and working temperatures and pressures.

2.6 TRANSITION FITTINGS

A. Plastic-to-Metal Transition Unions:

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

   a. Charlotte Pipe and Foundry Company.
   b. IPEX Inc.
   c. KBI Company.
   d. NIBCO INC.

2. Brass or copper end, solvent-cement-joint end of material and wall thickness to match plastic pipe material, rubber gasket, and threaded union.

2.7 DIELECTRIC FITTINGS

A. General Requirements: Assembly of copper alloy and ferrous materials with separating nonconductive insulating material. Include end connections compatible with pipes to be joined.

B. Dielectric Unions:

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

   a. A.Y. McDonald Mfg. Co.
   b. Capitol Manufacturing Company.
   c. Central Plastics Company.
   d. Hart Industries International, Inc.
   e. Jomar International Ltd.
   f. Matco-Norca.
   g. Watts Regulator Co.
   h. Zurn Industries, LLC.

2. Description:

   a. Standard: ASSE 1079.
   b. Pressure Rating: 125 psig minimum at 180 deg F.
   c. End Connections: Solder-joint copper alloy and threaded ferrous.

PART 3 - EXECUTION

3.1 PIPING APPLICATIONS

A. Process-water piping, below the raised floor, NPS 6 and smaller, shall be any of the following:

1. Type L drawn-temper copper tubing, wrought-copper fittings, and soldered, brazed, or pressure-seal joints. AND / OR

2. CPVC

B. Chilled-water piping, above the raised floor, NPS 2-1/2 and larger, shall be the following:
1. Schedule 40 steel pipe; grooved, mechanical joint coupling and fittings; and grooved, mechanical joints.

C. Process-water piping, above the raised floor, NPS 2-1/2 and larger, shall be the following:
1. Schedule 40 steel pipe; grooved, mechanical joint coupling and fittings; and grooved, mechanical joints.

D. Drain Piping: Copper tubing (DWV), wrought-copper fittings, and soldered, brazed.

E. Air-Vent Piping:

1. Inlet: Same as service where installed with metal-to-plastic transition fittings for plastic piping systems according to piping manufacturer's written instructions.

2. Outlet: Type K, annealed-temper copper tubing with soldered or flared joints.

3.2 PIPING INSTALLATIONS

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.

B. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

C. Install piping to permit valve servicing.

D. Install piping at indicated slopes.

E. Install piping free of sags and bends.

F. Install fittings for changes in direction and branch connections.

G. Install piping to allow application of insulation.

H. Select system components with pressure rating equal to or greater than system operating pressure.

I. Install groups of pipes parallel to each other, spaced to permit applying insulation and servicing of valves.

J. Install drains, consisting of a tee fitting, NPS 3/4 ball valve, and short NPS 3/4 threaded nipple with cap, at low points in piping system mains and elsewhere as required for system drainage.

K. Install piping at a uniform grade of 0.2 percent upward in direction of flow.

L. Reduce pipe sizes using eccentric reducer fitting installed with level side up.

M. Unless otherwise indicated, install branch connections to mains using tee fittings in main pipe, with the takeoff coming out the bottom of the main pipe. For up-feed risers, install the takeoff coming out the top of the main pipe.

N. Install valves according to Section 200523 "General-Duty Valves for Mechanical Piping."

O. Install unions in piping, NPS 2 and smaller, adjacent to valves, at final connections of equipment, and elsewhere as indicated.

P. Install flanges in piping, NPS 2-1/2 and larger, at final connections of equipment and elsewhere as indicated.

Q. Install shutoff valve immediately upstream of each dielectric fitting.

R. Comply with requirements in Section 200553 "Identification for Mechanical Piping and Equipment" for identifying piping.

S. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 200500.

T. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Section 200500.

U. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified Section 200500.

3.3 DIELECTRIC FITTING INSTALLATION

A. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.

B. Dielectric Fittings for NPS 2 and Smaller: Use dielectric unions.

C. Dielectric Fittings for NPS 2-1/2 to NPS 3: Use dielectric flange kits.

D. Dielectric Fittings for NPS 4 and Larger: Use dielectric flange kits.

3.4 HANGERS AND SUPPORTS

A. Comply with requirements in Section 200529 "Hangers and Supports for Mechanical Piping and Equipment" for hanger, support, and anchor devices. Comply with the following requirements for maximum spacing of supports.

B. Install the following pipe attachments:

1. Adjustable steel clevis hangers for individual horizontal piping less than 20 feet long.

2. Adjustable roller hangers and spring hangers for individual horizontal piping 20 feet or longer.

3. Pipe Roller: MSS SP-58, Type 44 for multiple horizontal piping 20 feet or longer, supported on a trapeze.

4. Spring hangers to support vertical runs.

5. Provide copper-clad hangers and supports for hangers and supports in direct contact with copper pipe.

6. On CPVC pipe, install pads or cushions on bearing surfaces to prevent hanger from scratching pipe. Support piping at intervals indicated below above the floor surface with 1-5/8” framing channel.

C. Install hangers for steel piping with the following maximum spacing:

1. NPS 3/4: Maximum span, 7 feet.
2. NPS 1: Maximum span, 7 feet.
3. NPS 1-1/2: Maximum span, 9 feet.
4. NPS 2: Maximum span, 10 feet.
5. NPS 2-1/2: Maximum span, 11 feet.
6. NPS 3 and Larger: Maximum span, 12 feet.

D. Install hangers for CPVC piping with the following maximum spacing:

1. NPS 3/4: Maximum span, 5 feet.
2. NPS 1: Maximum span, 5.5 feet.
3. NPS 1-1/2: Maximum span, 6 feet.
4. NPS 2: Maximum span, 6 feet.
5. NPS 3: Maximum span, 7 feet.
6. NPS 4: Maximum span, 7.5 feet.
7. NPS 6: Maximum span, 8.5 feet.

E. Install hangers for drawn-temper copper piping with the following maximum spacing:

1. NPS 3/4: Maximum span, 5 feet; minimum rod size, 1/4 inch.
2. NPS 1: Maximum span, 6 feet; minimum rod size, 1/4 inch.
3. NPS 1-1/4: Maximum span, 7 feet; minimum rod size, 3/8 inch.
4. NPS 1-1/2: Maximum span, 8 feet; minimum rod size, 3/8 inch.
5. NPS 2: Maximum span, 8 feet; minimum rod size, 3/8 inch.

6. NPS 2-1/2: Maximum span, 9 feet; minimum rod size, 3/8 inch.
7. NPS 3 and Larger: Maximum span, 10 feet; minimum rod size, 3/8 inch.

F. Support vertical runs at roof, at each floor, and at 10-foot intervals between floors.

3.5 PIPE JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

C. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.

D. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8/A5.8M.

E. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.

2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

F. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

G. Grooved Joints: Assemble joints with coupling and gasket, lubricant, and bolts. Cut or roll grooves in ends of pipe based on pipe and coupling manufacturer's written instructions for pipe wall thickness. Use grooved-end fittings and rigid, grooved-end-pipe couplings.

H. Mechanically Formed, Copper-Tube-Outlet Joints: Use manufacturer-recommended tool and procedure, and brazed joints.

3.6 TERMINAL EQUIPMENT CONNECTIONS

A. Sizes for supply and return piping connections shall be the same as or larger than equipment connections.

B. Install control valves in accessible locations close to connected equipment.

C. Install bypass piping with globe valve around control valve. If parallel control valves are installed, only one bypass is required.

D. Install ports for pressure gages and thermometers at coil inlet and outlet connections. Comply with requirements in Section 200519 "Meters and Gages for Mechanical Piping."

3.7 HOT TAP PROCEDURE

A. Contractor shall provide PNNL drawings with the location of all hot taps shown 10 days prior to scheduled start of work. Contractor shall also clearly identify all locations in the field.

B. Upon receipt of drawings PNNL will field verify abatement requirements. PNNL will also identify and coordinate, through the building mission groups, the impact of potential system shut downs, Owner requirements and will issue a notice to proceed.

C. Upon PNNL issuance of a notice to proceed the Contractor shall perform the following hot tap procedures:

1. Installation

a. Remove insulation as required for installation of scheduled hot tap.
b. Weld saddle sleeve to pipe. All welds shall be made as per 200500(3.3)(F)
c. Install new valve on saddle sleeve.
d. Install blind flange on valve to prevent accidental opening.
e. Pressure test valve/seating to one and a half (1-1/2) times design operating pressure for 24 hours. PNNL representative shall witness this test.
f. Upon passing pressure test and prior to hot tapping pipe:
   1) Verify that PNNL has staff ready to perform emergency shut-off procedures.
   2) Verify emergency patch is on location and sized to match pipe being tapped.
g. Hot tap pipe, remove plug and wire to valve handle.
h. Clean all strainers in pipes affected by hot taps made that day.
i. Reinsulate pipe.

D. Unless approved by PNNL all hot taps in horizontal lines shall be made at or above center line of pipe.

3.8 SYSTEM FILL

A. After testing, cleaning and flushing is completed, fill the Chilled-Water, and the Process-Water systems with a 35% (by volume) mixture of Dow Chemical “Dowfrost HD” inhibited propylene glycol and RO water solution. Coordinate the supply of RO water with Battelle Building Engineer or Construction Manager. See Div 1 for additional information.

3.9 LEAK TEST PROCEDURE

A. Hydrostatic Test

1. The main supply and return piping made of CPVC piping. Pneumatic testing of CPVC piping is not recommended by the manufacturer due to the potential of catastrophic brittle failure. Therefore, this portion of the system requires a hydrostatic test. Utilize the

following procedure in conjunction with Attachment A for documentation of hydrostatic testing.

2. Connect the OFCI flexible hose together creating a complete piping loop. Provide necessary fitting to connect OFCI hoses.

3. All system components are designed to withstand the test pressure. If there are any components suspected of not being rated for the test pressure, contact PNNL Engineering.

4. Fill the main supply and return lines and ancillary components with water (or the service fluid). Vent all air from the system by cycling purge/vent valves.

5. Go through the testing pre-test checklist identified in Attachment A (e.g. relief valve at 110% of test pressure, test fluid at room temp).

6. The test witness shall verify the water is completely filled in the system and that air has been properly vented from the system.

7. Once completely filled with water and vented of trapped air, isolate all heat exchanger connections by closing appropriate ball valves.

8. The test witness shall verify that all isolation valves are closed.

9. Increase the pressure in the system through the test port to 25 psig and hold for 15 minutes, checking for gross leaks in the system.

10. If no leaks are found, increase the pressure to 80 psi. Hold for 2 hours.

11. Lower the pressure to atmosphere.

12. Increase the water pressure to 80 psi and hold for 15 minutes.

13. At each step, examine joints for leaks utilizing chalk or another suitable visual technique.

14. Repair any leaks and repeat the test, including the cycle, until there is no leakage.

15. Documentation the test using Attachment A.

B. In-Service Leak Testing

1. After completion of both the hydrostatic and pneumatic test, perform an in-service leak test with the service fluid at the maximum operating pressure.
2. Open all valves and supply the service fluid to the entire system.
3. Visually examine the system to verify there are no leaks.
4. Document the in-service test is completed on Attachment B.

Attachment “A”

Test Location: _____	**Test Date:** _____
A.0	Test Performer: _____ (Print Name) Test Witness: _____ (Print Name)
A.1	Is the system prepared for testing? Insert "✓" or N/A ___ Fabrication Complete ___ Flushed/Cleaned ___ All Openings Sealed ____ Vent for air at high point ___ Components not rated or subject to test are removed ___ Vent/Relief Valve installed at 110% of test pressure ___ System and test fluid at room temp ___ Staff in immediate vicinity aware of test, appropriate hazard mitigation has been implemented
A.2	☐ Main supply line, return line, and ancillary components filled with water or service fluid Test Fluid: ☐ Process Fluid (name) _____ or ☐ Water (check one) ☐ The system is vented of air prior to testing Test Witness: _____ (Initial) Verified the system is full of the test fluid and has been vented
A.3	☐ System pressure increased to 25 psi and held for 15 minutes ☐ System visually inspected for gross leaks. No visual indication of leakage
A.4	Actual Test Pressure: _____ (target 80 psi): Hold 2 Hours Start Time: _____ End Time: _____; Final Test Pressure: _____ ☐ System visually inspected for gross leaks. No visual indication of leakage
A.5	☐ Reduce Pressure to Atmosphere Re-Apply Pressure; Cycle Test Pressure: Actual Test Pressure: _____ (target 80 psi): Hold 15 min ☐ System visually inspected for gross leaks. No visual indication of leakage
A.6	Test Acceptance: ☐ The test has been completed as described. There are no leaks in the system. Test Performer Signature: _____ Date:_____ Test Witness Signature: _____ Date:_____

Attachment "B"

Test Location: (describe details about the portion of the system being tested) _____ _____ _____	**Test Date:** _____
A.0	Test Performer: _____ (Print Name)
A.1	☐ Charge the system with the service fluid (after completing hydrostatic or pneumatic testing on appropriate sections)
A.2	☐ Open all valves to heat exchangers/chiller doors.
A.3	☐ Vent air out of the system
A.4	☐ System pressure increased to operating pressure
A.5	☐ System visually inspected for gross leaks. No visual indication of leakage
A.6	Test Acceptance: ☐ The test has been completed as described. There are no leaks in the system. Test Performer Signature: _____ Date:_____

3.10 FIELD QUALITY CONTROL

A. Prepare hydronic piping according to ASME B31.9 and as follows:

1. Leave joints, including welds, uninsulated and exposed for examination during test.

2. Provide temporary restraints for expansion joints that cannot sustain reactions due to test pressure. If temporary restraints are impractical, isolate expansion joints from testing.

3. Flush hydronic piping systems with clean water; then remove and clean or replace strainer screens.

4. Isolate equipment from piping. If a valve is used to isolate equipment, its closure shall be capable of sealing against test pressure without damage to valve. Install blinds in flanged joints to isolate equipment.

5. Install safety valve, set at a pressure no more than one-third higher than test pressure, to protect against damage by expanding liquid or other source of overpressure during test.

B. Perform the following tests on hydronic piping:

1. Use ambient temperature water as a testing medium unless there is risk of damage due to freezing. Another liquid that is safe for workers and compatible with piping may be used.

2. While filling system, use vents installed at high points of system to release air. Use drains installed at low points for complete draining of test liquid.

3. Isolate expansion tanks and determine that hydronic system is full of water.

4. Subject piping system to hydrostatic test pressure that is not less than 1.5 times the system's working pressure as noted above in section 3.8.

5. Prepare written report of testing.

C. Perform the following before operating the system:

1. Open manual valves fully.

2. Inspect pumps for proper rotation.

3. Inspect air vents at high points of system and determine if all are installed and operating freely (automatic type), or bleed air completely (manual type).

4. Set temperature controls so all coils are calling for full flow.

5. Inspect and set operating temperatures of hydronic equipment, such as boilers, chillers, cooling towers, to specified values.

6. Verify lubrication of motors and bearings.

END OF SECTION 232113

SECTION 232116

HYDRONIC PIPING SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes special-duty valves and specialties for the following:

1. Chilled-water piping.
2. Process-water piping.
3. Air-vent piping.
4. Check Valves

1.2 SUBMITTALS

A. Product Data: For each type of the following:

1. Valves: Include flow and pressure drop curves based on manufacturer's testing for calibrated-orifice balancing valves and automatic flow-control valves.

2. Air-control devices.

3. Hydronic specialties.

1.3 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.4 QUALITY ASSURANCE

A. ASME Compliance: Safety valves and pressure vessels shall bear the appropriate ASME label. Fabricate and stamp air separators and expansion tanks to comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.

PART 2 - PRODUCTS

2.1 VALVES

A. Check, Ball, and Butterfly Valves: Comply with requirements specified in Section 200523 "General-Duty Valves for Mechanical Piping".

B. Automatic Flow-Control Valves:

1. Basis-of-Design Product: Subject to compliance with requirements, provide Hays Fluid Controls or comparable product by one of the following:

   a. Griswold Controls.

2. Body: Brass or ferrous metal.

3. Piston and Spring Assembly: Stainless steel, tamper proof, self-cleaning, and removable.

4. Combination Assemblies: Include bonze or brass-alloy ball valve.

5. Identification Tag: Marked with zone identification, valve number, and flow rate.

6. Size: Same as pipe in which installed.

7. Performance: Maintain constant flow, plus or minus 5 percent over system pressure fluctuations.

8. Minimum CWP Rating: 175 psig (1207 kPa).

9. Maximum Operating Temperature: 200 deg F.

2.2 AIR-CONTROL DEVICES

A. Manual Air Vents:

1. Body: Bronze.
2. Internal Parts: Nonferrous.
3. Operator: Screwdriver or thumbscrew.
4. Inlet Connection: NPS 1/2 (DN 15).
5. Discharge Connection: NPS 1/8 (DN 6).
6. CWP Rating: 150 psig.
7. Maximum Operating Temperature: 225 deg F.

2.3 HYDRONIC PIPING SPECIALTIES

A. Y-Pattern Strainers:

1. Body: ASTM A 126, Class B, cast iron with bolted cover and bottom drain connection.

2. End Connections: Threaded ends for NPS 2 (DN 50) and smaller; flanged ends for NPS 2-1/2 (DN 65) and larger.

3. Strainer Screen: Stainless-steel, 30-mesh strainer, or perforated stainless-steel basket.

4. CWP Rating: 125 psig (860 kPa).

B. Flexible Connectors:

1. Body: Corrugated hose and braid, stainless steel.

2. End Connections: Flanged to match equipment connected.
3. Performance: Capable of 3/4-inch (20-mm) misalignment.
4. CWP Rating: 150 psig (1035 kPa).
5. Maximum Operating Temperature: 250 deg F (121 deg C).
6. Metraflex or Engineer Approved Equal.

C. Check Valve:

1. Class 125 Bronze Check Valve, Horizontal Swing, Regrinding Type, Y-Pattern, Renewable Seat and Disc.

2. Body: Bronze ASTM B 62

3. Bonnet: Bronze ASTM B 62

4. Hinge Pin: Bronze ASTM B 140 Alloy C31400

5. Disc Hanger: Bronze ASTM B62

6. Hanger Nut: Bronze ASTM B 16

7. Disc Holder: Bronze ASTM B 62

8. Seat Disc: Buna-N

9. Manufacture: Nibco T-413 or Engineer Approved Equal.

PART 3 - EXECUTION

3.1 VALVE APPLICATIONS

A. Install shutoff-duty valves at each branch connection to supply mains and at supply connection to each piece of equipment.

3.2 HYDRONIC SPECIALTIES INSTALLATION

A. Install manual air vents at high points in piping, at heat-transfer coils, and elsewhere as required for system air venting.

END OF SECTION 232116

SECTION 232123

HYDRONIC PUMPS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following categories of hydronic pumps for hydronic systems:

1. Vertical in-line pumps.

B. Related Sections include the following:

1. Division 20 Section "Motors" for general motor requirements.

1.2 SUBMITTALS

A. Product Data: Include certified performance curves and rated capacities; shipping, installed, and operating weights; furnished specialties; final impeller dimensions; and accessories for each type of product indicated. Indicate pump's operating point on curves.

B. Shop Drawings: Show pump layout and connections. Include Setting Drawings with templates for installing foundation and anchor bolts and other anchorages.

1. Wiring Diagrams: Detail wiring for power, signal, and control systems and differentiate between manufacturer-installed and field-installed wiring.

C. Maintenance Data: For pumps to include in maintenance manuals specified in Division 1.

1.3 QUALITY ASSURANCE

A. Product Options: Drawings indicate size, profiles, connections, and dimensional requirements of pumps and are based on the specific types and models indicated. Other manufacturers' pumps with equal performance characteristics may be considered. Refer to Division 1 Section "Administrative Requirements."

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction.

C. UL Compliance: Comply with UL 778 for motor-operated water pumps.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Manufacturer's Preparation for Shipping: Clean flanges and exposed machined metal surfaces and treat with anticorrosion compound after assembly and testing. Protect flanges, pipe openings, and nozzles with wooden flange covers or with screwed-in plugs.

B. Store pumps in dry location.

C. Retain protective covers for flanges and protective coatings during storage.

D. Protect bearings and couplings against damage from sand, grit, and other foreign matter.

E. Comply with pump manufacturer's written rigging instructions.

1.5 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. Mechanical Seals: One mechanical seal for each pump.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Vertical In-Line Pumps:

a. Armstrong Pumps, Inc.
b. Bell & Gossett ITT; Div. of ITT Fluid Technology Corp.
c. Grundfos Pumps Corp.
d. Taco; Fabricated Products Div.

2.2 GENERAL PUMP REQUIREMENTS

A. Pump Units: Factory assembled and tested.

B. Motors: Comply with requirements in Division 20 Section "Motors."

2.3 VERTICAL IN-LINE PUMPS

A. Description: Vertical, in-line, centrifugal, flexible-coupled, single-stage, radially split case design. Include vertical-mounting, bronze-fitted design and mechanical seals rated for 125-psig minimum working pressure and a continuous water temperature of 225 deg F.

1. Casing: Cast iron, with threaded companion flanges for piping connections smaller than NPS 3, drain plug at low point of volute, and threaded gage tappings at inlet and outlet connections.

2. Impeller: ASTM B 584, cast bronze, statically and dynamically balanced, closed, overhung, single suction, and keyed to shaft.

3. Wear Rings: Replaceable, bronze casing ring.

4. Shaft and Sleeve: Ground and polished stainless-steel shaft with bronze sleeve.

5. Shaft: Ground and polished stainless-steel shaft with axially split spacer coupling.

6. Seals: Mechanical, with carbon-steel rotating ring, stainless-steel spring, ceramic seat, and flexible bellows and gasket.

7. Seals: Stuffing box, with at least four rings of graphite-impregnated braided yarn with bronze lantern ring between center two graphite rings, and bronze packing gland.

8. Motor: Split coupled shaft and motor support allowing replacement of seals without removing motor.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine equipment foundations and anchor-bolt locations for compliance with requirements for installation.

1. Examine roughing-in for piping systems to verify actual locations of piping connections before pump installation.

2. Examine foundations and inertia bases for suitable conditions where pumps are to be installed.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PUMP INSTALLATION

A. Install pumps according to manufacturer's written instructions.

B. Install pumps to provide access for periodic maintenance, removal, including removing motors, impellers, couplings, and accessories.

C. Support pumps and piping separately so piping is not supported by pumps.

D. Suspend in-line pumps as indicated on the drawings.

3.3 CONNECTIONS

A. Piping installation requirements are specified in other Division 20 and Division 23 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Install piping adjacent to pump to allow service and maintenance.

C. Connect piping to pumps. Install valves that are the same size as piping connected to pumps.

D. Install suction and discharge pipe sizes equal to or greater than diameter of pump nozzles.

E. Install pressure gages on pump suction and discharge. Install at integral pressure-gage tappings where provided.

F. Install temperature and pressure-gage connector plugs in suction and discharge piping around each pump.

G. Install electrical connections for power, controls, and devices.

H. Electrical power and control wiring and connections are specified in Division 16 Sections.

I. Ground equipment.

1. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.4 COMMISSIONING

A. Verify that pumps are installed and connected according to the Contract Documents.

B. Verify that electrical wiring installation complies with manufacturer's written instructions and the Contract Documents.

C. Perform the following preventive maintenance operations and checks before starting:

1. Lubricate bearings.

2. Remove grease-lubricated bearing covers, flush bearings with kerosene, and clean thoroughly. Fill with new lubricant according to manufacturer's written instructions.

3. Disconnect coupling and check motor for proper rotation that matches direction marked on pump casing.

4. Verify that pumps are free to rotate by hand and that pumps for handling hot liquids are free to rotate with pumps hot and cold. Do not operate pumps if they are bound or drag, until cause of trouble is determined and corrected.

5. Check suction piping connections for tightness to avoid drawing air into pumps.

6. Clean strainers.

7. Verify that pump controls are correct for required application.

D. Starting procedure for pumps with shutoff power not exceeding safe motor power is as follows:

1. Fill and Charge system prior to starting.

2. Prime pumps by opening suction valves and closing drains, and prepare pumps for operation.

3. Open cooling water-supply valves in cooling water supply to bearings, where applicable.

4. Open cooling water-supply valves if stuffing boxes are water cooled.

5. Open sealing liquid-supply valves if pumps are so fitted.

6. Open warm-up valves of pumps handling hot liquids if pumps are not normally kept at operating temperature.

7. Open circulating line valves if pumps should not be operated against dead shutoff.

8. Start motors.

9. Open discharge valves slowly.

10. Observe leakage from stuffing boxes and adjust sealing liquid valve for proper flow to ensure lubrication of packing. Let packing "run in" before reducing leakage through stuffing boxes; then tighten glands.

11. Check general mechanical operation of pumps and motors.

12. Close circulating line valves once there is sufficient flow through pumps to prevent overheating.

E. When pumps are to be started against closed check valves with discharge shutoff valves open, steps are the same, except open discharge valves before starting motors.

F. Refer to Division 23 Section "Testing, Adjusting, and Balancing" for detailed requirements for testing, adjusting, and balancing hydronic systems.

END OF SECTION 232123

SECTION 233113

METAL DUCTS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes metal, round and rectangular ducts and fittings for supply and return air-distribution systems in pressure classes from minus-2 to plus 2-inch wg.

B. See Division 23 Section "Air Duct Accessories" for dampers, sound-control devices, duct-mounting access doors and panels, turning vanes, and flexible ducts.

1.2 QUALITY ASSURANCE

A. NFPA Compliance:

1. NFPA 90A, "Installation of Air Conditioning and Ventilating Systems."
2. NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."

B. Welding: See Section 200500.

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 SHEET METAL MATERIALS

A. Comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods, unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.

B. Galvanized Sheet Steel: Lock-forming quality; complying with ASTM A 653/A 653M and having G90 coating designation; ducts shall have mill-phosphatized finish for surfaces exposed to view.

C. Reinforcement Shapes and Plates: Galvanized-steel reinforcement meeting the requirements of 2.2.B.

D. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

2.3 SEALANT MATERIALS

A. Joint and Seam Tape: 2 inches wide; glass-fiber-reinforced fabric.

B. Tape Sealing System: Woven-fiber tape impregnated with gypsum mineral compound and modified acrylic/silicone activator to react exothermically with tape to form hard, durable, airtight seal.

C. Water-Based Joint and Seam Sealant: Flexible, adhesive sealant, resistant to UV light when cured, UL 723 listed, and complying with NFPA requirements for Class 1 ducts.

D. Solvent-Based Joint and Seam Sealant: One-part, nonsag, solvent-release-curing, polymerized butyl sealant formulated with a minimum of 75 percent solids.

E. Flanged Joint Mastic: One-part, acid-curing, silicone, elastomeric joint sealant complying with ASTM C 920, Type S, Grade NS, Class 25, Use O.

F. Flange Gaskets:

1. Butyl rubber or EPDM polymer with polyisobutylene plasticizer.
2. Neoprene, ASTM D 2000, Type BC, 3/16-inch thick, 50 durometer.

2.4 HANGERS AND SUPPORTS

A. Building Attachments: Concrete inserts, powder-actuated fasteners, or structural-steel fasteners appropriate for construction materials to which hangers are being attached.

1. Use powder-actuated concrete fasteners for standard-weight aggregate concretes or for slabs more than 4 inches thick.

2. Exception: Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes or for slabs less than 4 inches thick.

B. Hanger Materials: Galvanized sheet steel or threaded steel rod.

1. Strap and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for steel sheet width and thickness and for steel rod diameters.

C. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.

D. Trapeze and Riser Supports:

1. Galvanized-steel shapes and plates complying with ASTM A 36/A 36M.

2. Steel channels and associated components.

a. Manufacturers:

1) B-Line Systems, Inc.; a division of Cooper Industries.
2) ERICO/Michigan Hanger Co.; ERISTRUT Div.
3) GS Metals Corp.
4) Power-Strut Div.; Tyco International, Ltd.
5) Thomas & Betts Corporation.
6) Tolco Inc.
7) Unistrut Corp.; Tyco International, Ltd.

b. Coatings: Manufacturer's standard finish.

2.5 ROUND AND RECTANGULAR DUCT FABRICATION

A. Fabricate ducts, elbows, transitions, offsets, branch connections, and other construction according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" and complying with requirements for metal thickness, reinforcing types and intervals, tie-rod applications, and joint types and intervals.

1. Lengths: Fabricate rectangular ducts in lengths appropriate to reinforcement and rigidity class required for pressure class.

2. Deflection: Duct systems shall not exceed deflection limits according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible."

B. Transverse Joints: Prefabricated slide-on joints and components constructed using manufacturer's guidelines for material thickness, reinforcement size and spacing, and joint reinforcement.

1. Manufacturers:

a. Ductmate Industries, Inc.
b. Nexus Inc.
c. Ward Industries, Inc.

C. Formed-On Flanges: Construct according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible," Figure 1-4, using corner, bolt, cleat, and gasket details.

1. Manufacturers:

a. Ductmate Industries, Inc.
b. Lockformer.

2. Duct Size: Maximum 30 inches wide and up to 2-inch wg pressure class.

3. Longitudinal Seams: Pittsburgh lock sealed with noncuring polymer sealant.

D. Cross Breaking or Cross Beading: Cross break or cross bead duct sides 19 inches and larger and 0.0359 inch thick or less, with more than 10 sq. ft. of nonbraced panel area unless ducts are lined.

PART 3 - EXECUTION

3.1 DUCT APPLICATIONS

A. Static-Pressure Classes: Unless otherwise indicated, construct ducts according to the following:

1. Supply Ducts: 2-inch wg.

3.2 DUCT INSTALLATION

A. Construct and install ducts according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible," unless otherwise indicated.

B. Install ducts with fewest possible joints.

C. Install fabricated fittings for changes in directions, size, and shape and for connections.

D. Install turning vanes in all rectangular elbows unless noted otherwise.

E. Round elbows shall have a centerline radius of 1-1/2 times the duct diameter.

F. Install couplings tight to duct wall surface with a minimum of projections into duct. Secure couplings with sheet metal screws. Install screws at intervals of 12 inches, with a minimum of 3 screws in each coupling.

G. Install ducts, unless otherwise indicated, vertically and horizontally and parallel and perpendicular to building lines; avoid diagonal runs.

H. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.

I. Install ducts with a clearance of 1 inch, plus allowance for insulation thickness.

J. Conceal ducts from view in finished spaces. Do not encase horizontal runs in solid partitions unless specifically indicated.

K. Coordinate layout with suspended ceiling, fire- and smoke-control dampers, lighting layouts, and similar finished work.

L. Seal all joints and seams. Apply sealant to male end connectors before insertion, and afterward to cover entire joint and sheet metal screws. Seal ducts before external insulation is applied.

M. Electrical Equipment Spaces: Route ducts to avoid passing through transformer vaults and electrical equipment spaces and enclosures.

N. Non-Fire-Rated Partition Penetrations: Where ducts pass through interior partitions and exterior walls and are exposed to view, conceal spaces between construction openings and ducts or duct insulation with sheet metal flanges of same metal thickness as ducts. Overlap openings on 4 sides by at least 1-1/2 inches.

O. Protect duct interiors from the elements and foreign materials until building is enclosed. Follow SMACNA's "Duct Cleanliness for New Construction."

3.3 HANGING AND SUPPORTING

A. Support horizontal ducts within 24 inches of each elbow and within 48 inches of each branch intersection.

B. Support vertical ducts at maximum intervals of 16 feet and at each floor.

C. Install upper attachments to structures with an allowable load not exceeding one-fourth of failure (proof-test) load.

3.4 CONNECTIONS

A. Make connections to equipment with flexible connectors according to Division 23 Section "Air Duct Accessories."

B. Comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for branch, outlet and inlet, and terminal unit connections.

END OF SECTION 233113

SECTION 260500 - COMMON WORK RESULTS FOR ELECTRICAL

PART 1 - GENERAL

1.1 SCOPE OF WORK - GENERAL REQUIREMENTS

A. Drawings and general provisions of the contract, including General and Supplementary Conditions and other division 0 and 1 Specification Sections, apply to work of this Section.

B. This section specifies the general requirements for Electrical work. Detailed requirements for specific electrical items are specified in other sections and on drawings and are subject to the general requirements in this section. Provide all electrical labor and materials required for installation as indicated in the drawings and the specifications. All materials and labor not specifically called out but that are required to provide a complete and operable electrical installation in accordance with the contract shall be provided.

C. Coordinate work under this division with all other work under Contract, including work provided by the Owner's forces. Coordinate location of equipment and devices to avoid conflicts with other work. Plan the work ahead of schedule and verify electrical requirements, connections and interface with other trades. Coordinate the installation work to eliminate cutting and patching. Carefully examine the full set of Contract documents for electrical work and requirements. Extra cost will not be allowed if electrical work is required to be moved due to interference with other work. Extra cost will not be allowed for electrical work indicated in the Contract documents.

1.2 ABBREVIATIONS

A. UPS: Uninterruptible Power Supply

B. BMS: Building Management System

C. NAE: Network Automation Engine

D. NEC: National Electrical Code

1.3 CODES, STANDARDS AND FEES

A. Labor and materials shall comply with latest rules and regulations of following standards and codes:

WAC 296-46B Washington State Electrical Code.
National Electrical Code, 2008.
Applicable NFPA Publications.
Applicable ANSI, UL and NEMA Standards.
Requirements of Washington State Occupational Safety and Health.

B. If any conflict occurs between these rules and the drawings and specifications, the rules are to govern. This does not relieve the contractor of complying with any requirements as defined by the engineer concerning the plans and specifications which are in excess of the codes and regulations.

C. Installed electrical equipment shall be listed, labeled, or otherwise indicated as acceptable by a nationally accredited testing laboratory (UL listed and labeled equipment). Exceptions to the UL listing of one of a kind equipment will be inspected for conformance with the NEC.

1.4 SHOP DRAWINGS AND SUBMITTALS

A. The approval of submittals does not relieve responsibility to comply with the contract documents and/or governing codes and standards and does not authorize any deviations from the specifications or drawings unless an attached letter clearly lists the deviation. The burden of proof for equality, substitute equipment or materials must be shown to comply with the specification.

B. Submit for approval in compliance with section 013000 the following; insert catalog sheets, specification sheets and descriptive material in a common binder with a reference to the specification. Review submittals and stamp contractor approved prior to forwarding to Engineer for approval. Received submittals of individual items or without note of approval will be subject to return without review.

C. Submittals on equipment and material shall include: catalog sheets, specification sheets, wiring and connection diagrams, layout and dimensions, descriptive material, performance data, operation description and any other data required to show compliance with contract documents.

D. Provide equipment specified or clearly note on equipment submittal substitute equipment. The engineer reserves the right to reject substitute equipment, and there is no venue for appeal. Substitutions are allowed only for products specifications which list three or more acceptable manufacturers or state “or approved equal”, “or equal”. Supply submittals for the following items:

1. Switchboards & Circuit Breakers , see Section 262413 for submittal requirements.
2. Field Quality Control results from Section 260519
3. Arc Flash, see section 1.14

Additional items indicated herein.

1.5 INSPECTION

A. Materials and workmanship are subject to inspection at any time by Battelle. Correct or replace at no cost to the owner any work or material not in accordance with the intent of these contract documents or found to be deficient or defective by the engineer or code official.

1.6 DRAWINGS

A. Electrical Drawings are diagrammatic and complementary to Architectural and Mechanical Drawings; not intended to show all features of work. The plans are intended to only show general locations and operation. Determine the specific layout and electrical connections conform to the intent of contract documents. Any proposed departures from these plans and specifications shall be requested in writing from Battelle. The request shall be made as soon as practicable and within 30 days after contract award, stating the reasons for the proposed departures.

B. Because exact manufacturers of equipment are not known at the time of design, equipment sizes and types may be different from those shown on the drawings. Make any necessary changes to electrical rating of equipment or materials to accommodate actual equipment installed.

C. Install electrical items in a manner to provide symmetrical appearance where not dimensioned on drawings. Do not scale Drawings for equipment location. Review Architectural, Civil, Structural, and Mechanical Drawings and adjust work to conform to conditions shown. Data present on Drawings is as accurate as planning can determine. Dimensional accuracy is not guaranteed and field verification of dimensions, locations and levels to suit filed conditions.

D. The act of submitting a bid confirms that the existing conditions have been accounted for, including any allowances, in regards to the site, structural, architectural, mechanical, plumbing, and electrical drawings. Provide in writing prior to bid any contradictions, discrepancies or design work that does not meet code or will not function as intended. No additional costs to the owner will occur for failure to report discrepancies of the electrical system including conditions and dimensions shown on the drawings.

E. Riser and other diagrams are schematic only and do not necessarily show the physical arrangement of the equipment. They shall not be used to obtain quantities or lineal runs of conduit.

F. The drawings show the required size number and type of wires therein and points of termination of the conduits, but do not show the intended routing or total number of conduits required for the circuits shown. Additional conduits shall be installed wherever needed to complete the installation of the wiring required for the specific equipment furnished. Circuits may be combined into raceways provided such combinations of circuits are in accordance with the NEC.

1.7 LABELING

A. Refer to Division 26 section 260553 – IDENTIFICATION FOR ELECTRICAL SYSTEMS.

1.8 INSTALLATION AND COORDINATION

A. Provide and install all raceways including cable trays for electrical as well as equipment supplied by other Vendors or Trades. Failure to properly plan and coordinate this work with other equipment Vendors and Trades shall not be the cause for claims for extras. Refer to the Architectural, Structural, and Mechanical drawings for additional building details necessary for proper work coordination. If other Trades relieve the electrical contractor of any portion of this work, copies of the Release containing a complete and accurate description of the cables and conduits retained by the other Vendor or Trade shall be forwarded to the General Contractor and Battelle by Transmittal Letter.

B. Provide power wiring complete from power source to disconnects or other points of service of mechanical or other equipment requiring electrical service and make final connections.

C. Provide disconnect switches unless they are supplied as an integral part of a certain piece of equipment. Install motor starters and/or disconnect switches that are supplied with but are not an integral part of a certain piece of equipment.

D. No additional cost for cutting, patching, wiring, finishing or any other work required for relocation of work installed due to interferences between the work of the various trades is allowed.

E. Perform cutting, drilling and patching as necessary to properly accomplish the work. All cutting and patching shall be done with materials equal in quality and durability to the existing finish. Match the patch finish with the existing surface or wall finish. The finish on patched work shall match the finish on the existing surface or wall. Refer to Battelle in regards to the acceptability of a particular finish.

F. Owner and Contractor responsibilities are attached to this specification under Appendix “A”.

1.9 ENCLOSURES

A. Unless otherwise noted, enclosures for electrical equipment shall be as follows:

NEMA 1	Indoor locations.
NEMA 3R	Outdoor, damp or wet locations.

1.10 TESTS

A. Testing described below shall be in addition to any other tests required under the specific sections of this specification.

B. Adjust or calibrate protective devices as required so as to perform as intended. Functionally test the complete control system including the following; control devices, interlocking, and control logic.

C. After electrical system is complete and all systems have been appropriately checked, calibrated and adjusted, then inform the Battelle construction manager for final inspection and operational check-out. Make changes as necessary following the inspection and operational check-out.

1.11 HOUSEKEEPING

A. Continually remove debris, cuttings, crates etc. created. Perform at sufficient frequency to eliminate hazards to the public, other workmen and owner's employees. Remove demolished and abandoned material. If directed by owner, designated materials will be removed to a location identified by the owner.

1.12 OPERATION AND MAINTENANCE MANUAL

A. Provide operation and maintenance manuals for training of Battelle’s employees in operation and maintenance of systems and related equipment. Prepare a separate chapter for instruction of each class of equipment or system.

B. Submit copies of Operation and Maintenance Manual for approval. After review make all corrections and additions and provide number of copies as specified in other divisions of this specification.

1.13 GUARANTEE

A. Provide defect free work and equipment for a period of one year from date of acceptance. Replace at no cost to the owner any defects that arise within the one year guarantee period.

1.14 ARC FLASH

A. Arc Flash study to determine the incidental energy, flash boundary, and PPE requirements for panelboard and switchboard found on the one-line drawings. The study will use the IEEE 1584 calculation method and the study will be done on equipment 208Y/120 Volts and above. The study will use NFPA 70E standards for boundary calculations, hazard categories and recommended PPE. The study will include the following:

1. Incidental energy and flash boundary calculations.

2. Provide a protective device coordination study to determine the correct settings and sizes for fuses, circuit breakers and relays.

3. Provide and impedance one-line diagram. The impedance diagram will show the schematic wiring of the electrical distribution system.

4. List of recommendations for the devices that are underrated or where categories are 3 or higher. Provide settings for the Ground Fault Protection breakers.

5. Provide a short circuit study to verify that the interrupting rating is greater than the available fault current for fuses, circuit breakers, and relays.

B. ANSI compliant color coded arc flash warning labels listing PPE requirements at each location.

C. All studies are to be completed using SKM Power Tools software. All electronic files (include ing the SKM data base) are to be turned over at the completion of the study.

PART 2 - EXECUTION

2.1 COMMON REQUIREMENTS FOR ELECTRICAL INSTALLATION

A. Install in accordance with the 2008 National Electrical Code (NEC) and rework as necessary to meet code compliance. NEC code compliance will be enforced by a Battelle-Designated NEC inspector.

B. Comply with NECA 1.

C. Measure indicated mounting heights to bottom of unit for suspended items and to center of unit for wall-mounting items unless otherwise noted on drawings.

D. Headroom Maintenance: Arrange and install components and equipment to provide maximum headroom if mounting heights or other location criteria are not indicated.

E. Equipment: Facilitate service, maintenance and repair or replacement of installed components of both electrical equipment and other nearby installations. Connect in such a way as to assist future disconnecting with minimum interference with other items in the vicinity.

F. Verify before installation adequate working clearances and dedicated electrical space above for new panelboards, distribution boards and switchboards.

G. Schedule electrical outages of existing circuits to allow for planned shutdown of existing equipment.

2.2 CONTROL PANELS

A. UL 508 certified with appropriate label installed. ETL US 1995 certification is also acceptable for mechanical equipment.

B. NEC compliant. This will be verified by 3rd party electrical inspector coordinated and paid for by PNNL. All NEC violations must be re-worked by UL 508 shop and re-certified and re-labeled appropriately.

2.3 ELECTRICAL PENETRATIONS

A. Interior Penetrations of Non-Fire-Rated Walls and Floors: Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint.

B. Fire-Rated-Assembly Penetrations: Maintain indicated fire rating of walls, partitions, ceilings and floors at raceway and cable penetrations.

END OF SECTION 260500

SECTION 260519 – LOW VOLTAGE ELECTRICAL POWER CONDUCTORS & CABLES

PART 1 - GENERAL

1.1 GENERAL

A. This section specifies all conductors and cable to be used for this installation.

1.2 CODES AND STANDARDS

A. The current edition of the following standards, codes and specifications including documents referenced therein, form a part of this specification.

UL 83	Thermoplastic Insulated Wire and Cable.
UL 44	Rubber Insulated Wire and Cables.
NEMA WC5	Thermoplastic Insulated Wire and Cable for Distribution of Electrical Energy.

PART 2 - PRODUCTS

2.1 CONDUCTORS

A. Conductors and cables shall be identified on the overall jacket as to the manufacturer's name, conductor size, number of conductors, type of insulation, type of jacket, and voltage rating. Information shall be printed every three feet.

B. Color code electrical conductors to meet identification requirements in NEC 210.5 as follows:

1. 480V, 3 phase, A, B, C colors red, yellow and blue, respectively. Neutral white or gray except when installed in conduit shared with 120V to ground. In those cases the 277V to ground should have a white with red stripe neutral.

2. 208/120V, 3 phase, 4 wire, A, B, C colors black, purple and brown, respectively. Note: black and brown colors in 240/120V or 208/120V systems are 120V to ground in both cases and orange wild leg is 208V to ground.

3. 240V, 1 phase, colors black and brown. Neutral color white or gray. 3 phase, 3 wire, colors black, purple and brown.

4. 240V, 3 phase, 4 wire, A, B, C colors black, orange and brown, respectively, with B phase the high or “wild” leg. Orange color identification is also required for feeders in this configuration. Neutral color white or gray.

C. All 600 volt single conductors shall be copper type THHN/THWN dual rated, Class B stranding, PVC insulation with nylon jacket rated at 75^{o} C in wet locations, 90^{o} C in dry locations. Service entrance conductors to have TWHN-2 or XHHW-2 insulation.

D. Ground wire shall be bare or insulated copper conductor Class B stranding.

E. Minimum size of all 600 volt power wiring to be No. 12 unless otherwise noted.

2.2 ACCESSORIES

A. Wire Pulling compound shall be Polywater J by American Polywater Corp.

B. Plastic insulating tape shall be Scotch 33T by 3M.

C. Conduit protection tape shall be Scotchard No. 50 by 3M.

D. Insulating putty shall be Scotch-fill by 3M.

E. Duct sealing compound shall be Duct-Seal by Porcelain Products Co.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Power conductors shall be installed continuous with no splices. Pull boxes shall be used to keep pulling tension within allowable limits specified by manufacturers. Use wire pulling compound for installing conductors in conduit to limit the tension. Prior to installing conductors, all raceways shall be complete and protected from weather. Conduit runs shall be cleaned and swabbed. Replace conductors with damaged insulation.

B. Conductors No.6 and smaller located in panels and electrical equipment shall be bundled and laced with plastic cable ties at intervals not greater than 6 inches, spread into trees and connected to their respective terminals.

C. At least 6 inches of slack conductor shall be left at each outlet or junction box and 9 inches of conductor at each unconnected outlet. Tape free ends of unused conductors and coil neatly in outlet box.

D. Conductors shall be terminated with tool applied one-piece compression type connectors; tin plated high conductivity copper. Connectors for taps and splices on wire size No.10 and smaller shall be wire nuts. Connectors for wire sizes No. 8 and larger shall be one-hole lugs up to size No. 3/0 and two hole for size No 4/0 and larger. Where terminals do not accept connectors, then conductors shall be terminated directly to terminal block. All connectors shall be approved for the voltage at which it is applied and UL listed.

E. Provide a green equipment ground conductor, #12 AWG copper minimum. Size in accordance with NEC 250.122.

F. Use #12 THHN for all 15 or 20amp laboratory branch circuits.

G. Provide ground fault circuit interrupter (GFCI) protection for all 120vac receptacles, 15 and 20amp, installed less than 6' from a source of water.

H. Provide a separate neutral conductor for each laboratory 120vac receptacle circuit.

3.1 FIELD QUALITY CONTROL

A. For feeder and branch circuits of 100 amps and larger, 600V maximum. Perform insulation-resistance test on each conductor using a megohmmeter with respect to ground and adjacent conductors. Applied potential shall be 500 volts dc for 300 volt rated cable and 1000 volts dc for 600 volt rated cable. Minimum insulation-resistance values should not be less than 50 megohms. Test duration shall be one minute. Provide documentation for each set of conductors.

END OF SECTION 260519

SECTION 260523 – CONTROL VOLTAGE ELECTRICAL POWER CABLES

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. Control and Signal circuit conductors.
2. Identification products.
3. Sleeves and sleeve seals for cables.

1.3 DEFINITIONS

A. EMI: Electromagnetic interference.

B. IDC: Insulation displacement connector.

C. Low Voltage: As defined in NFPA 70 for circuits and equipment operating at less than 50 V or for remote-control and signaling power-limited circuits.

1.4 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

PART 2 - PRODUCTS

2.1 CONTROL AND SIGNAL CIRCUIT CONDUCTORS

A. Class 1 Control Circuits: Stranded copper, Type THHN-THWN, in raceway.

B. Class 2 and 3 Control Circuits: Stranded copper; Cable Types CL2, CL3, CM, CMG, CMP or others as allowed by NEC Article 725; concealed in building finishes or raceway.

2.2 IDENTIFICATION PRODUCTS

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. Brady Corporation.
2. HellermannTyton.
3. Kroy LLC.
4. Panduit Corp.

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

C. Comply with requirements in Division 26 Section "Identification for electrical systems".

2.3 SOURCE QUALITY CONTROL

A. Cable will be considered defective if it does not pass tests and inspections.

B. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 INSTALLATION OF PATHWAYS

A. Comply with TIA/EIA-569-A for pull-box sizing and length of conduit and number of bends between pull points.

B. Comply with requirements in Division 26 Section "Raceway and boxes for electrical systems" for installation of conduits and wireways.

C. Install manufactured conduit sweeps and long-radius elbows if possible.

3.2 INSTALLATION OF CONDUCTORS AND CABLES

A. Comply with NECA 1.

B. General Requirements for Cabling:

1. Route all control wiring/cabling in conduit.

2. Terminate all conductors; no control cable shall contain unterminated elements. Make terminations only at indicated outlets, terminals, and cross-connect and patch panels.

3. Cables may not be spliced. Secure and support cables at intervals not exceeding 30 inches and not more than 6 inches from cabinets, boxes, fittings, outlets, racks, frames, and terminals.

4. Bundle, lace, and train conductors to terminal points without exceeding manufacturer's limitations on bending radii, but not less than radii specified in BICSI ITSIM, "Cabling Termination Practices" Chapter. Install lacing bars and distribution spools.

5. Do not install bruised, kinked, scored, deformed, or abraded cable. Do not splice cable between termination, tap, or junction points. Remove and discard cable if damaged during installation and replace it with new cable.

6. Cold-Weather Installation: Bring cable to room temperature before dereeling. Heat lamps shall not be used for heating.

7. Pulling Cable: Comply with BICSI ITSIM, Ch. 4, "Pulling Cable." Monitor cable pull tensions.

C. Installation of Control-Circuit Conductors:

1. Install wiring in raceways. Comply with requirements specified in Division 26 Section "Raceway and Boxes for Electrical Systems."

3.3 REMOVAL OF CONDUCTORS AND CABLES

A. Remove abandoned conductors and cables.

3.4 CONTROL-CIRCUIT CONDUCTORS

A. Minimum Conductor Sizes:

1. Class 1 remote-control and signal circuits, No 14 AWG.
2. Class 2 low-energy, remote-control, and signal circuits, No 18 AWG.
3. Class 3 low-energy, remote-control, alarm, and signal circuits, No 18 AWG.

3.5 FIRESTOPPING

A. Comply with requirements in Division 07.

3.6 GROUNDING

A. For low-voltage wiring and cabling, comply with requirements in Division 26 Section "Grounding and Bonding for Electrical Systems."

3.7 IDENTIFICATION

A. Identify system components, wiring, and cabling according to TIA/EIA-606-A. Comply with requirements for identification specified in Division 26 Section "Identification for Electrical Systems."

3.8 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Tests and Inspections:

1. Visually inspect cable placement, cable termination, grounding and bonding, equipment and patch cords, and labeling of all components.

C. End-to-end cabling will be considered defective if it does not pass tests and inspections.

END OF SECTION 260523

SECTION 260533 - RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes raceways, fittings, boxes, enclosures, and cabinets for electrical wiring.

1.3 DEFINITIONS

A. EMT: Electrical metallic tubing.

B. ENT: Electrical nonmetallic tubing.

C. EPDM: Ethylene-propylene-diene terpolymer rubber.

D. FMC: Flexible metal conduit.

E. IMC: Intermediate metal conduit.

F. LFMC: Liquidtight flexible metal conduit.

G. LFNC: Liquidtight flexible nonmetallic conduit.

H. NBR: Acrylonitrile-butadiene rubber.

I. RNC: Rigid nonmetallic conduit.

1.4 SUBMITTALS

A. See 260500 for submittal requirements.

1.5 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 METAL CONDUIT AND TUBING

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:

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

1. AFC Cable Systems, Inc.
2. Alflex Inc.
3. Allied Tube & Conduit; a Tyco International Ltd. Co.
4. Anamet Electrical, Inc.; Anaconda Metal Hose.
5. Electri-Flex Co.
6. Manhattan/CDT/Cole-Flex.
7. Maverick Tube Corporation.
8. O-Z Gedney; a unit of General Signal.
9. Wheatland Tube Company.

C. Rigid Steel Conduit: ANSI C80.1.

D. IMC: ANSI C80.6.

E. EMT: ANSI C80.3., UL 651.

F. FMC: Zinc-coated steel.

G. LFMC: Flexible steel conduit with PVC jacket.

H. Fittings for Conduit (Including all Types and Flexible and Liquidtight), EMT, and Cable: NEMA FB 1; listed for type and size raceway with which used, and for application and environment in which installed.

1. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 886.
2. Fittings for EMT: Steel, compression type.

I. Joint Compound for Rigid Steel Conduit or IMC: Listed for use in cable connector assemblies, and compounded for use to lubricate and protect threaded raceway joints from corrosion and enhance their conductivity.

2.2 BOXES, ENCLOSURES, AND CABINETS

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

1. Cooper Crouse-Hinds; Div. of Cooper Industries, Inc.
2. EGS/Appleton Electric.
3. Erickson Electrical Equipment Company.

4. Hoffman.
5. Hubbell Incorporated; Killark Electric Manufacturing Co. Division.
6. O-Z/Gedney; a unit of General Signal.
7. RACO; a Hubbell Company.
8. Robroy Industries, Inc.; Enclosure Division.
9. Scott Fetzer Co.; Adalet Division.
10. Spring City Electrical Manufacturing Company.
11. Thomas & Betts Corporation.
12. Walker Systems, Inc.; Wiremold Company (The).
13. Woodhead, Daniel Company; Woodhead Industries, Inc. Subsidiary.

B. Sheet Metal Outlet and Device Boxes: NEMA OS 1.

C. Cast-Metal Outlet and Device Boxes: NEMA FB 1, aluminum, Type FD, with gasketed cover.

D. Nonmetallic Outlet and Device Boxes: NEMA OS 2.

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

F. Cast-Metal Access, Pull, and Junction Boxes: NEMA FB 1, cast aluminum with gasketed cover.

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

A. Comply with the following indoor applications, unless otherwise indicated:

1. Exposed, Not Subject to Physical Damage: EMT.
2. Exposed and Subject to Severe Physical Damage: Rigid galvanized steel conduit. Includes raceways in the following locations:

    a. Outdoor equipment pads.
    b. Corridors used for traffic of mechanized carts, forklifts, and pallet-handling units.
    c. Mechanical rooms, where subject to damage.

3. Concealed in Ceilings and Interior Walls and Partitions: EMT.
4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC, except use LFMC in damp or wet locations.
5. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, type 4, die cast, metallic or nonmetallic in damp or wet locations.

B. Minimum Raceway Size: 3/4-inch trade size unless otherwise noted on drawings.

C. Raceway Fittings: Compatible with raceways and suitable for use and location.

1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings, unless otherwise indicated.

2. EMT: Use compression fittings

3.2 INSTALLATION

A. Comply with NECA 1 for installation requirements applicable to products specified in Part 2 except where requirements on Drawings or in this Article are stricter.

B. Keep raceways at least 6 inches away from parallel runs steam or hot-water pipes.

C. Complete raceway installation before starting conductor installation.

D. Piping systems installed at a required slope have right of way.

E. Provide minimum cover in accordance with NEC article 300.5 column 3 of table 300.5.

F. Route vertical conduit runs perpendicular to floor and horizontal runs parallel to ceiling. Route conduits in walls or ceiling space where possible. Support raceways as required by 2008 NEC.

G. Provide pull, junction, and splice boxes, even if not shown on drawings.

H. Conceal conduit and EMT within finished walls, ceilings, and floors, unless otherwise indicated.

I. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of pull wire.

J. Control conductors on the exposed piping instrumentation in room 1109 shall be run in nonmetallic flexible conduit. Color to approved by engineer.

K. Flexible Conduit Connections: Use maximum of 72 inches of flexible conduit for equipment subject to vibration, noise transmission, or movement; and for transformers and motors.

1. Use LFMC in damp or wet locations subject to severe physical damage.

L. Steel conduit/Nonmetallic conduit installed in or under concrete shall be as follows:

1. Steel conduit runs through concrete shall be fully made up and secured to reinforcing rods to prevent movement during the concrete pour.

2. Conduit installed in poured floors shall be effectively closed immediately after installation. Suggested means for closing are wrapping with heavy grade of tape, installation of a capped bushing, or plugs designed for the purpose. Stubs shall remain closed during construction, or until the raceway is extended to a termination point.

3. Steel conduit shall be rigid and galvanized.

4. Conduit shall be supported to prevent damage prior to and during the concrete pour.

5. When nonmetallic conduits are used in or under concrete floor slabs, change to rigid galvanized steel prior to exiting the floor slab (use rigid conduit elbow for stub up). Stub the rigid galvanized coupling a minimum of ¼" above the concrete slab. Where the completion of the raceway system will be delayed, the stub shall be marked in some manner to indicate a supplemental equipment grounding conductor is required because the entire run is not metal, and therefore not electrically continuous.

6. Plastic sheet marker shall be placed continuously over buried electrical conduits. Place marker tape directly over the line and 1' below finish grade. Place intermediate markers at intervals of not more than 4". Marker shall be 6" wide, yellow detectable "terra tape" as manufactured Griffith Co., Inc., or approved equal.

END OF SECTION 260533

SECTION 260553 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Equipment ID's to be furnished by Battelle.

B. Provide engraved plastic laminated nameplates or electronically generated and printed tape labels for new power and lighting panels. Labels shall have minimum 3/8-inch letters, black letters on white background for normal power and red letters on white background for standby/emergency power. For existing panelboards, provide correct, typewritten panel directories of new or revised panelboard circuits.

C. Provide an electronically generated printed tape label or engraved plastic laminated adhesive label for circuit identification at safety disconnects and receptacles. Labels shall have minimum 3/8-inch letters, black letters on white background for normal power and red letters on white background for standby/emergency power.

D. Equipment to be labeled:

1) Switchboards, Electrical Cabinets, and Enclosures includes controls.
2) Disconnect Switches.
3) Enclosed Circuit Breakers.
4) Motor Starters/Controllers.
5) Push-button Stations.
6) UPS and Manual Transfer Switch.
7) 24V Power Supplies.
8) 120V Receptacles and Switches

E. Refer to Section 260500 – COMMON WORK RESULTS FOR ELECTRICAL – for additional Arc Flash labeling requirements.

END OF SECTION 260553

SECTION 262413 – PANELBOARDS AND SWITCHBOARDS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the specifications for the distribution panelboards and lighting and appliance branch-circuit panelboards.

1.2 CODES AND STANDARDS

NEMA 1	Instructions for Safe Installation, Operation, and Maintenance of Panelboards Rated 600 Volts or Less
NEMA 250	Enclosures for Electrical Equipment (1000 V maximum)

1.3 SHOP DRAWINGS AND SUBMITTALS

A. Product Data: For each type of panelboard, overcurrent protective device, accessory, and component indicated. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.

B. Shop Drawings: For each panelboard and related equipment.

1. Dimensioned plans, elevations, sections, and details. Show tabulations of installed devices, equipment features, and ratings. Include the following:

   a. Enclosure types and details for types other than NEMA 250, Type 1.
   b. Bus configuration, current, and voltage ratings.
   c. Short-circuit current rating of panelboards and overcurrent protective devices.
   d. UL listing for full rating of installed devices.
   e. Features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.

2. Operation and maintenance data.

1.4 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Comply with NEMA PB 1.1.

C. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

1. The basis for design is the QED Switchboard from Square D Company. Other manufacturer’s equipment may be submitted provided they are approved by the engineer prior to bid. GE, Eaton-CH, Siemens

2.2 PANELBOARDS

A. GENERAL

1. Except as otherwise noted, provide panelboards, enclosures and ancillary components of types, sizes, and ratings indicated. Equip with number of unit panelboard devices as required for complete installation. Fully equip “spaces” with hardware to receive breaker or switch of size indicated. Provide CU/AL rated lugs of proper size to accommodate conductors specified.

B. DISTRIBUTION AND LIGHTING AND APPLIANCE PANELBOARDS

1. Panels to be service entrance rated where required by code. Provide dead-front safety type distribution and lighting/appliance panel boards as indicated, with switching and protective devices in quantities, ratings, types and arrangements shown. Provide bolt-on thermal magnetic type branch breakers. Where multiple breakers are indicated, provide with common trip handle. Equip with copper bus bars, full-sized neutral bus, and ground bus.

a. Provide panelboards/cicuit breakers suitable for available fault current.

b. All breakers to be provided with factory installed lockout devices. Operating handles on breakers are to be no higher than 6’-6”.

c. Provide mechanical lugs in the quantity and size required per one line drawing.

C. PANELBOARD ENCLOSURES

1. Flush or Surface, as indicated; tight closing doors without play, when latched. Where two cabinets are located adjacent to each other in finished areas, provide matching trim of same height.

2. Provide lock for each cabinet door. All electrical distribution equipment locks shall be keyed identically. Supply owner with a minimum of six keys.

3. Fasten panelboard front with machine screws with oval countersunk heads, finish hardware quality, with escutcheons or approved trim clamps. Surface mounted panelboards with fronts greater than 48 inches vertical dimension shall be hinged at right side in addition to hinged door over dead front.

4. Finish: Provide factory prime coat for cabinets to be located in finished areas. Where cabinets are located in unfinished areas, standard lacquer or enamel finish, gray or blue-gray color shall be substituted for factory prime coat.

PART 3 - EXECUTION

3.1 INSTALLATION

A. GENERAL

1. Install distribution boards and enclosures where indicated, in accordance with manufacturer's written instructions, applicable requirements of the NEC and NECA's "Standard of Installation", and NEMA PB1.1, in compliance with recognized industry practices to ensure products fulfill requirements.

2. Set field-adjustable switches and circuit-breaker trip ranges.

3. Install filler plates in unused spaces.

4. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs as specified in Division 26 Section "Identification for Electrical Systems".

6. Ground equipment according to Division 26 Section "Grounding and Bonding for Electrical Systems".

7. Connect wiring according to Division 26 Section "Low Voltage Electrical Power Conductors and Cables."

3.2 MOUNTING

A. Secure in place with top of cabinet at 6'-0" unless otherwise noted or cabinet is greater 72". Top of cabinet and trim shall be level. Firmly anchor cabinets directly or with concealed bracing to building structure. When panels are not located in or directly on a wall, provide a support frame of formed steel channel, which is anchored to the floor and ceiling structure. Interiors shall not be installed until structure is totally enclosed. Where panels are mounted adjacent to each other, the top edges shall be at the same height.

B. Provide 4" high concrete curb under floor standing distribution panelboards. (Not Used)

C. Mount plumb and rigid without distortion of box. Mount recessed panelboards with fronts uniformly flush with wall finish.

3.3 CIRCUIT INDEX

A. For each branch circuit panelboard provide a typewritten index listing each circuit in the panelboard by number with it proper load designation. Mount with transparent protective cover inside cabinet door. Listing shall match circuit breaker arrangements typically with odd number on the left side and even number on the right side. Room numbers used shall be the final room numbers used in the building as verified with the Owner and not the room number assigned on the plans.

3.4 SPACE

A. Verify space available with equipment sizes and code required working clearances prior to submittal of shop drawings.

3.5 FEED THROUGH AND DOUBLE LUGS (Not Used)

A. Provide feed through or double lugs with amperage equal to the incoming feeder amperage unless shown as larger.

3.6 FIELD QUALITY CONTROL

A. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

B. Testing

1. Use a calibrated torque wrench and torque all lugs per manufacturer's recommendations.

2. Operate all circuit breakers and verify very high resistance when open and very low resistance when closed. Record values with micro-ohmmeter.

3. Provide written documentation for all testing with initials and dates.

4. Measure resistance across all field made buss connections. Document all values. Use micro-ohmmeter as needed.

5. Verify correct phase rotation at the input and output on the main breaker and all feeder bussing. Document values with construction manager.

6. Perform Insulation testing per section 260519.

7. Perform continuity testing on all conductors. Document values.

END OF SECTION 262413

SECTION 312000 – EARTH MOVING

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. Section Includes:

1. Preparing subgrades for slabs-on-grade.
2. Subbase course for concrete walks.
3. Subbase course and base course for asphalt paving.
4. Excavating and backfilling for utility trenches.

B. Related Sections include the following:

1. Division 31, Section 312100, “Controlled Density Fill”.

1.3 DEFINITIONS

A. Backfill: Soil material used to fill an excavation.

B. Backfill, optional: See section 312100 for Controlled Density Fill.

C. Backfill for electrical duct bank: See section 312100 for Controlled Density Fill.

D. Base Course: Aggregate layer placed between the subgrade and hot-mix asphalt pavement, or aggregate layer placed between the subgrade and a cement concrete or hot-mix asphalt walk.

E. Bedding Course: Aggregate layer placed over the excavated subgrade in a trench before laying pipe.

F. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.

G. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.

1. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by the Battelle Construction Manager. Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.
2. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by the Battelle Construction Manager. Unauthorized

excavation, as well as remedial work directed by the Battelle Construction Manager, shall be without additional compensation.

H. Fill: Soil materials used to raise existing grades.

I. Subgrade: Uppermost surface of an excavation or the top surface of a fill or backfill immediately below base course, topsoil, or surfacing materials.

J. Utilities: On-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

1.4 QUALITY ASSURANCE

A. Pre-excavation Conference: Conduct conference at Project site.

1.5 PROJECT CONDITIONS

A. Utility Locator Service: Notify utility locator service at 1-800-424-5555 before beginning earth moving operations.

B. GPS ground scans: As directed in the Project Excavation Permit, provide GPS ground scans and flagging

C. Do not commence earth moving operations until plant-protection measures are in place.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.

B. Satisfactory Soils: Soil Classification Groups GW, GP, GM, SW, SP, and SM according to ASTM D 2487, or a combination of these groups; free of rock or gravel larger than 3 inches in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.

C. Unsatisfactory Soils: Soil Classification Groups GC, SC, CL, ML, OL, CH, MH, OH, and PT according to ASTM D 2487, or a combination of these groups.

1. Unsatisfactory soils also include satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction.

D. Base Course and Top Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; shall comply with Washington State Department of Transportation (WSDOT) specifications 9-03.9(3) for crushed surfacing.

E. Engineered Fill/Structural Fill: The native sand and gravel may be used for structural fill with material larger than 3 inches removed or 5/8 inch minus crushed rock in accordance with WSDOT 9-03.9(3) can be used.

F. Controlled Density Fill: See Section 312100.

2.2 ACCESSORIES

A. Detectable Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches wide and 4 mils thick, continuously inscribed with a description of the utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earth moving operations.

B. Provide and maintain erosion and sedimentation controls during earth moving operations.

C. Protect subgrades and foundation soils from freezing temperatures and frost. Remove temporary protection before placing subsequent materials.

3.2 EXCAVATION

A. Unclassified Excavation: Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include rock, soil materials, and obstructions. No changes in the Contract Sum or the Contract Time will be authorized for rock excavation or removal of obstructions.

1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.

3.3 BUILDING EXCAVATION

3.4 EXCAVATION FOR WALKS AND PAVEMENTS

A. Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and subgrades. The top 12 inches of subgrade shall be scarified and compacted to a minimum in-place dry density of 92 percent of the maximum laboratory dry density.

3.5 EXCAVATION FOR UTILITY TRENCHES

A. Excavate trenches to indicated gradients, lines, depths, and elevations.

B. Excavate trenches to uniform widths to provide the following clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit unless otherwise indicated.

1. Clearance: As shown on drawings.

C. Trench Bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of conduit. Shape subgrade to provide continuous support for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade.

3.6 SUBGRADE INSPECTION

A. Proof-roll subgrade below the pavements with a pneumatic-tired dump truck to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.

B. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by the Battelle Construction Manager, without additional compensation.

3.7 UNAUTHORIZED EXCAVATION

A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Controlled density fill may be used if approved by the Battelle Construction Manager.

1. Fill unauthorized excavations under other construction, pipe, or conduit as directed by Battelle Construction Manager.

3.8 STORAGE OF SOIL MATERIALS

A. Stockpile all borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover or keep damp to prevent windblown dust.

1. Stockpile soil materials away from edge of excavations.

3.9 ELECTRICAL TRENCH BACKFILL

A. Place controlled density fill as indicated on drawings. Allow to cure a minimum of two days prior to placing backfill.

B. Trenches under Footings: Place controlled density fill as indicated on drawings up to the bottom and completely filling under the footing. Allow to cure a minimum of 14 days prior to removing the temporary steel shoring and final backfill.

C. Install warning tape directly above utilities, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.

D. Place and compact final backfill of satisfactory soil to final subgrade elevation in preparation for surface covering.

3.10 SOIL MOISTURE CONTROL

A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 2 percent of optimum moisture content.

1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.

2. Remove and replace, or scarify and air dry, otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.

3.11 COMPACTION OF SOIL BACKFILLS AND FILLS

A. Place backfill and fill soil materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.

B. Place backfill and fill soil materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.

C. Compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D 1557:

1. Under roadways, scarify and re-compact the top 6 inches below subgrade to a minimum 92 percent.
2. Engineered fill under or adjacent to structures, and pavements, compact to a minimum of 95 percent.
3. Under turf or unpaved areas, scarify and re-compact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 85 percent.
4. For utility trenches, compact each layer of initial and final backfill soil material at 85 percent.

3.12 GRADING

A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.

B. Site Rough Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:

1. Landscaped or unpaved Areas: Plus or minus 1 inch.
2. Pavements: Plus or minus 1/2 inch.

C. Grading inside Building Lines: Finish subgrade to a tolerance of 1/2 inch when tested with a 10-foot straightedge.

3.13 BASE AND TOP COURSES UNDER PAVEMENT

A. Place base and top course materials on proof rolled subgrades free of mud, frost, snow, or ice.

B. On prepared subgrade, place base course under pavement as follows:

1. Shape base course to required crown elevations and cross-slope grades.
2. Place base course in maximum 8 inch thick layers to provide a final compacted thickness of 6 inches.
3. Compact base course at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 95 percent of maximum dry unit weight according to ASTM D 1557.

C. On prepared base course, place top course in preparation for asphalt pavement as follows:

1. Place top course in maximum 6 inch thick layers to provide a final compacted thickness of 4 inches.

2. Compact top course at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 95 percent of maximum dry unit weight according to ASTM D 1557.

3.14 PROTECTION

A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.

B. Repair and reestablish grades where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.

C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.

1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.15 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Remove surplus satisfactory soil and waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them at the direction of the Battelle Construction Manager.

END OF SECTION 312000

SECTION 312100 – CONTROLLED DENSITY FILL

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 specifies ready-mix Controlled Density Fill (CDF) for the following applications:

1. Beddings, encasements, and closures for tanks and piping.

2. General backfill applications for trenches and abutments.

B. Related Sections include the following:

1. Section 033000 – Cast-In-Place-Concrete.

2. Section 312000 – Earth Moving

C. Definitions:

1. Ready-mix Controlled Density Fill (CDF) is used as an alternative to compacted soil and is also known as controlled low strength material, or flowable fill.

2. Controlled Density Fill may be either machine or hand tool excavatable depending on the chosen compressive strength for the project.

1.3 SUBMITTALS

A. Test and Performance Data:

1. Controlled Density Fill shall have a compressive strength of 100 psi according to ASTM C39 at 28 days after placement. Submit complete mix design.

2. Controlled Density Fill shall have a minimal subsidence and bleed water which is measured as a Final Bleeding of less than 2.0% (retains 98.0% of original height after placement, approximately ¼" per foot of depth) as measured in Section 10 of ASTM C940 "Standard Test Method for Expansion and Bleeding of Freshly Mixed Grouts for Pre-placed Aggregate Concrete in the Laboratory".

3. Controlled Density Fill shall have a unit weight of 90 – 125 pcf.

4. Where used for electrical conduit trench backfill, the mix shall include a red dye

PART 2 - PRODUCTS AND MATERIALS

2.1 PRODUCTS

A. Air Entraining Admixture:

1. Grace Construction Products, “DARAFILL”

2. Masterbuilders Technologies, “RHEOCELL – RHEOFILL”

B. Dye for Electrical Conduit Trench Backfill:

1. Quikcrete Companies, “Cement Color #1317-03.

2. Davis Colors, Inc., “Pigment #160, Extra Light Red”

2.2 MATERIALS

A. Portland Cement: ASTM C150

B. Aggregate: ASTM C33

C. Fly Ash: ASTM C618, Class C or F

D. Water: Clean potable

2.3 MIXTURE

A. Mix design shall produce a consistency that will result in a flowable product at the time of placement which does not require manual means to move it into place.

B. Provide mix with a fresh unit weight between 90 – 125 pcf and a compressive strength of 100 psi when measured 28 days after placement.

C. Controlled Density Fill shall have an in-place yield of 98% of the design yield.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions of substrates or other conditions under which the work is to be performed and notify the Battelle Construction Manager of circumstances detrimental to proper placement of the material.

3.2 PLACEMENT

A. Secure piping, conduits, and other items to be encased to prevent movement during placement of the Controlled Density Fill.

3.3 PLACEMENT

A. Protect Controlled Density Fill from traffic or overlay materials until sufficient strength has been achieved for further construction operations.

END OF SECTION 312100

SECTION 321216
ASPHALT PAVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Hot-mix asphalt paving.

2. Pavement-marking paint.

B. Related Sections include the following:

1. Division 1, Section 013000, “Administrative Requirements” for submittal procedures.

2. Division 31, Section 312000, “Earth Moving” for subgrades and base course.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated. Include technical data and tested physical and performance properties.

1. Job-Mix Designs: For each job mix proposed for the Work.

1.4 INFORMATIONAL SUBMITTALS

A. Material Certificates: For each paving material, from manufacturer.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: A paving-mix manufacturer registered with and approved by Washington State Department of Transportation (WSDOT) 2012.

B. Regulatory Requirements: Comply with materials, workmanship, and other applicable requirements of WSDOT 2012 for asphalt paving work.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Do not apply asphalt materials if subgrade is wet or excessively damp, if rain is imminent or expected before time required for adequate cure, or if the following conditions are not met:

1. Tack Coat: Minimum surface temperature of 60 deg F.

2. Asphalt Base Course: Minimum surface temperature of 40 deg F and rising at time of placement.

3. Asphalt Surface Course: Minimum surface temperature of 60 deg F at time of placement.

PART 2 - PRODUCTS

2.1 AGGREGATES

A. Coarse Aggregate: ASTM D 692, sound; angular crushed stone, crushed gravel, or cured, crushed blast-furnace slag.

B. Fine Aggregate: ASTM D 1073, sharp-edged natural sand or sand prepared from stone, gravel, cured blast-furnace slag, or combinations thereof.

C. Mineral Filler: ASTM D 242, rock or slag dust, hydraulic cement, or other inert material.

2.2 ASPHALT MATERIALS

A. Asphalt Binder: AASHTO M 320 or AASHTO MP 1a, PG 64-22.

B. Tack Coat: ASTM D 977 emulsified asphalt, or ASTM D 2397 cationic emulsified asphalt, slow setting, diluted in water, of suitable grade and consistency for application.

2.3 AUXILIARY MATERIALS

A. Herbicide: Commercial chemical for weed control, registered by the EPA. Provide in granular, liquid, or wettable powder form.

2.4 MIXES

A. Hot-Mix Asphalt: Dense, hot-laid, hot-mix asphalt plant mixes approved by authorities having jurisdiction; and complying with the following requirements:

1. Provide mixes with a history of satisfactory performance for the WSDOT.

2. Base and Top Course: Conform to WSDOT specification 9-03.9(3) for crushed surfacing.

3. Surface Course: Conform to WSDOT Class A or Class B asphalt concrete and should be compacted to a minimum 91 percent of the maximum theoretical specific gravity (Rice's density).

PART 3 - EXECUTION

3.1 EXAMINATION

A. Proof-roll subgrade below pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.

B. Proceed with paving only after unsatisfactory conditions have been corrected.

3.2 SURFACE PREPARATION

A. General: Immediately before placing asphalt materials, remove loose and deleterious material from substrate surfaces. Ensure that prepared subgrade is ready to receive paving.

B. Herbicide Treatment: Apply herbicide according to manufacturer's recommended rates and written application instructions. Apply to dry, prepared subgrade or surface of compacted-aggregate base before applying paving materials.

C. Tack Coat: Apply uniformly to surfaces of existing pavement at a rate of 0.05 to 0.15 gal./sq. yd.

1. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.

2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.

3.3 HOT-MIX ASPHALT PLACING

A. Machine place hot-mix asphalt on prepared surface, spread uniformly, and strike off. Place asphalt mix by hand to areas inaccessible to equipment in a manner that prevents segregation of mix. Place each course to required grade, cross section, and thickness when compacted.

1. Spread mix at minimum temperature of 250 deg F.

2. Regulate paver machine speed to obtain smooth, continuous surface free of pulls and tears in asphalt-paving mat.

B. Place paving in consecutive strips not less than 10 feet wide unless infill edge strips of a lesser width are required.

C. Promptly correct surface irregularities in paving course behind paver. Use suitable hand tools to remove excess material forming high spots. Fill depressions with hot-mix asphalt to prevent segregation of mix; use suitable hand tools to smooth surface.

3.4 JOINTS

A. Joints at existing paving shall be constructed to be smooth even transitions to ensure a continuous bond.

1. Clean contact surfaces and apply tack coat to joints.

2. Begin and end new asphalt paving adjacent existing pavement edge to prevent high areas or hollows.

3. Roll joint to provide a flat, nearly invisible joint.

3.5 COMPACTION

A. General: Begin compaction as soon as placed hot-mix paving will bear roller weight without excessive displacement. Compact hot-mix paving with hot, hand tampers or with vibratory-plate compactors in areas inaccessible to rollers.

1. Complete compaction before mix temperature cools to 185 deg F.

B. Breakdown Rolling: Complete breakdown or initial rolling immediately after rolling joints and outside edge. Examine surface immediately after breakdown rolling for indicated crown, grade, and smoothness. Correct laydown and rolling operations to comply with requirements.

C. Intermediate Rolling: Begin intermediate rolling immediately after breakdown rolling while hot-mix asphalt is still hot enough to achieve specified density. Continue rolling until hot-mix asphalt course has been uniformly compacted to the following density:

1. Average Density: 92 percent of reference maximum theoretical density according to ASTM D 2041, but not less than 90 percent nor greater than 96 percent.

D. Finish Rolling: Finish roll paved surfaces to remove roller marks while hot-mix asphalt is still warm.

E. Edge Shaping: While surface is being compacted and finished, trim edges of pavement to match adjacent paving alignment. Bevel edges while asphalt is still hot; compact thoroughly.

F. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.

G. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

3.6 INSTALLATION TOLERANCES

A. Pavement Thickness: Compact each course to produce the thickness indicated within the following tolerances:

1. Base and Top Course: Plus or minus 1/2 inch.

2. Asphalt Surface Course: Plus 1/4 inch, no minus.

B. Pavement Surface Smoothness: Compact each course to produce a surface smoothness within the following tolerances as determined by using a 10-foot straightedge applied transversely or longitudinally to paved areas:

1. Surface Course: 1/8 inch.

3.7 DISPOSAL

A. Except for material indicated to be recycled, remove excavated materials from Project site and legally dispose of them in an EPA-approved landfill at the direction of the Battelle Construction Manager.

END OF SECTION 321216

EMSL 3020 BLDG
HPCS-4 POWER & COOLING

PROJECT #S593062-EDP03

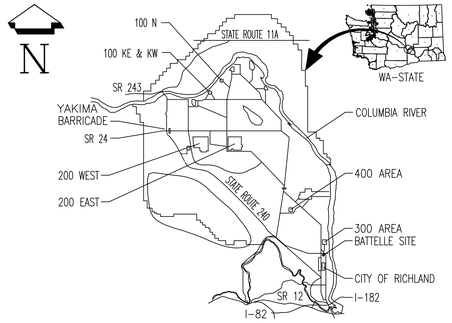
PROJECT WORKSHEET & DOCUMENT LIST

DRAWING/SHEET	TITLE
CONSTRUCTION SPECIFICATION	
S593062-SPCC03	CONSTRUCTION SPECIFICATION
PROJECT	
WS9610/1	CIVIL, SOUTH POWER & COOLING PROJECT TITLE/DRAWING LIST
WS9611/1	CIVIL, SOUTH POWER & COOLING PROJECT LEGEND/ABBREVIATION
DEMOLITION	
WS9612/1	ARCHITECTURAL, DEMO @ RAISED FLOOR RM 1109 PLAN
WS9613/1	ARCHITECTURAL, DEMO @ REFLECTED CEILING RM 1109 PLAN
WS9614/1	MECHANICAL/ELECTRICAL, DEMO @ LIEBERT UNIT RM 1109 PLAN
WS9614/2	MECHANICAL/ELECTRICAL, DEMO @ LIEBERT UNIT RM 1109 PLAN
WS9614/3	MECHANICAL/ELECTRICAL, DEMO @ LIEBERT UNIT RM 1109 PLAN
WS9615/1	MECHANICAL, DEMO ABOVE CEILING RM 1109 PLAN
WS9616/1	ELECTRICAL, DEMO @ LIGHTING RM 1109 PLAN
WS9617/1	ELECTRICAL, DEMO @ FIRE ALARM RM 1109 PLAN
WS9617/2	ELECTRICAL, DEMO @ FIRE ALARM PANEL M WIRING DIAGRAM
WS9618/1	ELECTRICAL, DEMO @ COMPUTER SHUTDOWN RM 1109 PLAN
WS9618/2	ELECTRICAL, DEMO @ COMPUTER SHUTDOWN WIRING DIAGRAMS
WS9619/1	NOT USED
CIVIL	
WS9620/1	CIVIL, SOUTH POWER FEED PARTIAL SITE PLAN
WS9620/2	CIVIL, SOUTH POWER FEED PROFILE/TRENCH SECTIONS
WS9620/3	CIVIL, SOUTH POWER FEED ENLARGED DETAILS
WS9621/1	NOT USED
WS9622/1	NOT USED
ARCHITECTURAL	
WS9623/1	ARCHITECTURAL, RAISED FLOORING & PARTITION RM 1109 PLAN
WS9623/2	ARCHITECTURAL, RAISED FLOORING & PARTITION RM 1109 DETAILS
WS9624/1	NOT USED
WS9625/1	ARCHITECTURAL, REFLECTED CEILING RM 1109 PLAN
WS9626/1	NOT USED
MECHANICAL	
WS9627/1	MECHANICAL, CHWS/CHWR RM 1109 PLAN
WS9627/2	MECHANICAL, CHWS/CHWR SECTIONS AND DETAILS
WS9627/3	MECHANICAL, CHWS/CHWR SECTIONS AND DETAILS
WS9628/1	MECHANICAL, CHWS/CHWR SUPPORTS & DETAILS
WS9628/2	MECHANICAL, CHWS/CHWR SUPPORTS & DETAILS
WS9629/1	MECHANICAL, ABOVE CEILING RM 1109 PLAN
WS9630/1	NOT USED
ELECTRICAL	
WS9631/1	ELECTRICAL, DISTRIBUTION BOARD 026 & 027 ONE-LINE DIAGRAM
WS9632/1	ELECTRICAL, POWER RM 1109 OVERALL PLAN
WS9632/2	ELECTRICAL, POWER RM 1109 PLAN
WS9632/3	ELECTRICAL, POWER RM 1109 SECTIONS
WS9632/4	ELECTRICAL, POWER RM 1109 SECTIONS
WS9633/1	ELECTRICAL, LIGHTING RM 1109 PLAN
WS9634/1	ELECTRICAL, CONTROL PLAN
WS9634/2	ELECTRICAL, CONTROL BUS DIAGRAM
WS9634/3	ELECTRICAL, CONTROL EXPANSION MODULE WIRING DIAGRAM
WS9634/4	ELECTRICAL, CONTROL EXPANSION MODULE WIRING DIAGRAM
WS9634/5	ELECTRICAL, CONTROL WIRING DIAGRAM
WS9635/1	ELECTRICAL, FIRE ALARM MODS PARTIAL PLAN RM 1109
WS9635/2	ELECTRICAL, FIRE ALARM MODS WIRING DIAGRAMS
WS9636/1	NOT USED
FIRE PROTECTION	
WS9637/1	FIRE PROTECTION, SPRINKLER MOD RM 1109 PLAN
WS9638/1	NOT USED

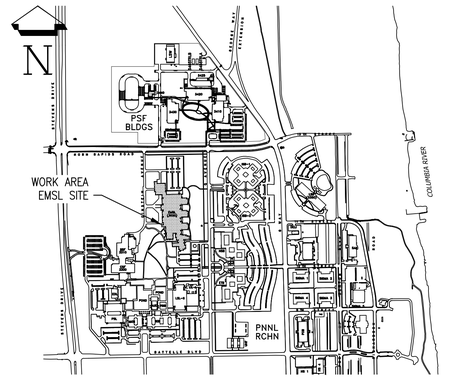
PHOTO 1 – AERIAL LOOKING EAST
SCALE: NONE

PHOTO 2 – RM 1109 LOOKING NORTH-EAST
SCALE: NONE

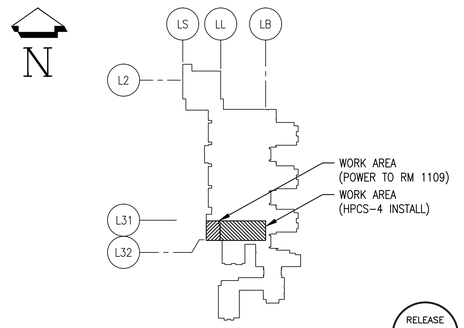
PHOTO 3 – RM 1109 LOOKING SOUTH-EAST
SCALE: NONE



VICINITY PLAN
SCALE: NONE



SITE PLAN
SCALE: NONE



KEY PLAN
SCALE: NONE

RELEASE
01-18-13
DATE
JMK

EDP # S593062-EDP03

DRAWN KS KOSCHIK	DATE 11/15/11	U. S. DEPARTMENT OF ENERGY PACIFIC NORTHWEST SITE OFFICE			
CHECKED		Pacific Northwest Division — Battelle — Richland, Washington 99352			
ENGR DK DA KOONTZ	1/18/13	CIVIL SOUTH POWER & COOLING PROJECT TITLE/DWG LIST			
APVD					
OTHER		PROJ TITLE: HPCS-4 POWER & COOLING			
OTHER		SIZE: F	INDEX NO: 0000 0100	BLDG NO: EMSL	DWG NO: WS9610 REV NO: 0
APVD FOR IMPLEMENTATION BY: NA ON WORKSHEET				SCALE: NONE	SHEET 1 OF 1

DRAWING NO	DRAWING TITLE
WS9611	PROJECT LEGEND/ABBREV
WS9610	PROJECT TITLE/DWG LIST
S593062-SPCC03	CONSTRUCTION SPEC

REFERENCE DRAWINGS
NEXT USED ON

REV NO	DESCRIPTION	CHK BY / DATE	ENGR BY / DATE	QA BY / DATE	REV BY / DATE
RR					

REVISIONS

200000513-R10-5/07

LEGEND

NEW STRUCTURE OR EQUIPMENT	
NEW UNDERGROUIND UTILITY LINES	
EXST UNDERGROUIND UTILITY LINES	
EXST STRUCTURE OR EQUIPMENT	
EXST RAISED TILE FLOOR (2' SQ)	
NEW GRADE	389
EXST GRADE	389
NEW OTHER #1	
NOT IN CONTRACT (NIC)	
EXST MISC #1	
EXST MISC #2	
EXST MISC #3	
EXST MISC #4	
ASPHALT	
AGGREGATE/GRAVEL BASE	
RIVER ROCK	
CDF	
CONCRETE	
EARTH/TOPSOIL	
GRASS/SOD	
PIPE INSULATION	
AR	ARGON
CA	COMPRESSED AIR
CHWR	CHILLED WATER RETURN
CHWS	CHILLED WATER SUPPLY
CD	CONDENSATE DRAIN
CO	CARBON MONOXIDE
CO2	CARBON DIOXIDE
COMM	COMMUNICATION
COND	CONDENSATE DRAIN LINE
ELEC	ELECTRICAL POWER
FP	FIRE PROTECTION WATER
G	NATURAL GAS
GC	GROUNDING CABLE
IRR	IRRIGATION
LN2	LIQUID NITROGEN
LVS	LABORATORY VACUUM SYSTEM
HE	HELIUM
HHWR	HOT HEATING WATER RETURN
HHWS	HOT HEATING WATER SUPPLY
HPW	HIGH PURITY WATER
HYD	HYDROGEN
N2	NITROGEN
OX	OXYGEN
P10	P10 GAS
PCHWR	PROCESS CHILLED WATER RETURN
PCHWS	PROCESS CHILLED WATER SUPPLY
PCW	PROCESS COLD WATER
PHW	PROCESS HOT WATER
PR	PROPANE
PS	PROCESS SEWER LINE
RO	REVERSE OSMOSIS WATER
SAN	SANITARY SEWER
SCW	SANITARY COLD WATER
SHW	SANITARY HOT WATER
SD	STORM DRAIN
SG	SPECIALTY GAS
SV	SANITARY VENT
SWR	SOURCE WATER RETURN
SWS	SOURCE WATER SUPPLY
WW	WELL WATER
XXXX / EL X'-X"	DATUM ELEVATION LABEL
	CONDUIT W/ CONDUCTORS (TO BE USED)
	CONDUIT W/O CONDUCTORS (SPARES)
	CONDUIT CAPPED IN PLAN

#	SHEET NOTE
#	PART NUMBER
L32	COLUMN LINE DESIGNATOR
	CONNECT TO EXISTING
xxx / #	EQUIPMENT LABEL
	AUTOMATIC AIR/GAS VENT
	MANUAL AIR VENT
	PRESSURE GAGE WITH VALVE
PI	PRESSURE INDICATOR WITH SYPHON AND VALVE
	SAFETY RELIEF ACTUATOR
HB	STRAINER WITH HOSE BIB
	STRAINER
VBR	VACUUM BREAKER
	PUMP
	CONTROL VALVE
HB	DRAIN VALVE WITH HOSE BIB CONNECTION
	GATE VALVE
	ANGLE GATE VALVE
	3-WAY GATE VALVE
	BALL VALVE
	3-WAY BALL VALVE
	BUTTERFLY VALVE
	MANUAL BALANCING VALVE
	PLUG VALVE
	POST INDICATING VALVE
	NEEDLE VALVE
	CHECK VALVE
FCV	AUTOMATIC FLOW CONTROL VALVE
FV	DIAPHRAGM FLOAT CONTROL VALVE
M	SOLENOID VALVE
FS	FLOW SENSOR
FM	FLOW METER
M	MOTOR ACTUATOR
P	PRESSURE GAGE
S	SOLENOID ACTUATOR
T	TEMPERATURE GAUGE
TS	TEMPERATURE SENSOR
T	THERMOSTAT
	RETURN GRILL
	SUPPLY GRILL
	CEILING TILE OR LIGHT
A	WALL TYPE CALLOUT
	LIGHT POLE
	FIRE HYDRANT
	INTERNALLY LINED DUCTWORK

	DRAIN
FD	FLOOR DRAIN
	TRAP PRIMER
YCO	"Y" CLEAN-OUT
	FLOOR CLEANOUT OR CLEANOUT TO GRADE
HB	HOSE BIB
	CLEANOUT
	WALL CLEANOUT
	FLOOR SINK
	FLOOR SINK, 1/2 GRATE
	PIPE RISE
	PIPE PLUG (SPARE)
	PIPE DROP
	PIPE CONNECTION BOTTOM
	PIPE CONNECTION TOP
	EXPANSION JOINT
	FLANGED CONNECTION
	FLEXIBLE CONNECTION
	UNION
	REDUCER
	PIPING CAPPED FOR CONNECTION
BTU	BRITISH THERMAL UNIT METER
DP	DIFFERENTIAL PRESSURE TRANSMITTER
FS	FLOW SWITCH
HD	HEAT DETECTOR
SD	SMOKE DETECTOR
TS	TEMPERATURE SENSOR
VP	VELOCITY PRESSURE SENSOR
	PENDENT SPRINKLER
	RECESSED SPRINKLER
	UPRIGHT SPRINKLER
	PIPE HANGER
	CHWS/CHWR HOSE
	CONDUIT HOMERUN
	DAMPER
	DISCONNECT
	DUPLEX RECEPTACLE
	FIRE SPRINKLERS
	TO BE REMOVED OR DEMO
S	MANUAL MOTOR SWITCH
T	THERMOSTAT
	PIPE FLOW ARROW
	PIPE SLOPE DIRECTION
	PANEL BOX LOCATED ON WALL
	208V, 20A, 3 PHASE, 3 POLE, 4 WIRE, WIREWAY MOUNTED, WATERTIGHT PIN AND SLEEVE, NORTH AMERICAN RATING, BLUE HOUSING, RECEPTACLE, HUBBELL #430R9W
	208V, 30A, 1 PHASE, 2 POLE, 3 WIRE, WIREWAY MOUNTED, ISOLATED GND, TWIST-LOCK RECEPTACLE WITH COVER PLATE, NEMA #L6-30R, HUBBELL #IG2620A
	208V, 50A, 3 PHASE, 3 POLE, 4 WIRE, MOUNTED IN WIREMOLD 6000 ALUM RACEWAY WITH BOX COVER, HUBBEL #S750
	120V, 20A, 1 PHASE, 2 POLE, 3 WIRE, WIREWAY MOUNTED, ISOLATED GND, DUPLEX RECEPTACLE WITH COVER PLATE, NEMA #5-20R, HUBBELL #IG5362
	125V, 20A, 1 PHASE, 2 POLE, 3 WIRE, WIREWAY MOUNTED, ISOLATED GND, TWIST-LOCK RECEPTACLE WITH COVER PLATE, NEMA #L5-20R
	120V, 20A, 1 PHASE, NEMA 5-20R, SURFACE MOUNT, 4 PLEX RECEPTACLE IN DOUBLE GANG BOX, BLUE IN COLOR, HUBBELL #5352BLU WITH STAINLESS STEEL COVER PLATE
	DUPLEX RECEPTACLE, NEMA 5-20
	DUPLEX RECEPTACLE, NEMA 5-20 WITH GFCI IN WATERPROOF ENCLOSURE
J	JUNCTION BOX
	LIGHT SWITCH
	GROUNDING ROD
ST	SHUNT-TRIP
ST	SHUNT-TRIP
M	LINE METERING

ABBREVIATIONS

A	AMPS
ABAND	ABANDONED
AC	AIR CONDITIONER/ALTERNATING CURRENT
ACM	ASBESTOS CONTAINING MATERIAL
ADJ	ADJUSTABLE
AFF	ABOVE FINISHED FLOOR
AHU	AIR HANDLER UNIT
AI	ANALOG INPUT
AL	ALUMINUM
ALT	ALTERNATE
AO	ANALOG OUTPUT
AP	ACCESS PANEL
APPROX	APPROXIMATE
ARCH	ARCHITECTURAL
AS	AIR SEPARATOR
ASB	ASBESTOS
ASSY	ASSEMBLY
ATM	ATMOSPHERE
ATS	AUTOMATIC TRANSFER SWITCH
AUTO	AUTOMATIC
AUX	AUXILIARY
AV	AIR VENT
AWG	AMERICAN WIRE GAUGE
BC	BATTERY CABINET
BFP	BACKFLOW PREVENTER
BG	BELOW GRADE
BI	BINARY INPUT
BLDG	BUILDING
BLK	BLOCK
BO	BINARY OUTPUT
BOD	BOTTOM OF DUCT
BOF	BOTTOM OF FOOTING
BOP	BOTTOM OF PIPE
BOT	BOTTOM
BKR	BREAKER
BRKT	BRACKET
BSMT	BASEMENT
BTU	BRITISH THERMAL UNIT
C	COIL/CLOSED
CB	CATCH BASIN/CIRCUIT BREAKER
CAB	CABINET
CAH	COMPUTER AIR HANDLER
CAV	CONTINUOUS AIR VOLUME
CC	COOLING COIL
CCTV	CLOSED CIRCUIT TELEVISION
CD	CONDENSATE DRAIN
CDF	CONTROLLED DENSITY FILL
CFCI	CONTRACTOR FURNISH CONTRACTOR INSTALL
CFM	CUBIC FEET PER MINUTE
CHLR	CHILLER
CIRC	CIRCULATE
CJ	CONTROL JOINT
CKT	CIRCUIT
CL	CENTERLINE
CLG	CEILING
CLR	CLEAR
CM	CONSTRUCTION MANAGER
CMU	CONCRETE MASONRY UNIT
CO	CLEANOUT
COL	COLUMN
COMM	COMMUNICATION
CONC	CONCRETE
COND	CONDENSATE
CONF	CONFERENCE
CONN	CONNECTION
CONST	CONSTRUCTION
CONT	CONTINUOUS
COP	COPPER
COR	CITY OF RICHLAND
CORR	CORRIDOR
CPVC	CHLORINATED POLYVINYL CHLORIDE
CRAH	COMPUTER ROOM AIR HANDLER
CND	CONDUIT
CS	CARBON STEEL
CSM	COGNIZANT SPACE MANAGER
CT	COOLING TOWER
CTR	CENTER
CY	CUBIC YARD
CYL	CYLINDER
CV	CONTROL VALVE
ø	DIAMETER
D	DEPTH
DB	DISTRIBUTION BOARD
DC	DIRECT CURRENT
DEG	DEGREE
DEMO	DEMOLITION
DET	DETAIL
DIA	DIAMETER
DIAG	DIAGONAL
DIM	DIMENSION
DIST	DISTANCE
DMP	DAMPER
DN	DOWN
DOE	DEPARTMENT OF ENERGY
DP	DISTRIBUTION PANEL
DR	DRAIN
DWG	DRAWING
E	EXHAUST
ECN	ENGINEERING CHANGE NOTICE
EDP	ENGINEERING DESIGN PLAN
EF	EXHAUST FAN
EG	EXHAUST GRILL
EIFS	EXTERIOR INSULATION FINISH SYSTEM
EJ	EXPANSION JOINT
EL	ELEVATION
ELEC	ELECTRICAL
ELEV	ELEVATOR
EM	ELECTRICAL METER
EMBD	EMBEDDED
EMER	EMERGENCY
EMSL	ENVIRONMENTAL MOLECULAR SCIENCE LAB
EMT	ELECTRICAL METALLIC TUBING
ENLGD	ENLARGED
EPO	EMERGENCY POWER OFF
EQ	EQUAL
EQPT	EQUIPMENT
EW	EACH WAY/EYE WASH
EWT	ENTERING WATER TEMPERATURE
EXP	EXPANSION
EXST	EXISTING
EXT	EXTERIOR
F	FILTER
FA	FIRE ALARM
FC	FAIL CLOSE
FO	FAIL OPEN
FO&ED	FACILITY OPERATION & ENGINEERING DIV
°F	DEGREES FAHRENHEIT
FCO	FLOOR CLEANOUT
FCU	FAN COIL UNIT
FCV	FLOW CONTROL VALVE
FD	FLOOR DRAIN
FDS	FUSED DISCONNECT SWITCH
FF	FINISHED FLOOR
FG	FLOOR GRILL
FH	FIRE HYDRANT/FUME HOOD
FL	FLOOR
FLT	FILTER
FLEX	FLEXIBLE
FLUOR	FLUORESCENT
FM	FLOW METER
FMCS	FACILITY MANAGEMENT CONTROL SYSTEM
FMP	FACILITY MOD PERMIT
FMS	FACILITY MANAGEMENT SYSTEM
FO	FACE OF
FP	FIREPROOF
FS	FLOOR SINK/FLOW SWITCH
FT	FEET
FTG	FOOTING
FUA	FACILITY USE AGREEMENT
GA	GAUGE
GAL	GALLON
GALV	GALVANIZED
GB	GRADE BEAM
GC	GENERAL CONTRACTOR
GEN	GENERAL/GENERATOR
GFCI	GROUND FAULT CIRCUIT INTERRUPTER
GFE	GOVERNMENT FURNISHED EQUIPMENT
GFI	GROUND FAULT INTERRUPTER
GFP	GROUND FAULT PROTECTION
GLV	GLOBE VALVE
GND	GROUND
GPR	GAS PRESSURE REDUCER
GPM	GALLON PER MINUTE
GRC	GALVANIZED RIGID CONDUIT
GRS	GALVANIZED RIGID SWEEP
GV	GATE VALVE
GWB	GYPSUM WALL BOARD
GYP	GYPSUM
H	HEIGHT
HB	HOSE BIBB
HDR	HEADER
HEPA	HIGH EFFICIENCY PARTICLE AIR
HH	HANDHOLE
HM	HOLLOW METAL
HP	HORSEPOWER
HPC	HIGH PERFORMANCE COMPUTER
HPCS	HIGH PERFORMANCE COMPUTER SYSTEM
HVE	HEATING, VENTILATION & EXHAUST
HVAC	HEATING, VENTILATION & AIR CONDITIONING
HX	HEAT EXCHANGER
HZ	HERTZ
IB	INFILTRATION BED
ID	INSIDE DIAMETER/IDENTIFICATION
IDEC	INDIRECT EVAPORATIVE COOLING
IE	INVERT ELEVATION (TOP OF PIPE)
INFO	INFORMATION
IN	INCH
IOPS	INTEGRATED OPERATIONS SYSTEM
JB	JUNCTION BOX
JPP	JOB PLANNING PACKAGE
KCMIL	THOUSAND CIRCULAR MILLS
KO	KNOCK-OUT
KS	KNEE SPACE
KV	KILOVOLT
KVA	KILOVOLT-AMPERES
KW	KILOWATT
L	LENGTH
LAB	LABORATORY
LAI	LIMITED ACCESS AREA
LAN	LOCAL AREA NETWORK
LBS	POUNDS
LTG	LIGHTING
LWT	LEAVING WATER TEMPERATURE
MATL	MATERIAL
MAX	MAXIMUM
MBP	MAINTENANCE BY-PASS
MCC	MOTOR CONTROL CENTER
MDF	MAIN DISTRIBUTION FRAME
MDP	MAIN DISTRIBUTION PANEL
MECH	MECHANICAL
MEZZ	MEZZANINE
MISC	MISCELLANEOUS
MFR	MANUFACTURE
MG	MULTIGAGE/MOTOR GENERATOR
MH	MANHOLE
MIN	MINIMUM/MINUTE
MNPT	MALE NATIONAL PIPE THREAD
MODS	MODIFICATIONS
MPH	MILES PER HOURS
MS	MASTER SWITCHGEAR
MTG	MOUNTING
N+1	NUMBER + 1
NA	NOT APPLICABLE
NC	NOT CLOSED
NEC	NATIONAL ELECTRICAL CODE
NFPA	NATIONAL FIRE PROTECTION ASSOCIATION
NIC	NOT IN CONTRACT
NO	NOT OPEN/NUMBER
NOM	NOMINAL
NPS	NATIONAL PIPE SIZE
NPT	NATIONAL PIPE THREAD
NTS	NOT TO SCALE
OD	OUTSIDE DIAMETER/OVERFLOW DRAIN
OC	ON CENTER
OCC	OCCUPANCY
OFCI	OWNER FURNISH CONTRACTOR INSTALL
OFOI	OWNER FURNISH OWNER INSTALL
OFD	OVERFLOW DRAIN LINE
OHSC	OVERHEAD SERVICE CARRIER
OPNG	OPENING
OSHA	OCCUPATIONAL SAFETY & HEALTH ADMIN
P	PUMP/PRESSURE
P&ED	PROJECTS & ENGINEERING DIVISION
PB	PULL BOX/PANELBOARD
PBX	PHONE BRANCH EXCHANGE
PC	PRE-CAST
PCM	PERSONAL CONTAMINATION MONITOR
PD-1	PROJECT DECISION - 1
PG	PRESSURE GAUGE
PH	PHASE
PL	PLACE/PLATE
PLC	PROGRAMMABLE LOGIC CONTROLLER
PLMB	PLUMBING
PMP	PUMP
PMM	POWER MANAGEMENT MODULE
PNL	PANEL
PNNL	PACIFIC NORTHWEST NATIONAL LAB
PNSO	PACIFIC NORTHWEST SITE OFFICE
POC	POINT OF CONNECTION
POS	POINT OF SERVICE
PP	POWER PANEL
PRV	PRESSURE REDUCING VALVE
PSF	POUNDS PER SQUARE FOOT
PSI	POUNDS PER SQUARE INCH
PSIG	POUNDS PER SQUARE INCH GAUGE
PSV	PRESSURE SAFETY VALVE
PUE	POWER USAGE EFFICIENCY
PVC	POLYVINYL CHLORIDE
PWR	POWER
QTY	QUANTITY
R	RETURN/RADIUS
R&D	RESEARCH & DEVELOPMENT
RA	RETURN AIR
RB	RUBBER BASE
RCP	REFLECTED CEILING PLAN
RCPT	RECEPTACLE
RD	ROOF DRAIN
RED	REDUCER
REF	REFERENCE
REM	REMOVED
REQD	REQUIRED
RF	RETURN FAN
RG	RETURN GRILL
RM	ROOM
RPM	REVOLUTIONS PER MINUTE
RV	RELIEF VALVE/RELIEF VENT
RWP	RADIOLOGICAL WORK PERMIT
S	SUPPLY
SA	SUPPLY AIR
SATC	SUSPENDED ACOUSTICAL TILE CEILING
SCHED	SCHEDULE
SD	STORM DRAIN/SMOKE DETECTOR
SEC	SECOND
SECT	SECTION
SF	SUPPLY FILTER
SF	SQUARE FEET
SG	SUPPLY GRILL
SH	SHEET/SHOWER
SIM	SIMILAR
SJ	SEISMIC JOINT
SK	SINK
SMR	SURFACE METAL RACEWAY
SNO	SNORKEL
SP	SPACE
SPEC	SPECIFICATION
SPR	SPRINKLER
SQ	SQUARE
SRV	SAFETY RELIEF VALVE
SST	STAINLESS STEEL
ST	SHUNT-TRIP
STA	STATION
STL	STEEL
STD	STANDARD
STRL	STRUCTURAL
SW	SWITCH
SWBD	SWITCHBOARD
SWGR	SWITCHGEAR
SYM	SYMMETRICAL
SYS	SYSTEM
TD	TRENCH DRAIN
TK	TANK
TEL	TELEPHONE
TEMP	TEMPERATURE/TEMPORARY
TO	TOP OF
TOC	TOP OF CONCRETE
TOS	TOP OF STEEL
TP	TRAP PRIMER
TS	TEMPERATURE SENSOR/TUBE STEEL
TV	TELEVISION
TYP	TYPICAL
UGND	UNDERGROUND
UNO	UNLESS NOTED OTHERWISE
UPC	UNIFORM PLUMBING CODE
UPS	UNINTERRUPTED POWER SUPPLY
UR	URINAL
UTIL	UTILITY
UV	ULTRAVIOLET
V	VENT/VOLTS
VAC	VOLTS ALTERNATING CURRENT
VAV	VARIABLE AIR VOLUME
VCT	VINYL COMPOSITION TILE
VD	VOLUME DAMPER
VERT	VERTICAL
VEL	VELOCITY
VFD	VARIABLE FREQUENCY DRIVE
W	WASTE/WATT/WIDTH
W/	WITH
WC	WATER CLOSET
WCO	WALL CLEANOUT
WF	WIDE FLANGE
WH	WATER HEATER
WKSH	WORKSHEET
WM	WATER METER
WP	WEATHERPROOF/WORK POINT
WT	WEIGHT
WW	WELL WATER
WWF	WELDED WIRE FABRIC
XFMR	TRANSFORMER

GENERAL NOTES

(UNLESS OTHERWISE SPECIFIED)

1. NOT ALL SYMBOLS SHOWN IN LEGEND OR ABBREVIATIONS IN LIST ARE USED ON PROJECT DRAWINGS. ADDITIONAL ABBREVIATIONS (NOT SHOWN) ARE IN ACCORDANCE WITH ASME Y14.38-1999.

RELEASE 01-18-13 DATE JMK

EDP # S593062-EDP03

DRAWN	DATE
KS KOSCHIK	11/15/11
CHECKED	
ENGR DK DA KOONTZ	1/18/13
APVD	
OTHER	
OTHER	
APVD FOR IMPLEMENTATION BY: NA ON WORKSHEET	

U. S. DEPARTMENT OF ENERGY
PACIFIC NORTHWEST SITE OFFICE
Pacific Northwest Division — Battelle — Richland, Washington 99352

CIVIL
SOUTH POWER & COOLING
PROJECT LEGEND/ABBREV

PROJ TITLE: HPCS-4 POWER & COOLING

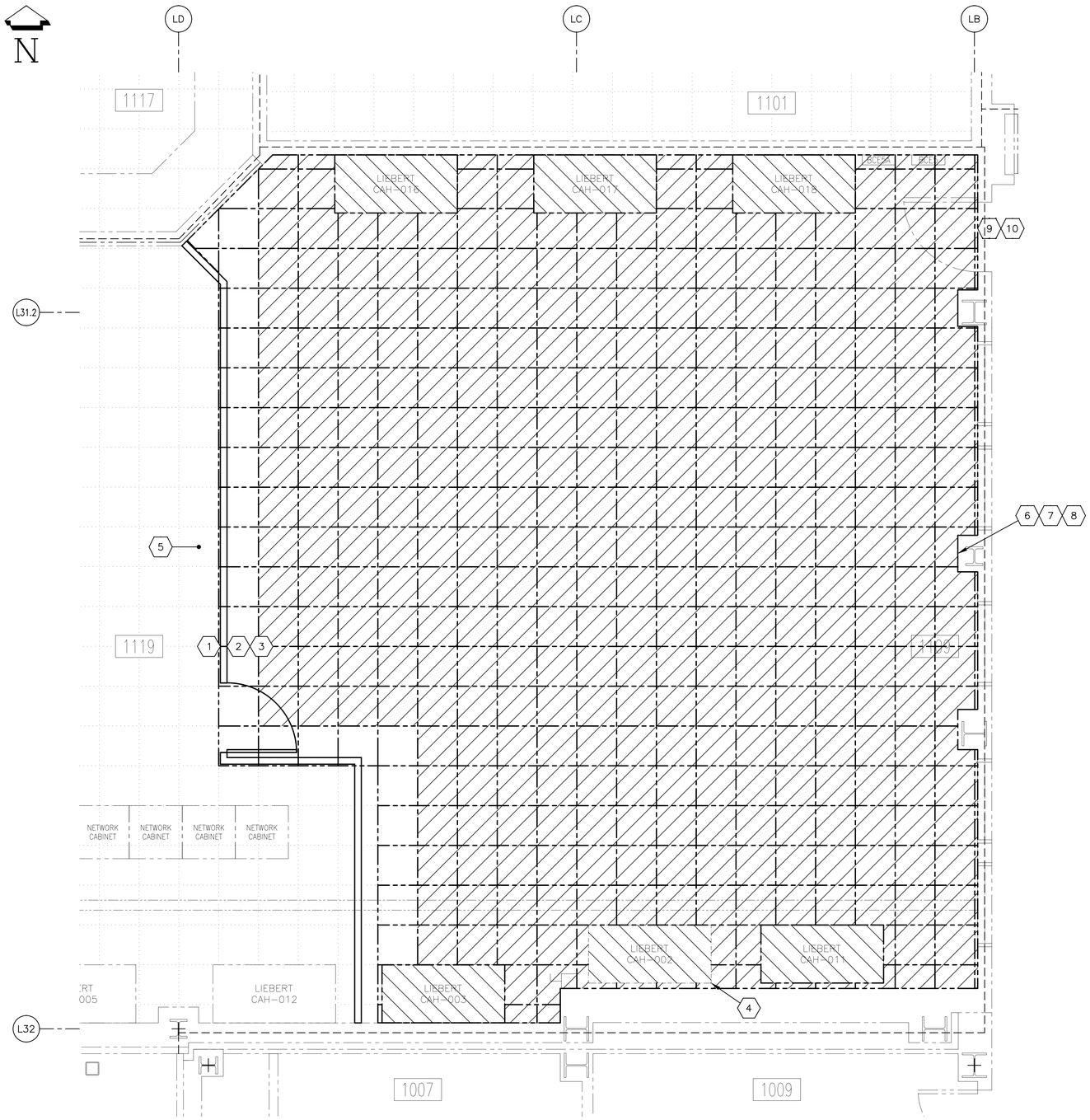
SIZE	INDEX NO	BLDG NO	DWG NO	REV NO
F	0101	EMSL	WS9611	0

SCALE NONE — SHEET 1 OF 1

REFERENCE DRAWINGS	
DRAWING NO	DRAWING TITLE
WS9611	PROJECT LEGEND/ABBREV
WS9610	PROJECT TITLE/DWG LIST
S593062-SPCC03	CONSTRUCTION SPEC
NEXT USED ON	

REVISIONS						
RR	QA BY / DATE	ENGR BY / DATE	CHK BY / DATE	REV BY / DATE	DESCRIPTION	REV NO

200000513-R10-5/07



COMPUTER RM PARTIAL PLAN – DEMO @ RAISED FLOOR

3/8" = 1'-0" 0' 2' 4' 8' SCALE FEET

NOTE: ALL EXISTING BELOW FLOOR DEVICES OR OBSTRUCTIONS NOT SHOWN.

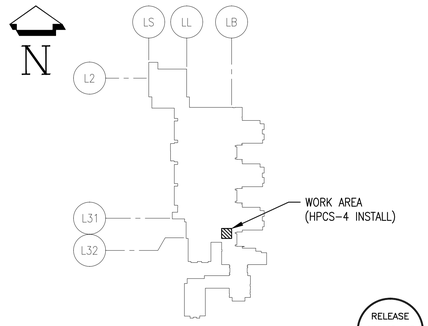
GENERAL NOTES

(UNLESS OTHERWISE SPECIFIED)

1. DIMENSIONS ARE IN FEET AND INCHES UNLESS OTHERWISE SPECIFIED.
2. FIELD VERIFY DIMENSIONS AND REPORT DISCREPANCIES WITH FIELD CONDITIONS TO BATTELLE CONSTRUCTION MANAGER PRIOR TO ANY CONSTRUCTION.
3. WORK SHALL BE COORDINATED WITH THE BATTELLE CONSTRUCTION MANAGER.
4. SURFACES DAMAGED DURING CONSTRUCTION SHALL BE REPAIRED TO MATCH CONDITION OF EXISTING.
5. NOT ALL SYMBOLS SHOWN IN LEGEND OR ABBREVIATIONS IN LIST ARE USED ON PROJECT DRAWINGS. ADDITIONAL ABBREVIATIONS (NOT SHOWN) ARE IN ACCORDANCE WITH ASME Y14.38–1999. SEE WORKSHEET WS9611.
6. DEMOLITION WHICH LEAVES OPEN PENETRATIONS IN FIRE BARRIERS MUST BE RESEALED WITH EITHER A TEMPORARY FIRESTOP PRODUCT (IF PENETRATION IS TO BE REUSED) OR PERMANENT FIRESTOP SEAL. ALL WALLS IN THE PROJECT AREA OF RM 1109 ARE 1–HOUR RATED FIRE BARRIERS, CAUTION SHOULD BE EXERCISED TO PREVENT DAMAGE TO FIRE BARRIERS. REPAIR DAMAGED AREAS IN ACCORDANCE WITH REQUIRED STANDARDS AND UL LISTED DETAILS.

SHEET NOTES

1. CLEAN SIDE OF COMPUTER RM. MINIMIZE DEBRIS DURING ANY WORK.
2. CONSTRUCTION SIDE OF COMPUTER RM. INCLUDES DEMOLITION, RELOCATION OR NEW WORK. GUIDANCE TO CONTRACTOR – DUST OR DEBRIS THAT IS GENERATED DURING DEMOLITION OR CONSTRUCTION SHALL NOT BE INTRODUCED TO THE BELOW FLOOR AIR SYSTEM ON THE CLEAN SIDE OF COMPUTER RM.
3. LOCATION OF NEW WALL (ABOVE FLOOR) AND BARRIER (BELOW FLOOR). INSTALL WALL PRIOR TO ANY DEMOLITION, RELOCATION OR NEW WORK. SEE ARCH WSKH WS9623.
4. REMOVE LEIBERT UNITS AND FRAMES, TYPICAL 6 PL. SEE MECH WKSH WS9614.
5. EXISTING RAISED FLOOR TILE SYSTEM (2'–0"x2'–0"), BOTH SOLID AND PERFORATED TILES TO REMAIN.
6. REMOVE EXISTING RAISED FLOOR TILE SYSTEM (2'–0"x2'–0") AND RETAIN FOR REINSTALLATION, INCLUDING TILES, VERTICAL PEDESTALS, HORIZONTAL CROSS MEMBERS AND ALL ASSOCIATED MOUNTING HARDWARE AS NECESSARY TO COMPLETE NEW PIPING AND ELECTRICAL INFRASTRUCTURE SERVICES. SEE ARCH WS9623.
7. PRIOR TO REMOVING VERTICAL PEDESTALS FROM FLOOR MARK ORIGINAL LOCATIONS, THIS WILL PROVIDE GUIDANCE DURING CONSTRUCTION TO ELIMINATE INTERFERENCES WITH NEW BELOW FLOOR PIPING AND NEW RAISED FLOOR BUILD–BACK.
8. REMOVE EXISTING ELECTRICAL GROUND COPPER WIIRE AND LUGS ATTACHED TO VERTICAL PEDESTAL SUPPORTS. STORE FOR REUSE. SEE WKSH WS9623, SH2, DETAIL 7.
9. RE–KEY EXISTING 42" DOOR (BY BATTELLE) AS MAIN ENTRANCE TO THIS AREA DURING ENTIRE CONSTRUCTION PROJECT.
10. AFTER FLOOR REMOVAL PROVIDE TEMPORARY WOOD LANDING WITH HAND RAILING AND RAMP TO EXISTING COMPUTER RM CONCRETE FLOOR 2'–0" BELOW. MATCH DOOR OPENING MIN.



KEY PLAN

SCALE: NONE

RELEASE 01–18–13 DATE JMK

EDP # S593062–EDP03

DRAWN	DATE
KS KOSCHIK	11/15/11
CHECKED	
ENGR GCT GC TURPEN	18 JAN 13
APVD	
OTHER	
OTHER	
APVD FOR IMPLEMENTATION BY NA ON WORKSHEET	

U. S. DEPARTMENT OF ENERGY
PACIFIC NORTHWEST SITE OFFICE

Pacific Northwest Division — Battelle — Richland, Washington 99352

ARCHITECTURAL DEMO @ RAISED FLOOR RM 1109 PLAN

PROJ TITLE: HPCS–4 POWER & COOLING

SIZE	INDEX NO	BLDG NO	DWG NO	REV NO
F	0800	EMSL	WS9612	0

SCALE SHOWN — SHEET 1 OF 1

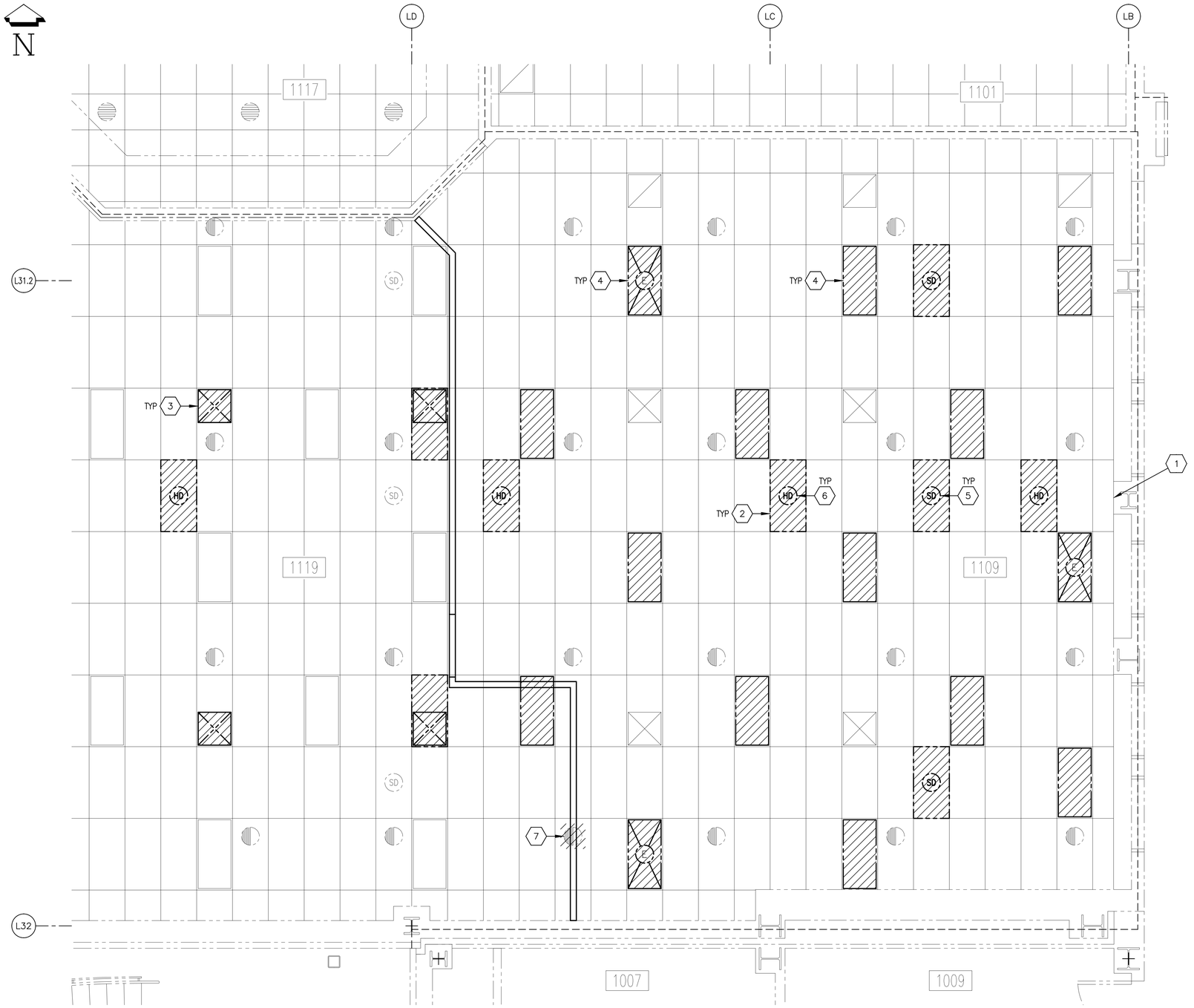
DRAWING NO	DRAWING TITLE
WS9611	PROJECT LEGEND/ABBREV
WS9610	PROJECT TITLE/DWG LIST
S593062–SPCC03	CONSTRUCTION SPEC

REFERENCE DRAWINGS

NEXT USED ON

RR	QA BY / DATE	ENGR BY / DATE	CHK BY / DATE	REV BY / DATE	DESCRIPTION	REV NO

REVISIONS



COMPUTER RM PARTIAL PLAN – DEMO @ REFLECTED CEILING

3/8" = 1'–0" SCALE 0' 2' 4' 8' FEET

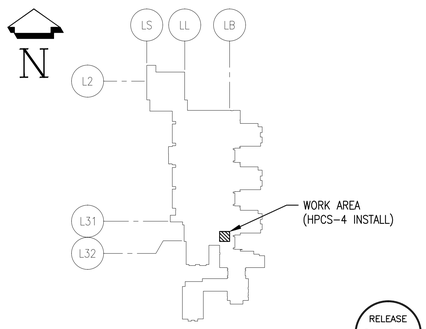
GENERAL NOTES

(UNLESS OTHERWISE SPECIFIED)

1. DIMENSIONS ARE IN FEET AND INCHES UNLESS OTHERWISE SPECIFIED.
2. FIELD VERIFY DIMENSIONS AND REPORT DISCREPANCIES WITH FIELD CONDITIONS TO BATTELLE CONSTRUCTION MANAGER PRIOR TO ANY CONSTRUCTION.
3. WORK SHALL BE COORDINATED WITH THE BATTELLE CONSTRUCTION MANAGER.
4. SURFACES DAMAGED DURING CONSTRUCTION SHALL BE REPAIRED TO MATCH CONDITION OF EXISTING.
5. NOT ALL SYMBOLS SHOWN IN LEGEND OR ABBREVIATIONS IN LIST ARE USED ON PROJECT DRAWINGS. ADDITIONAL ABBREVIATIONS (NOT SHOWN) ARE IN ACCORDANCE WITH ASME Y14.38–1999. SEE WORKSHEET WS9611.
6. DEMOLITION WHICH LEAVES OPEN PENETRATIONS IN FIRE BARRIERS MUST BE RESEALED WITH EITHER A TEMPORARY FIRESTOP PRODUCT (IF PENETRATION IS TO BE REUSED) OR PERMANENT FIRESTOP SEAL. ALL WALLS IN THE PROJECT AREA OF RM 1109 ARE 1–HOUR RATED FIRE BARRIERS, CAUTION SHOULD BE EXERCISED TO PREVENT DAMAGE TO FIRE BARRIERS. REPAIR DAMAGED AREAS IN ACCORDANCE WITH REQUIRED STANDARDS AND UL LISTED DETAILS.

SHEET NOTES

1. EXISTING REFLECTED CEILING PLAN. TO FACILITATE THE INSTALLATION OF NEW MECHANICAL AND ELECTRICAL COMPONENTS A PORTION OF THE SUSPENDED ACOUSTICAL TILE CEILING SYSTEM WILL BE REQUIRED TO BE TEMPORARILY REMOVED AND REINSTALLED, INCLUDING LIGHTING, CONDUIT, HVAC GRILLES, SENSORS, DETECTORS, FIRE PROTECTION TRIMS, ETC. CONTRACTOR TO DETERMINE THE AMOUNT OF CEILING AREA TO BE WORKED AS NECESSARY.
2. REMOVE EXISTING CEILING TILES IN LOCATIONS WHERE COMPONENT DEMOLITION OCCURS.
3. EXISTING SUPPLY DIFFUSERS TO BE REMOVED. SEE MECH DEMO WKSH WS9615/1.
4. EXISTING LIGHT FIXTURES TO BE REMOVED. SEE ELEC LIGHTING DEMO WKSH WS9616/1
5. EXISTING SMOKE DETECTORS TO BE REMOVED. SEE ELEC DEMO WKSH WS9617/1.
6. EXISTING HEAT DETECTORS TO BE REMOVED. SEE ELEC DEMO WKSH WS9618/1
7. EXISTING FIRE SPRINKLER TO BE RELOCATED. SEE FIRE MOD WKSH WS9637/1



KEY PLAN

SCALE: NONE

RELEASE 01–18–13 DATE JMK

EDP # S593062–EDP03

DRAWN	DATE
KS KOSCHIK	11/15/11
CHECKED	
ENGR GCT	
GC TURPEN	18 JAN 13
APVD	
OTHER	
OTHER	
APVD FOR IMPLEMENTATION BY	
NA ON WORKSHEET	

U. S. DEPARTMENT OF ENERGY
PACIFIC NORTHWEST SITE OFFICE

Pacific Northwest Division Battelle Richland, Washington 99352

ARCHITECTURAL
DEMO @ REFLECTED CLG
RM 1109 PLAN

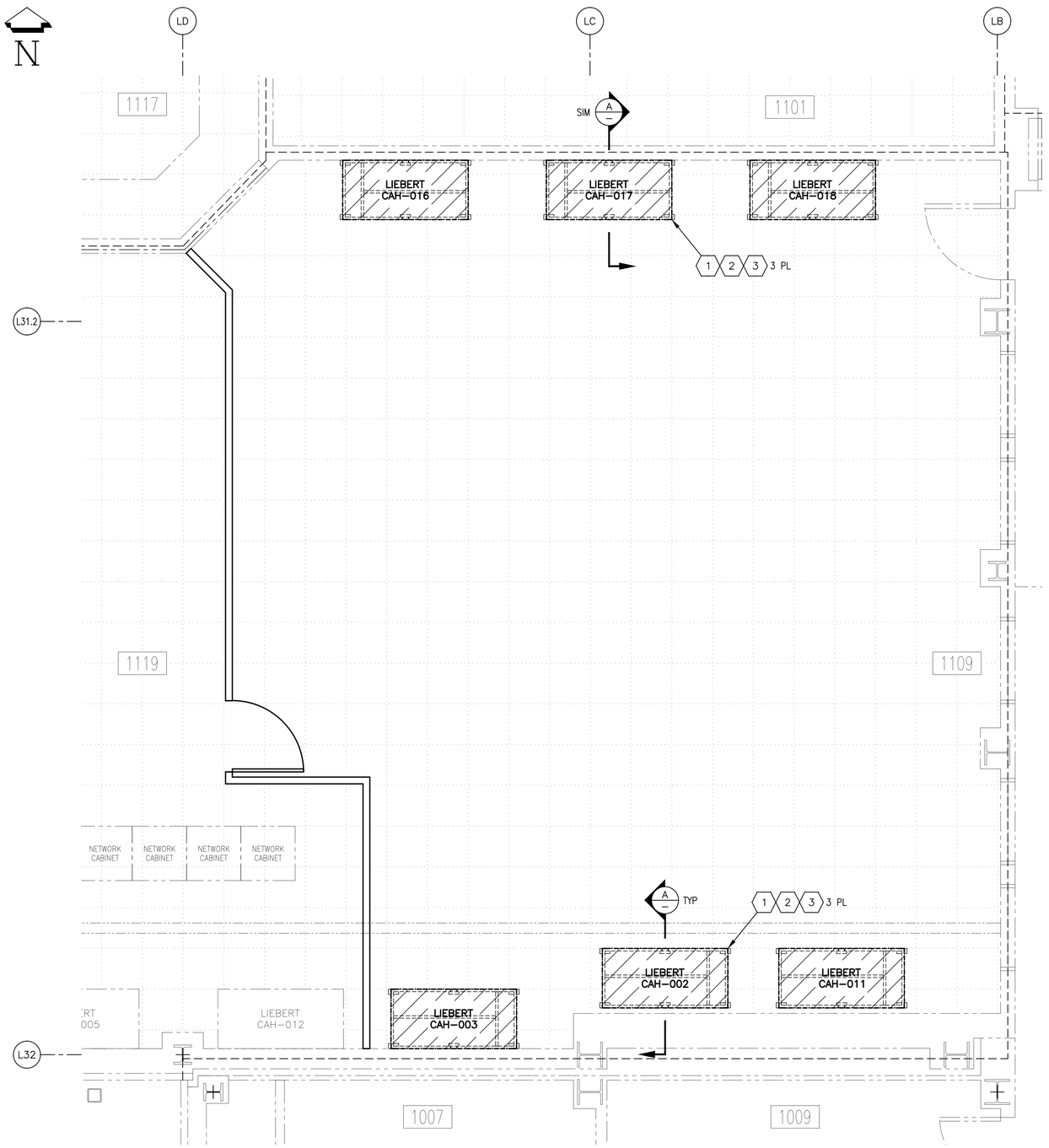
PROJ TITLE: HPCS–4 POWER & COOLING

SIZE	INDEX NO	BLDG NO	DWG NO	REV NO
F	0800	EMSL	WS9613	0

SCALE SHOWN SHEET 1 OF 1

DRAWING NO	DRAWING TITLE
REFERENCE DRAWINGS	
NEXT USED ON	
WS9611	PROJECT LEGEND/ABBREV
WS9600	PROJECT TITLE/DWG LIST
S593062–SPCC03	CONSTRUCTION SPEC

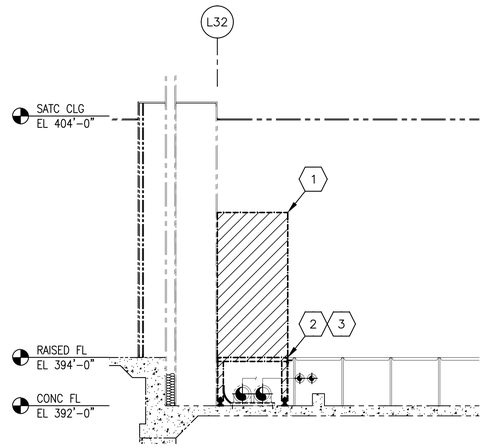
RR	QA BY / DATE	ENGR BY / DATE	CHK BY / DATE	REV BY / DATE	DESCRIPTION	REV NO
REVISIONS						



COMPUTER RM PARTIAL PLAN – DEMO @ LIEBERT UNIT

3/8" = 1'-0" SCALE 0' 2' 4' 8' FEET

NOTE: ALL EXISTING BELOW FLOOR DEVICES OR OBSTRUCTIONS NOT SHOWN.



A SECTION

SCALE: 3/8" = 1'-0"

NOTE: ALL EXISTING BELOW FLOOR DEVICES OR OBSTRUCTIONS NOT SHOWN.

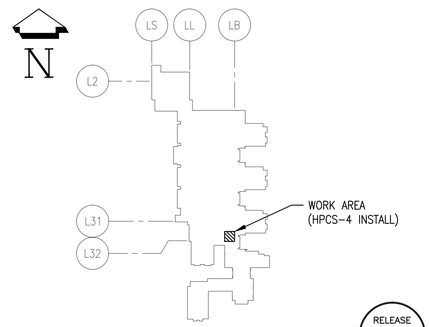
GENERAL NOTES

(UNLESS OTHERWISE SPECIFIED)

1. DIMENSIONS ARE IN FEET AND INCHES UNLESS OTHERWISE SPECIFIED.
2. FIELD VERIFY DIMENSIONS AND REPORT DISCREPANCIES WITH FIELD CONDITIONS TO BATTELLE CONSTRUCTION MANAGER PRIOR TO ANY CONSTRUCTION.
3. WORK SHALL BE COORDINATED WITH THE BATTELLE CONSTRUCTION MANAGER.
4. SURFACES DAMAGED DURING CONSTRUCTION SHALL BE REPAIRED TO MATCH CONDITION OF EXISTING.
5. NOT ALL SYMBOLS SHOWN IN LEGEND OR ABBREVIATIONS IN LIST ARE USED ON PROJECT DRAWINGS. ADDITIONAL ABBREVIATIONS (NOT SHOWN) ARE IN ACCORDANCE WITH ASME Y14.38–1999. SEE WORKSHEET WS9611.
6. THE PIPING AND CONDUIT SHOWN ON THE DRAWINGS IS DIAGRAMMATIC IN NATURE AND DOES NOT NECESSARILY SHOW ALL REQUIRED FITTINGS AND/OR ACTUAL ROUTING. ALL OBSTRUCTIONS MAY NOT BE SHOWN ON DRAWINGS. PROVIDE ALL MATERIAL FOR A COMPLETE INSTALLATION.
7. DEMOLITION WHICH LEAVES OPEN PENETRATIONS IN FIRE BARRIERS MUST BE RESEALED WITH EITHER A TEMPORARY FIRESTOP PRODUCT (IF PENETRATION IS TO BE REUSED) OR PERMANENT FIRESTOP SEAL. ALL WALLS IN THE PROJECT AREA OF RM 1109 ARE 1–HOUR RATED FIRE BARRIERS, CAUTION SHOULD BE EXERCISED TO PREVENT DAMAGE TO FIRE BARRIERS. REPAIR DAMAGED AREAS IN ACCORDANCE WITH REQUIRED STANDARDS AND UL LISTED DETAILS.

SHEET NOTES

1. REMOVE 30 TON LIEBERT CAH–002, CAH–003, CAH–011, CAH–016, CAH–017 AND CAH–018 (DO NOT DAMAGE). PLACE ON PALLETS, DELIVER TO LOCATION DESIGNATED BY BATTELLE CONSTRUCTION MANAGER.
2. REMOVE 30 TON LIEBERT SUPPORT STAND (DO NOT DAMAGE). DELIVER TO LOCATION DESIGNATED BY BATTELLE CONSTRUCTION MANAGER.
3. PROVIDE FLOOR TILES IN LOCATION WHERE LIEBERTS ARE REMOVED. SEE ARCH WKSH WS9623 FOR ADDITIONAL INFO.



KEY PLAN

SCALE: NONE

RELEASE 01–18–13 DATE JMK

EDP # S593062–EDP03

DRAWN	DATE
KS KOSCHIK	11/15/11
CHECKED	
ENGR STEVE GOURLEY	
SE GOURLEY	1/18/13
APVD	
OTHER	
OTHER	
APVD FOR IMPLEMENTATION BY	
NA ON WORKSHEET	

U. S. DEPARTMENT OF ENERGY
PACIFIC NORTHWEST SITE OFFICE

Pacific Northwest Division — Battelle — Richland, Washington 99352

MECH/ELEC DEMO @ LIEBERT UNIT RM 1109 PLAN

PROJ TITLE: HPCS–4 POWER & COOLING

SIZE	INDEX NO	BLDG NO	DWG NO	REV NO
F	8516	EMSL	WS9614	0

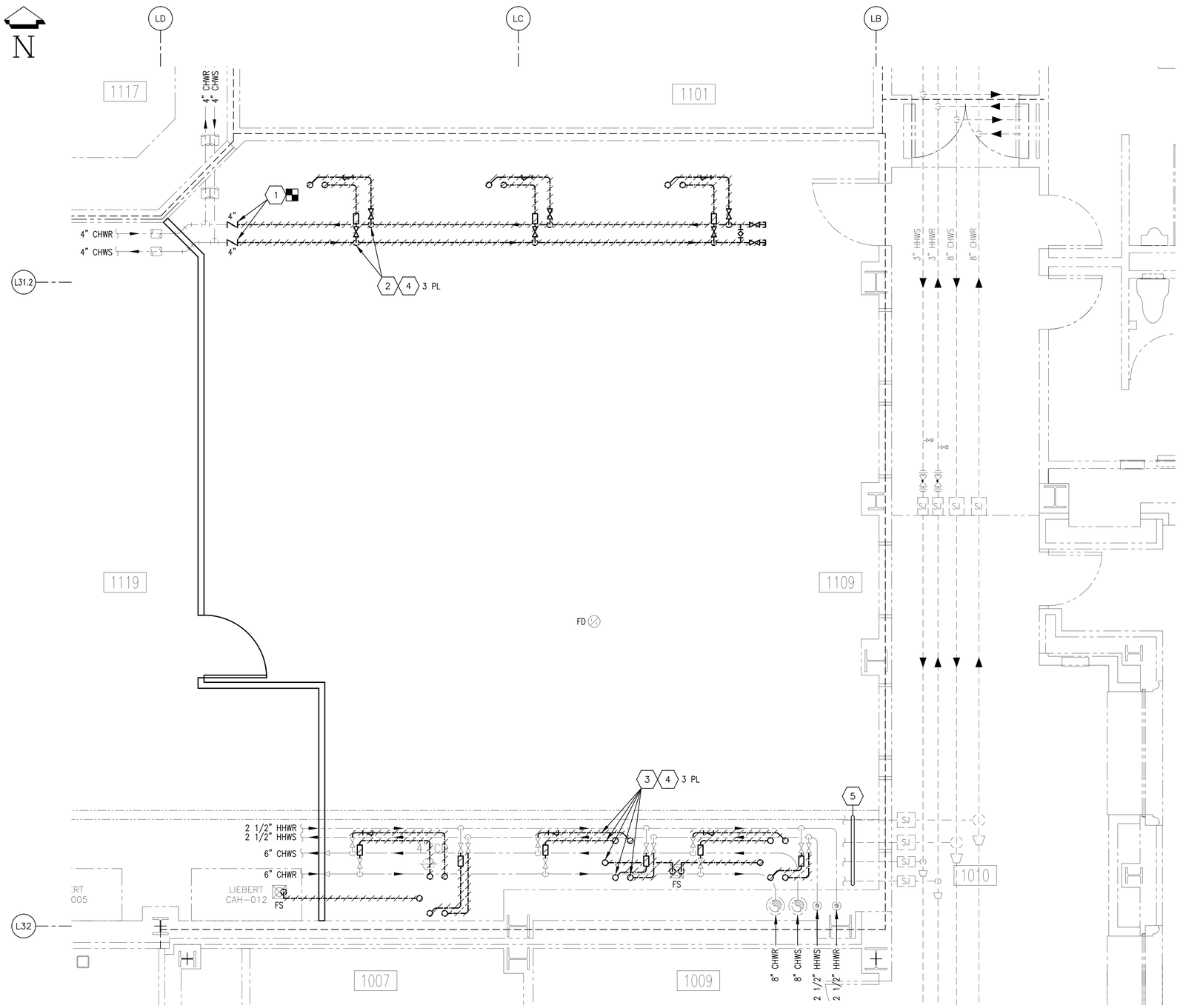
SCALE SHOWN — SHEET 1 OF 3

REFERENCE DRAWINGS	
WS9611	PROJECT LEGEND/ABBREV
WS9610	PROJECT TITLE/DWG LIST
S593062–SPCC03	CONSTRUCTION SPEC
DRAWING NO	DRAWING TITLE

NEXT USED ON

RR	QA BY / DATE	ENGR BY / DATE	CHK BY / DATE	REV BY / DATE	DESCRIPTION	REV NO

REVISIONS



SHEET NOTES

1. PROVIDE BUTTERFLY VALVES AND CAP ON EXISTING 4" CHWS/CHWR NEAR LOCATION SHOWN.
2. DEMOLISH PIPING AND SUPPORTS ASSOCIATED WITH LIEBERT CAH-016, CAH-017 AND CAH-018 BEYOND NEW ISOLATION VALVES LOCATED ON CHWS AND CHWR. CAP PIPE AND VALVE.
3. DEMOLISH PIPING AND SUPPORTS ASSOCIATED WITH LIEBERT CAH-002, CAH-003 AND CAH-011 UP TO EXISTING ISOLATION VALVES LOCATED ON CHWS, CHWR, HWS AND HWR. CAP PIPE AND VALVE. DEMOLISH CD PIPING TO FLOOR SINK.
4. DEMO SHALL BE DONE WITH NON-SPARK PRODUCING TOOLS. A VACUUM CLEANER SHALL BE USED DURING ALL CUTTING ACTIVITIES.
5. EXISTING CHWS/CHWR & HHWS/HHWR PIPING ABOVE CEILING SPACE, CONNECTS TO HEADERS RUNNING NORTH-SOUTH ABOVE CORRIDOR 1010 (SHOWN FOR REF ONLY).

COMPUTER RM PARTIAL PLAN – DEMO @ LIEBERT CHWS/CHWR (BELOW FL)

3/8" = 1'-0" SCALE 0' 2' 4' 8' FEET

NOTE: LIEBERT UNITS AND SUPPORT STAND NOT SHOWN.

RELEASE 01-18-13 DATE JMK

EDP # S593062-EDP03

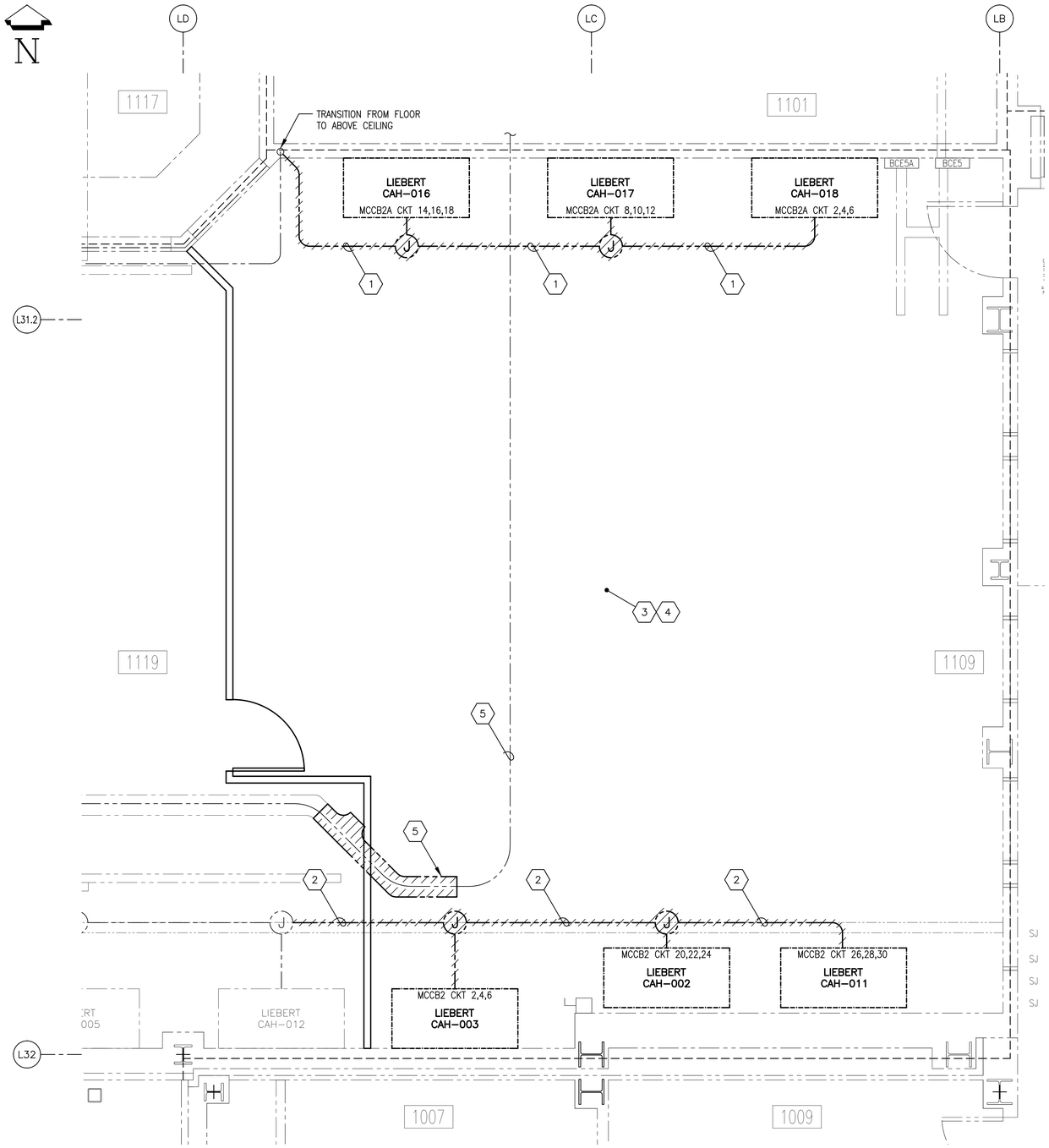
DRAWN KS KOSCHIK	DATE 11/15/11	U. S. DEPARTMENT OF ENERGY PACIFIC NORTHWEST SITE OFFICE	
CHECKED		Pacific Northwest Division Baffelle Richland, Washington 99352	
ENGR STEVE GOURLEY SE GOURLEY	1/18/13	MECH/ELEC DEMO @ LIEBERT UNIT RM 1109 PLAN	
APVD			
OTHER		PROJ TITLE HPCS-4 POWER & COOLING	
OTHER		SIZE F / INDEX NO 8516 / BLDG NO EMSL / DWG NO WS9614 / REV NO 0	
APVD FOR IMPLEMENTATION BY NA ON WORKSHEET		SCALE SHOWN / SHEET 2 OF 3	

DRAWING NO	DRAWING TITLE
REFERENCE DRAWINGS	
NEXT USED ON	

REV NO	DESCRIPTION	QA BY / DATE	ENGR BY / DATE	CHK BY / DATE	REV BY / DATE
RR					

REVISIONS

Z0000513-R10-5/07

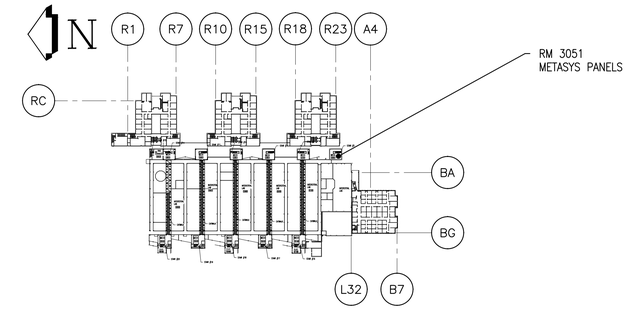


COMPUTER RM PARTIAL PLAN – DEMO @ LIEBERT POWER (BELOW FL)

3/8" = 1'–0" 0' 2' 4' 8' SCALE FEET

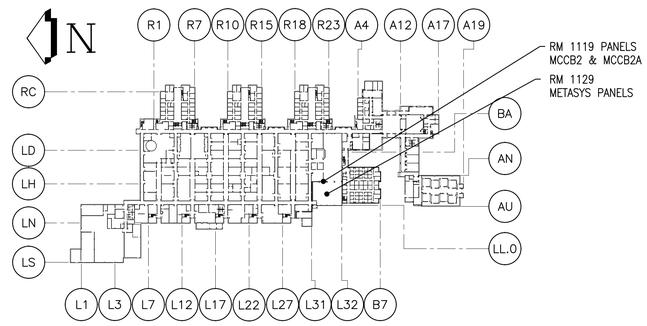
SHEET NOTES

1. DISCONNECT/REMOVE POWER CONDUCTORS, CONDUIT, AND JUNCTION BOXES BACK TO PANEL MCCB2A. DISCONNECT/REMOVE FLEXIBLE CONDUIT AND ASSOCIATED CONTROL WIRING FROM ROOM 1129 CONTROL PANEL BETWEEN THE 30 TON COMPUTER ROOM AIR HANDLER.
2. DISCONNECT/REMOVE POWER CONDUCTORS, CONDUIT, AND JUNCTION BOXES BACK TO PANEL MCCB2. DISCONNECT/REMOVE FLEXIBLE CONDUIT AND ASSOCIATED CONTROL WIRING FROM ROOM 3051 CONTROL PANEL BETWEEN THE 30 TON COMPUTER ROOM AIR HANDLER.
3. REMOVE ALL ABANDONED IN PLACE CONDUIT AND WIREWAY AND ASSOCIATED MOUNTING HARDWARE BELOW FLOOR (NOT SHOWN ON PLAN).
4. RETAIN GROUNDING GRID (NOT SHOWN) FOR RAISED FLOOR.
5. REMOVE/CUT CABLE TRAY TO ALLOW FOR INSTALLATION OF BELOW FLOOR BARRIER. PROTECT CABLES AND RETAIN.



2ND FLOOR KEY PLAN

SCALE: NONE



1ST FLOOR KEY PLAN

SCALE: NONE

RELEASE 01–18–13 DATE JMK

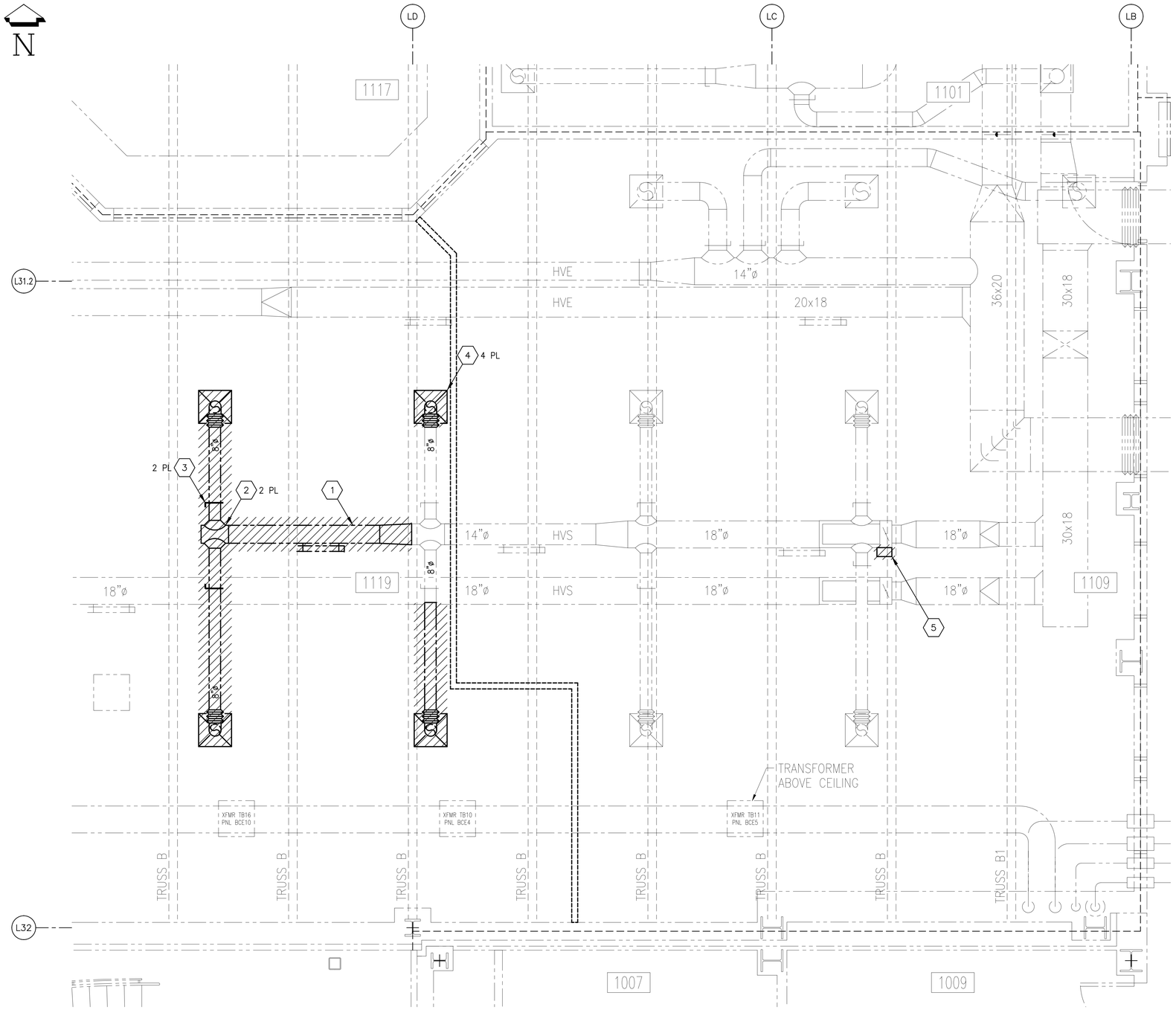
EDP # S593062–EDP03

DRAWN KS KOSCHIK	DATE 11/15/11	U. S. DEPARTMENT OF ENERGY PACIFIC NORTHWEST SITE OFFICE	
CHECKED		Pacific Northwest Division — Battelle — Richland, Washington 99352	
ENGR BG BJ GRAF	1/18/13	MECH/ELEC DEMO @ LIEBERT UNIT RM 1109 PLAN	
APVD			
OTHER		PROJ TITLE HPCS–4 POWER & COOLING	
OTHER		SIZE F / INDEX NO 7301 / BLDG NO EMSL / DWG NO WS9614 / REV NO 0	
APVD FOR IMPLEMENTATION BY NA ON WORKSHEET		SCALE SHOWN / SHEET 3 OF 3	

DRAWING NO	DRAWING TITLE
REFERENCE DRAWINGS	
NEXT USED ON	

RR	QA BY / DATE	ENGR BY / DATE	CHK BY / DATE	REV BY / DATE	DESCRIPTION	REV NO
REVISIONS						

20000513–R10–5/07



COMPUTER RM PARTIAL PLAN – DEMO @ SUPPLY DUCT (ABOVE CLG)

3/8" = 1'-0" SCALE 0' 2' 4' 8' FEET

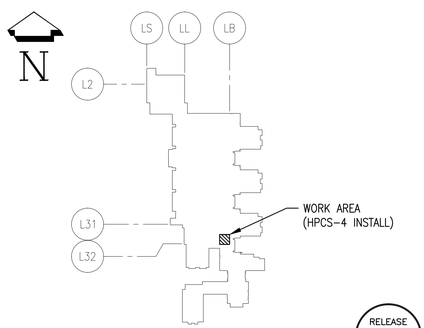
GENERAL NOTES

(UNLESS OTHERWISE SPECIFIED)

1. DIMENSIONS ARE IN FEET AND INCHES UNLESS OTHERWISE SPECIFIED.
2. FIELD VERIFY DIMENSIONS AND REPORT DISCREPANCIES WITH FIELD CONDITIONS TO BATTELLE CONSTRUCTION MANAGER PRIOR TO ANY CONSTRUCTION.
3. WORK SHALL BE COORDINATED WITH THE BATTELLE CONSTRUCTION MANAGER.
4. SURFACES DAMAGED DURING CONSTRUCTION SHALL BE REPAIRED TO MATCH CONDITION OF EXISTING.
5. NOT ALL SYMBOLS SHOWN IN LEGEND OR ABBREVIATIONS IN LIST ARE USED ON PROJECT DRAWINGS. ADDITIONAL ABBREVIATIONS (NOT SHOWN) ARE IN ACCORDANCE WITH ASME Y14.38–1999. SEE WORKSHEET WS9611.
6. THE PIPING AND CONDUIT SHOWN ON THE DRAWINGS IS DIAGRAMMATIC IN NATURE AND DOES NOT NECESSARILY SHOW ALL REQUIRED FITTINGS AND/OR ACTUAL ROUTING. ALL OBSTRUCTIONS MAY NOT BE SHOWN ON DRAWINGS. PROVIDE ALL MATERIAL FOR A COMPLETE INSTALLATION.
7. DEMOLITION WHICH LEAVES OPEN PENETRATIONS IN FIRE BARRIERS MUST BE RESEALED WITH EITHER A TEMPORARY FIRESTOP PRODUCT (IF PENETRATION IS TO BE REUSED) OR PERMANENT FIRESTOP SEAL. ALL WALLS IN THE PROJECT AREA OF RM 1109 ARE 1–HOUR RATED FIRE BARRIERS, CAUTION SHOULD BE EXERCISED TO PREVENT DAMAGE TO FIRE BARRIERS. REPAIR DAMAGED AREAS IN ACCORDANCE WITH REQUIRED STANDARDS AND UL LISTED DETAILS.

SHEET NOTES

1. DEMOLISH EXISTING PORTION OF SUPPLY DUCT AS SHOWN
2. DEMOLISH EXISTING DUCT TRANSITION.
3. DEMOLISH EXISTING 8"ø DUCT AND DAMPER.
4. DEMOLISH EXISTING SUPPLY DIFFUSER (TO BE RELOCATED) AND FLEX DUCT. SEE MECH WKSH WS9629.
5. DEMOLISH EXISTING JCI TERMINAL UNIT CONTROLLER, ASSOCIATED WIRING, CONDUIT AND TEMPERATURE SENSOR. SEE MECH WKSH WS9629 AND ELEC CONTROL WKSH WS9634.



KEY PLAN

SCALE: NONE

RELEASE 01–18–13 DATE JMK

EDP # S593062–EDP03

DRAWN	DATE
KS KOSCHIK	11/15/11
CHECKED	
ENGR STEVE GOURLEY	
SE GOURLEY	1/18/13
APVD	
OTHER	
OTHER	
APVD FOR IMPLEMENTATION BY	
NA ON WORKSHEET	

U. S. DEPARTMENT OF ENERGY
PACIFIC NORTHWEST SITE OFFICE

Pacific Northwest Division — Battelle — Richland, Washington 99352

MECHANICAL
DEMO ABOVE CEILING
RM 1109 PLAN

PROJ TITLE: HPCS–4 POWER & COOLING

SIZE	INDEX NO	BLDG NO	DWG NO	REV NO
F	8900	EMSL	WS9615	0

SCALE SHOWN SHEET 1 OF 1

DRAWING NO	DRAWING TITLE
WS9611	PROJECT LEGEND/ABBREV
WS9610	PROJECT TITLE/DWG LIST
S593062–SPCC03	CONSTRUCTION SPEC

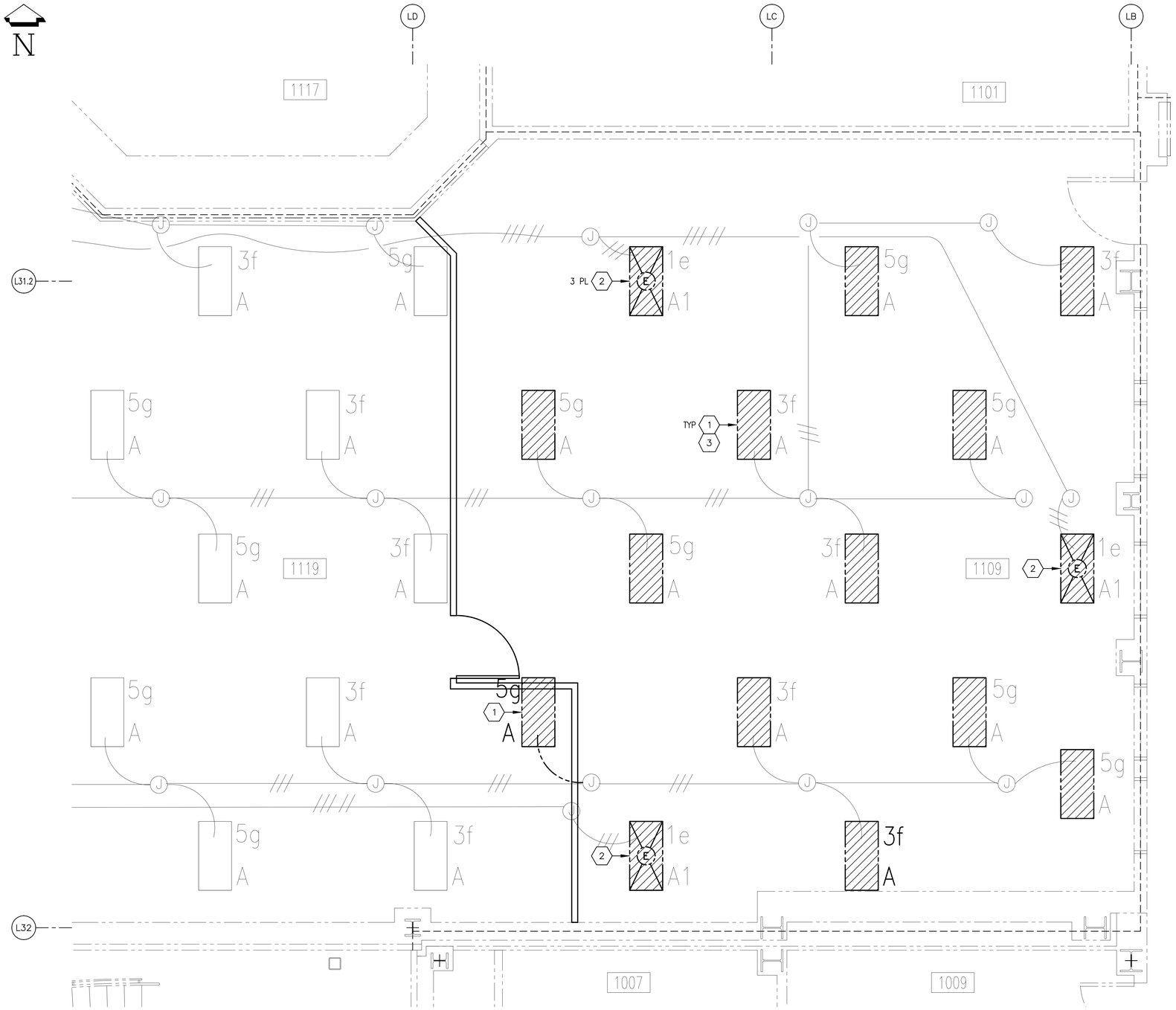
REFERENCE DRAWINGS

NEXT USED ON

REV NO	DESCRIPTION	REV BY / DATE	CHK BY / DATE	ENGR BY / DATE	QA BY / DATE
RR					

REVISIONS

20000513–R10–5/07



COMPUTER RM PARTIAL PLAN – DEMO @ LIGHTING

3/8" = 1'–0" SCALE 0' 2' 4' 8' FEET

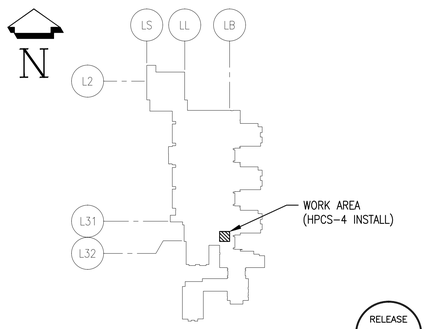
GENERAL NOTES

(UNLESS OTHERWISE SPECIFIED)

1. DIMENSIONS ARE IN FEET AND INCHES UNLESS OTHERWISE SPECIFIED.
2. FIELD VERIFY DIMENSIONS AND REPORT DISCREPANCIES WITH FIELD CONDITIONS TO BATTELLE CONSTRUCTION MANAGER PRIOR TO ANY CONSTRUCTION.
3. WORK SHALL BE COORDINATED WITH THE BATTELLE CONSTRUCTION MANAGER.
4. SURFACES DAMAGED DURING CONSTRUCTION SHALL BE REPAIRED TO MATCH CONDITION OF EXISTING.
5. NOT ALL SYMBOLS SHOWN IN LEGEND OR ABBREVIATIONS IN LIST ARE USED ON PROJECT DRAWINGS. ADDITIONAL ABBREVIATIONS (NOT SHOWN) ARE IN ACCORDANCE WITH ASME Y14.38–1999. SEE WORKSHEET WS9611.
6. DEMOLITION WHICH LEAVES OPEN PENETRATIONS IN FIRE BARRIERS MUST BE RESEALED WITH EITHER A TEMPORARY FIRESTOP PRODUCT (IF PENETRATION IS TO BE REUSED) OR PERMANENT FIRESTOP SEAL. ALL WALLS IN THE PROJECT AREA OF RM 1109 ARE 1–HOUR RATED FIRE BARRIERS, CAUTION SHOULD BE EXERCISED TO PREVENT DAMAGE TO FIRE BARRIERS. REPAIR DAMAGED AREAS IN ACCORDANCE WITH REQUIRED STANDARDS AND UL LISTED DETAILS.

SHEET NOTES

1. REMOVE AND DISPOSE EXISTING LIGHT FIXTURE, REMOVE ALL MERCURY CONTAINING LAMPS. SEE SPECIFICATION SECTION 17600 FOR DISPOSAL REQUIREMENTS.
2. E–LIGHT FIXTURES ARE FED FROM PANEL EBH21 CIRCUIT 1. PANEL IS LOCATED ON CATWALK 3150. REMOVE CONDUCTORS AND CONDUITS BACK TO NEAREST FIXTURE OR JUNCTION BOX.
3. FIXTURES ARE FED FROM PANEL BH22 CIRCUITS 3 AND 5. PANEL IS LOCATED ON CATWALK 3150. REMOVE CONDUCTORS AND CONDUITS BACK TO NEAREST FIXTURE OR JUNCTION BOX.



KEY PLAN

SCALE: NONE

RELEASE 01–18–13 DATE JMK

EDP # S593062–EDP03

H–3–71316	LIGHTING MAIN LEVEL COMPUTER LAB 1
WS9611	PROJECT LEGEND/ABBREV
WS9600	PROJECT TITLE/DWG LIST
S593062–SPCC03	CONSTRUCTION SPEC
DRAWING NO	DRAWING TITLE

REFERENCE DRAWINGS

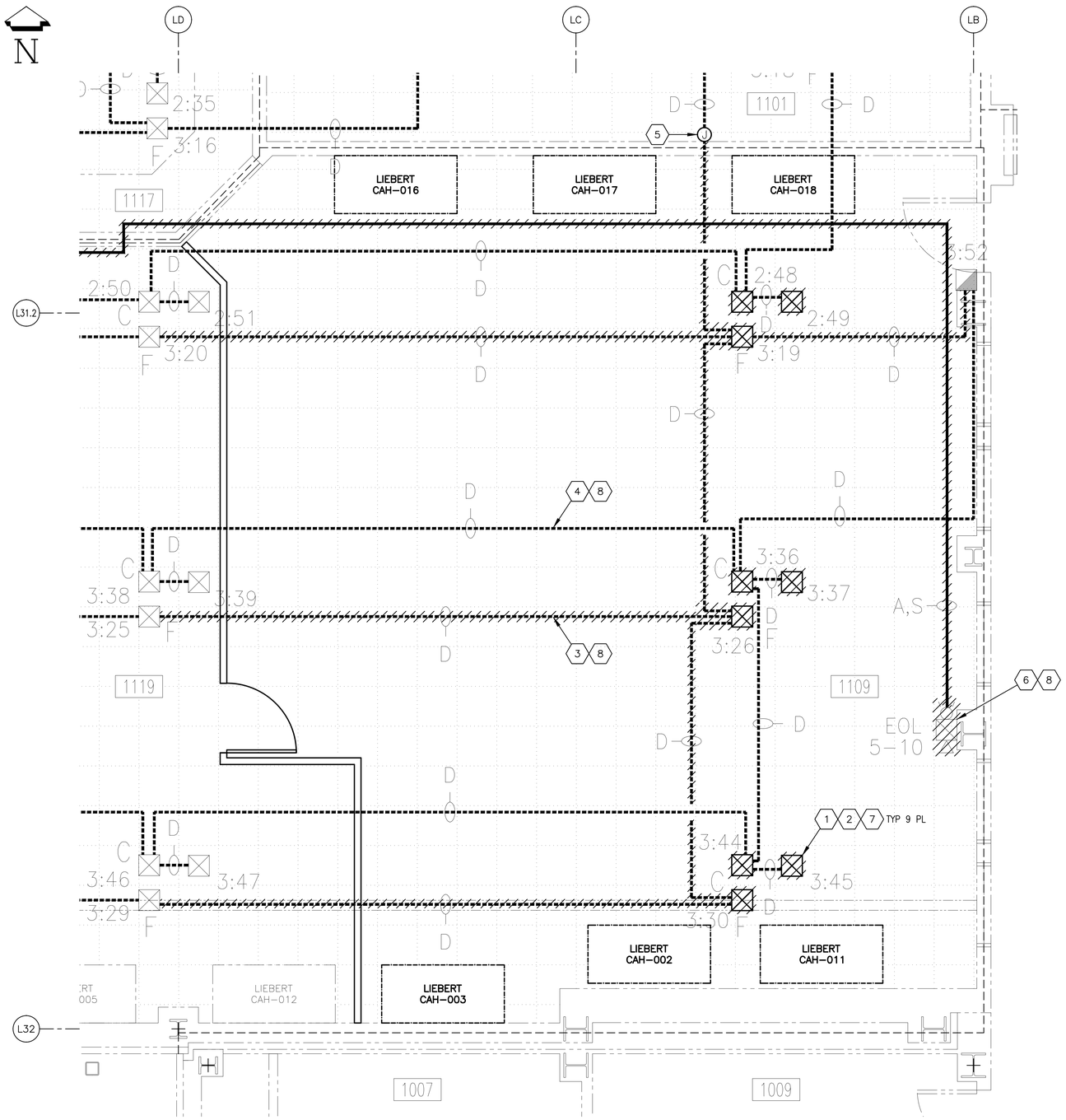
NEXT USED ON

RR	QA BY / DATE	ENGR BY / DATE	CHK BY / DATE	REV BY / DATE	DESCRIPTION	REV NO

REVISIONS

DRAWN KS KOSCHIK	DATE 11/15/11	U. S. DEPARTMENT OF ENERGY PACIFIC NORTHWEST SITE OFFICE
CHECKED		Pacific Northwest Division Battelle Richland, Washington 99352
ENGR BG BJ GRAF	1/18/13	ELECTRICAL DEMO @ LIGHTING RM 1109 PLAN
APVD		PROJ TITLE HPCS–4 POWER & COOLING
OTHER		SIZE F / INDEX NO 0800 / BLDG NO EMSL / DWG NO WS9616 / REV NO 0
OTHER		SCALE SHOWN / SHEET 1 OF 1
APVD FOR IMPLEMENTATION BY NA ON WORKSHEET		

200000513–R10–5/07



COMPUTER RM PARTIAL PLAN – DEMO @ FIRE ALARM

3/8" = 1'–0" 0' 2' 4' 8' SCALE FEET

NOTE: ALL EXISTING BELOW FLOOR DEVICES OR OBSTRUCTIONS NOT SHOWN.

WIRE LEGEND

SYMBOL	DESCRIPTION	
A	#14AWG SHIELDED PAIR	STROBE CIRCUIT
B	4#16 TWISTED SHIELDED	PRINTER INTERFACE CABLE
C	2#14AWG THHN	CONVENTIONAL INITIATING CIRCUIT
D	2#16AWG TWISTED SHIELDED	DATA
E	2#14AWG THHN	AUX. FUNCTION CIRCUIT (HVAC, DDC)
S	2#14AWG TWISTED THHN	SPEAKER CIRCUIT
☒	SMOKE DETECTOR DIRECTLY AT CEILING	
☒C	SMOKE DETECTOR ABOVE CEILING	
☒F	SMOKE DETECTOR BELOW RAISED FLOOR	

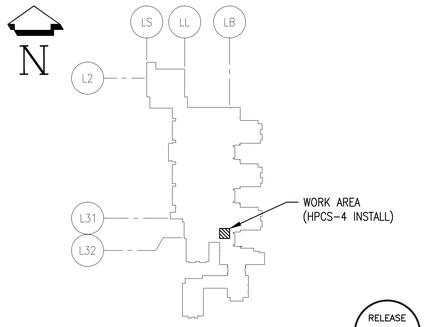
GENERAL NOTES

(UNLESS OTHERWISE SPECIFIED)

1. DIMENSIONS ARE IN FEET AND INCHES UNLESS OTHERWISE SPECIFIED.
2. FIELD VERIFY DIMENSIONS AND REPORT DISCREPANCIES WITH FIELD CONDITIONS TO BATTELLE CONSTRUCTION MANAGER PRIOR TO ANY CONSTRUCTION.
3. WORK SHALL BE COORDINATED WITH THE BATTELLE CONSTRUCTION MANAGER.
4. SURFACES DAMAGED DURING CONSTRUCTION SHALL BE REPAIRED TO MATCH CONDITION OF EXISTING.
5. NOT ALL SYMBOLS SHOWN IN LEGEND OR ABBREVIATIONS IN LIST ARE USED ON PROJECT DRAWINGS. ADDITIONAL ABBREVIATIONS (NOT SHOWN) ARE IN ACCORDANCE WITH ASME Y14.38–1999. SEE WORKSHEET WS9611.
6. THE CONDUIT SHOWN ON THE DRAWINGS IS DIAGRAMMATIC IN NATURE AND DOES NOT NECESSARILY SHOW ALL REQUIRED FITTINGS AND/OR ACTUAL ROUTING. ALL OBSTRUCTIONS MAY NOT BE SHOWN ON DRAWINGS. PROVIDE ALL MATERIAL FOR A COMPLETE INSTALLATION.
7. DEMOLITION WHICH LEAVES OPEN PENETRATIONS IN FIRE BARRIERS MUST BE RESEALED WITH EITHER A TEMPORARY FIRESTOP PRODUCT (IF PENETRATION IS TO BE REUSED) OR PERMANENT FIRESTOP SEAL. ALL WALLS IN THE PROJECT AREA OF RM 1109 ARE 1–HOUR RATED FIRE BARRIERS, CAUTION SHOULD BE EXERCISED TO PREVENT DAMAGE TO FIRE BARRIERS. REPAIR DAMAGED AREAS IN ACCORDANCE WITH REQUIRED STANDARDS AND UL LISTED DETAILS.
8. AN ACCEPTANCE TEST PROCEDURE WILL BE REQUIRED AFTER DEMOLITION IS COMPLETED TO VERIFY THE FIRE ALARM SYSTEM IS OPERATIONAL.

SHEET NOTES

1. REMOVE SMOKE DETECTOR AND DETECTOR BASE, 9 PL.
2. RECONNECT THE DATA LOOP WIRING FOR THE REMAINING SMOKE DETECTORS. SPLICES SHALL BE MADE WITH BUTT SPLICE CONNECTORS OR TERMINAL STRIPS.
3. REMOVE FIRE ALARM CONDUITS AND WIRING UNDER THE FLOOR.
4. FIRE ALARM CONDUITS AND WIRING ABOVE THE CEILING SHALL REMAIN IN PLACE.
5. PROVIDE JUNCTION BOX ON REMAINING CONDUIT. ADDITIONAL CONDUIT AND WIRE WILL BE REQUIRED TO CONNECT DATALOOP TO SMOKE DETECTOR IN ADJACENT AREA.
6. REMOVE WALL MOUNTED SPEAKER STROBE #5–10, RELOCATE EOL DEVICES TO LAST NOTIFICATION DEVICE ON CIRCUIT, POSSIBLY SPEAKER STROBE #5–9C. REMOVE WIRING FROM SPEAKER STROBE #5–10 BACK TO NEXT DEVICE.
7. REMOVAL OF SMOKE DETECTION DEVICES WILL REQUIRE PLANNED OUTAGE OF EMSL FIRE ALARM SYSTEM PRIOR TO DEMOLITION. THE SIEMENS MXL FIRE ALARM PANEL WILL REQUIRE A PROGRAM REVISION DURING THE OUTAGE. COORDINATE WITH BATTELLE CONSTRUCTION MANAGER.
8. REFER TO DWG H–3–302161 FOR LISTING OF EMSL FIRE ALARM DRAWINGS.



KEY PLAN

SCALE: NONE

RELEASE 01–18–13 DATE JMK

EDP # S593062–EDP03

DRAWN	DATE
KS KOSCHIK	11/15/11
CHECKED	
ENGR ALM AL MINTON	1/18/13
APVD	
OTHER	
OTHER	
APVD FOR IMPLEMENTATION BY NA ON WORKSHEET	

U. S. DEPARTMENT OF ENERGY
PACIFIC NORTHWEST SITE OFFICE

Pacific Northwest Division — Battelle — Richland, Washington 99352

ELECTRICAL
DEMO @ FIRE ALARM RM 1109 PLAN

PROJ TITLE: HPCS–4 POWER & COOLING

SIZE	INDEX NO	BLDG NO	DWG NO	REV NO
F	7701	EMSL	WS9617	0

SCALE SHOWN — SHEET 1 OF 2

REFERENCE DRAWINGS	
DRAWING NO	DRAWING TITLE
H–3–302161	FIRE ALARM TITLE SHEET
WS9611	PROJECT LEGEND/ABBREV
WS9610	PROJECT TITLE/DWG LIST
S593062–SPCC03	CONSTRUCTION SPEC
NEXT USED ON	

REVISIONS						
REV NO	DESCRIPTION	REV BY / DATE	CHK BY / DATE	ENGR BY / DATE	QA BY / DATE	RR

SHEET NOTES

1. REMOVE SMOKE DETECTOR AND DETECTOR BASE, 9 PL. REMOVE WIRING ASSOCIATED WITH THE DETECTOR REMOVED FROM FLOOR.
2. RECONNECT THE DATA LOOP WIRING FOR THE REMAINING SMOKE DETECTORS. SPLICES SHALL BE MADE WITH BUTT SPLICE CONNECTORS OR TERMINAL STRIPS.
3. REMOVE SPEAKER/STROBE #5–10, RECONNECT EOL DEVICES TO SPEAKER AND STROBE CIRCUIT.

ZC1–8B–25 #1 (SPEAKER)

ZC1–8B–25 #2 (STROBE)

MMB–3

TO NOTIFIER/SIEMENS INTERFACE PANEL TRI–S, T1 & T2 SEE H–3–302177 SHEET 3, ZONE F7

ALD–21

PSR–1

AHU–001

TYP 9 PL

COMPUTER RM 1119 FLOW SWITCH
COMPUTER RM 1119 OS&Y TAMPER

1011 CORRIDOR FIRE DOOR

RELEASE
01–18–13
DATE
JMK

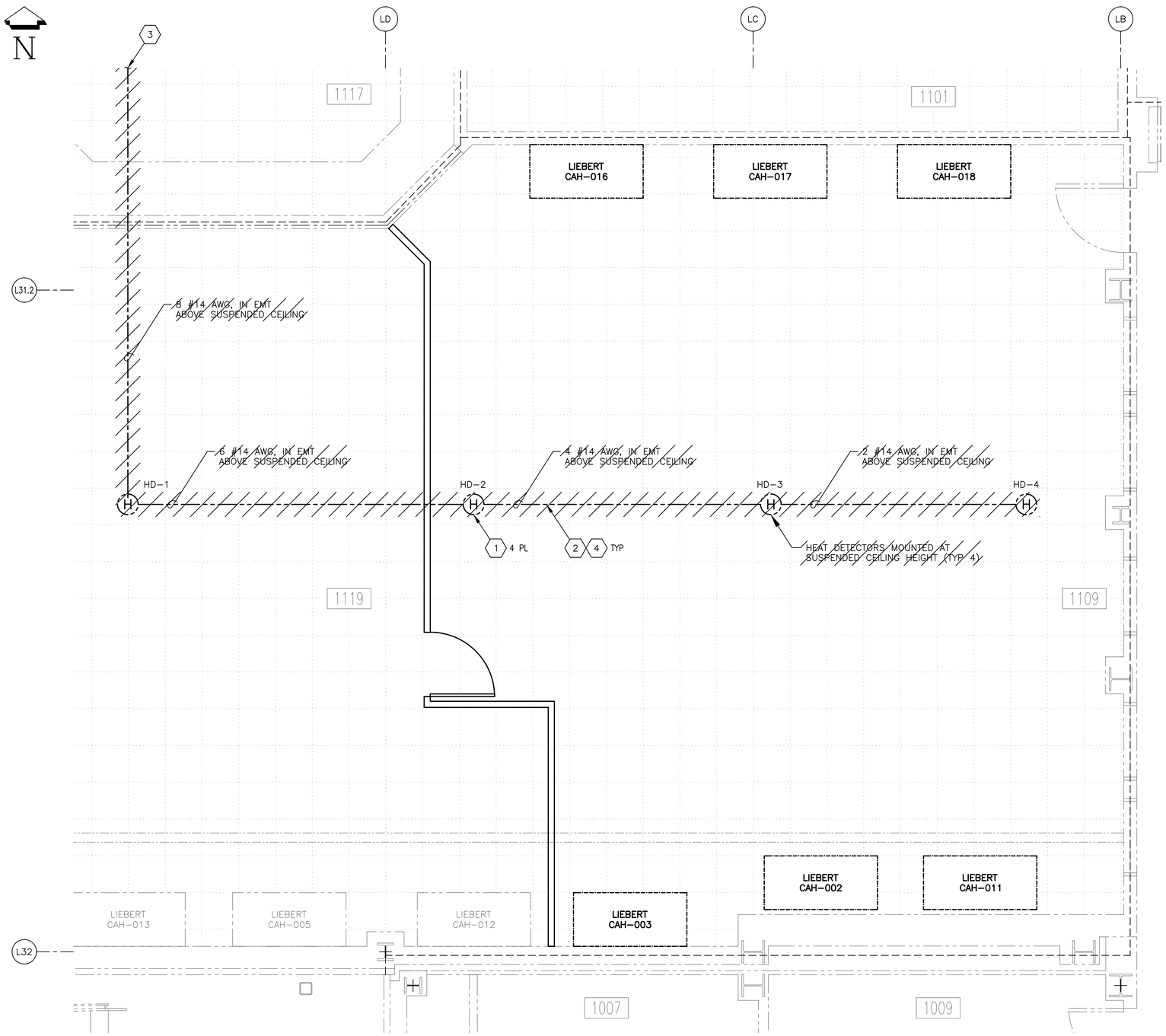
EDP # S593062–EDP03

DRAWN KS KOSCHIK	DATE 11/15/11	U. S. DEPARTMENT OF ENERGY PACIFIC NORTHWEST SITE OFFICE	
CHECKED		Pacific Northwest Division — Battelle — Richland, Washington 99352	
ENGR ALM AL MINTON	1/18/13	ELECTRICAL DEMO @ FIRE ALARM PANEL M WIRING DIAG	
APVD		PROJ TITLE HPCS–4 POWER & COOLING	
OTHER		SIZE F — INDEX NO 7702 — BLDG NO EMSL — DWG NO WS9617 — REV NO 0	
OTHER		SCALE NONE — SHEET 2 OF 2	
APVD FOR IMPLEMENTATION BY NA ON WORKSHEET			

DRAWING NO	DRAWING TITLE
REFERENCE DRAWINGS	
NEXT USED ON	

REV NO	DESCRIPTION	REV BY / DATE	CHK BY / DATE	ENGR BY / DATE	QA BY / DATE
	REVISIONS				RR

Z0000513–R10–5/07



COMPUTER RM PARTIAL PLAN – DEMO @ COMPUTER SHUTDOWN

3/8" = 1'–0" SCALE 0' 2' 4' 8' FEET

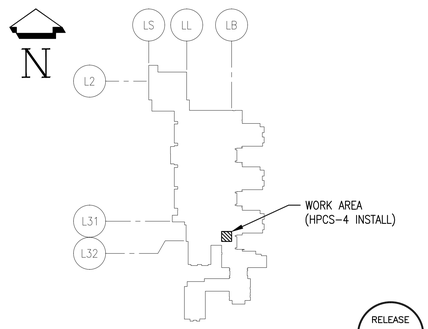
GENERAL NOTES

(UNLESS OTHERWISE SPECIFIED)

1. DIMENSIONS ARE IN FEET AND INCHES UNLESS OTHERWISE SPECIFIED.
2. FIELD VERIFY DIMENSIONS AND REPORT DISCREPANCIES WITH FIELD CONDITIONS TO BATTELLE CONSTRUCTION MANAGER PRIOR TO ANY CONSTRUCTION.
3. WORK SHALL BE COORDINATED WITH THE BATTELLE CONSTRUCTION MANAGER.
4. SURFACES DAMAGED DURING CONSTRUCTION SHALL BE REPAIRED TO MATCH CONDITION OF EXISTING.
5. NOT ALL SYMBOLS SHOWN IN LEGEND OR ABBREVIATIONS IN LIST ARE USED ON PROJECT DRAWINGS. ADDITIONAL ABBREVIATIONS (NOT SHOWN) ARE IN ACCORDANCE WITH ASME Y14.38–1999. SEE WORKSHEET WS9611.
6. THE CONDUIT SHOWN ON THE DRAWINGS IS DIAGRAMMATIC IN NATURE AND DOES NOT NECESSARILY SHOW ALL REQUIRED FITTINGS AND/OR ACTUAL ROUTING. ALL OBSTRUCTIONS MAY NOT BE SHOWN ON DRAWINGS. PROVIDE ALL MATERIAL FOR A COMPLETE INSTALLATION.
7. DEMOLITION WHICH LEAVES OPEN PENETRATIONS IN FIRE BARRIERS MUST BE RESEALED WITH EITHER A TEMPORARY FIRESTOP PRODUCT (IF PENETRATION IS TO BE REUSED) OR PERMANENT FIRESTOP SEAL. ALL WALLS IN THE PROJECT AREA OF RM 1109 ARE 1–HOUR RATED FIRE BARRIERS, CAUTION SHOULD BE EXERCISED TO PREVENT DAMAGE TO FIRE BARRIERS. REPAIR DAMAGED AREAS IN ACCORDANCE WITH REQUIRED STANDARDS AND UL LISTED DETAILS.

SHEET NOTES

1. REMOVE HEAT DETECTOR ABOVE SUSPENDED CEILING, 4 PL.
2. REMOVE EMT CONDUIT, CONDUCTORS AND SUPPORTS ABOVE SUSPENDED CEILING.
3. REMOVE EMT CONDUIT, CONDUCTORS AND SUPPORTS BACK TO PANEL B3U LOCATED IN RM 1141.
4. PRIOR TO DEMOLITION OF HEAT DETECTOR CIRCUITS, THE COMPUTER RM SHUTDOWN CONTROL PANEL SHALL BE CONFIGURED TO PREVENT SHUTDOWN OF COMPUTERS. BYPASS/AUTO SWITCHES ON CONTROL PANEL SHOULD BE PLACED IN BYPASS. COORDINATE WITH BATTELLE CONSTRUCTION MANAGER AND BUILDING ENGINEER. DETAILS SHALL BE IDENTIFIED IN THE PROJECT JPP.



KEY PLAN

SCALE: NONE

RELEASE 01–18–13 DATE JMK

EDP # S593062–EDP03

DRAWN	DATE
KS KOSCHIK	11/15/11
CHECKED	
ENGR ALM AL MINTON	1/18/13
APVD	
OTHER	
OTHER	
APVD FOR IMPLEMENTATION BY NA ON WORKSHEET	

U. S. DEPARTMENT OF ENERGY
PACIFIC NORTHWEST SITE OFFICE

Pacific Northwest Division — Battelle — Richland, Washington 99352

ELECTRICAL DEMO @ COMPUTER SHUTDOWN RM 1109 PLAN

PROJ TITLE: HPCS–4 POWER & COOLING

SIZE	INDEX NO	BLDG NO	DWG NO	REV NO
F	7701	EMSL	WS9618	0

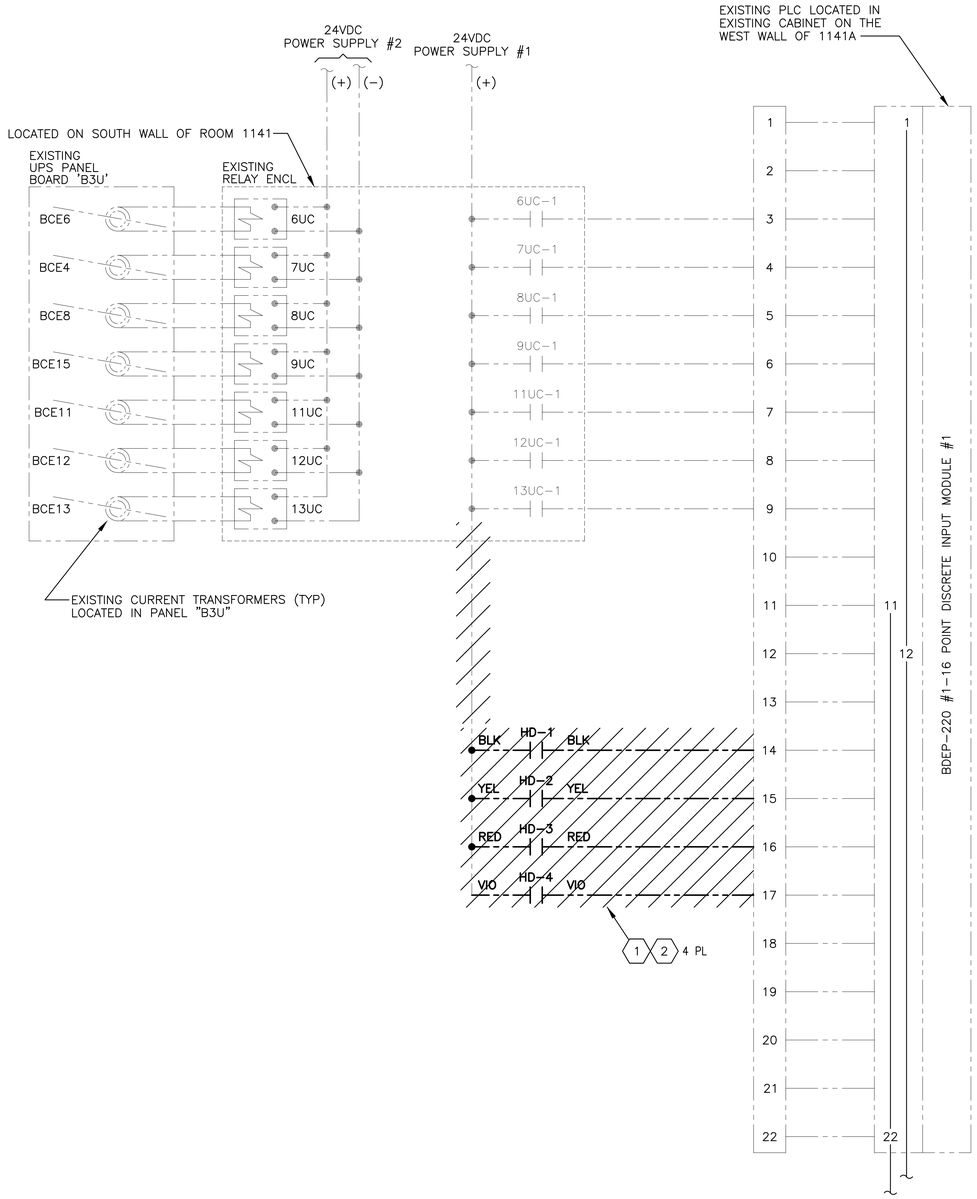
SCALE SHOWN — SHEET 1 OF 2

REFERENCE DRAWINGS	
H–3–310270	ELEC COMPUTER SHUTDOWN WIRING DIAG
H–3–309477	ELEC COMPUTER SHUTDOWN PLC INPUT
WS9611	PROJECT LEGEND/ABBREV
WS9610	PROJECT TITLE/DWG LIST
S593062–SPCC03	CONSTRUCTION SPEC
DRAWING NO	DRAWING TITLE
NEXT USED ON	

REVISIONS						
RR	QA BY / DATE	ENGR BY / DATE	CHK BY / DATE	REV BY / DATE	DESCRIPTION	REV NO

SHEET NOTES

1. REMOVE HEAT DETECTOR ABOVE SUSPENDED CEILING, 4 PL. REMOVE ASSOCIATED WIRING BACK TO PLC.
2. EXISTING FACILITY DRAWINGS H-3-309477 AND H-3-310270 PROVIDE ADDITIONAL DETAILS TO THE WIRING BUT NOT ADDITIONAL WORK SCOPE.



PLC #1141 INPUT MODULE WIRING DIAGRAM

RELEASE 01-18-13 DATE JMK

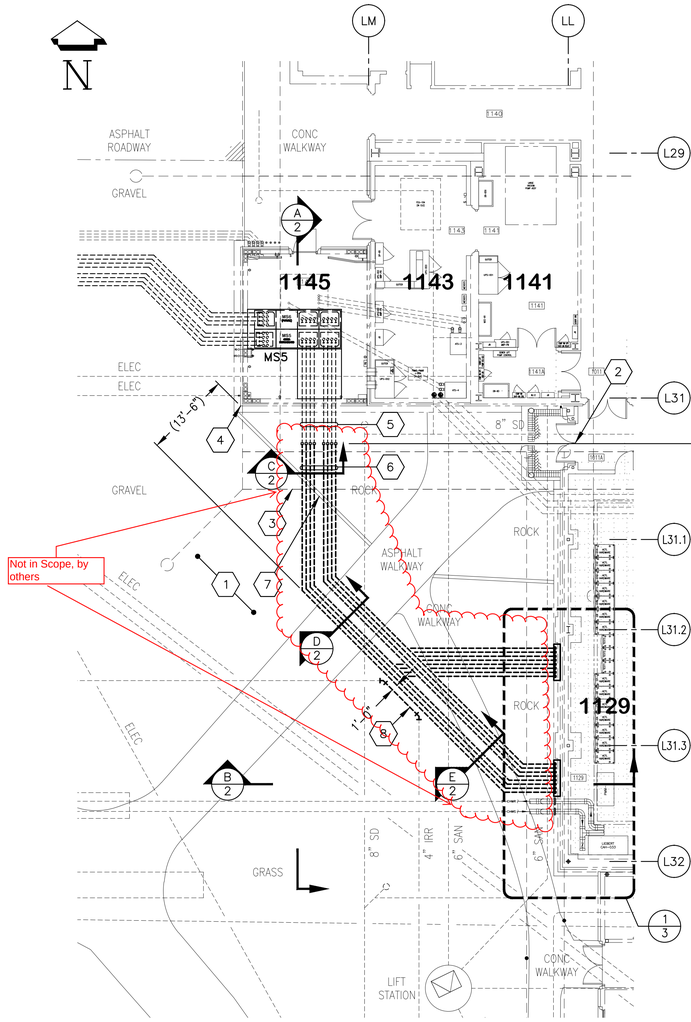
EDP # S593062-EDP03

DRAWN KS KOSCHIK	DATE 11/15/11	U. S. DEPARTMENT OF ENERGY, PACIFIC NORTHWEST SITE OFFICE
CHECKED		Pacific Northwest Division — Battelle — Richland, Washington 99352
ENGR AL MINTON	1/18/13	ELECTRICAL
APVD		DEMO @ COMPUTER SHUTDOWN
OTHER		WIRING DIGRAMS
OTHER		PROJ TITLE: HPCS-4 POWER & COOLING
APVD FOR IMPLEMENTATION BY: NA ON WORKSHEET		SIZE F; INDEX NO 7702; BLDG NO EMSL; DWG NO WS9618; REV NO 0; SCALE SHOWN; SHEET 2 OF 2

DRAWING NO	DRAWING TITLE
REFERENCE DRAWINGS	
NEXT USED ON	

RR	QA BY / DATE	ENGR BY / DATE	CHK BY / DATE	REV BY / DATE	DESCRIPTION	REV NO
REVISIONS						

Z0000513-R10-5/07



SOUTH POWER FEED – PARTIAL SITE PLAN

1" = 10' SCALE 0' 5' 10' 20' 30' FEET

GENERAL NOTES

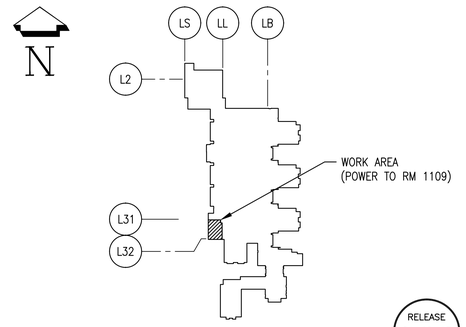
(UNLESS OTHERWISE SPECIFIED)

1. DIMENSIONS ARE IN FEET AND INCHES UNLESS OTHERWISE SPECIFIED.
2. FIELD VERIFY DIMENSIONS AND REPORT DISCREPANCIES WITH FIELD CONDITIONS TO BATTELLE CONSTRUCTION MANAGER PRIOR TO ANY CONSTRUCTION.
3. WORK SHALL BE COORDINATED WITH THE BATTELLE CONSTRUCTION MANAGER.
4. SURFACES DAMAGED DURING CONSTRUCTION SHALL BE REPAIRED TO MATCH CONDITION OF EXISTING.
5. NOT ALL SYMBOLS SHOWN IN LEGEND OR ABBREVIATIONS IN LIST ARE USED ON PROJECT DRAWINGS. ADDITIONAL ABBREVIATIONS (NOT SHOWN) ARE IN ACCORDANCE WITH ASME Y14.38–1999. SEE WORKSHEET WS9611.
6. THE CONDUIT SHOWN ON THE DRAWINGS IS DIAGRAMMATIC IN NATURE AND DOES NOT NECESSARILY SHOW ALL REQUIRED FITTINGS AND/OR ACTUAL ROUTING. ALL OBSTRUCTIONS MAY NOT BE SHOWN ON DRAWINGS. PROVIDE ALL MATERIAL FOR A COMPLETE INSTALLATION.

SHEET NOTES

1. REMOVE EXISTING GRASS, GRAVEL, LANDSCAPE ROCK, ASPHALT ROADWAY, ASPHALT WALKWAY, CONCRETE WALKWAY, CONCRETE MOW STRIP, IRRIGATION LINES AND SPRINKLER HEADS AS NEEDED FOR CONDUIT TRENCHING. REPLACE SURFACING TO MATCH EXISTING UPON COMPLETION OF CONDUIT INSTALLATION AND BACKFILLING.
2. TRENCHING IMPACTS EXISTING FIRE LANE AND CORRIDOR 1011 SOUTH–WEST EXIT IN VESTIBULE 1011A. COORDINATE DETOURS AND POSTINGS WITH BATTELLE CONSTRUCTION MANAGER.
3. EXISTING GROUND GRID AROUND PERIMETER OF BUILDING, HAS (2) EACH PARALLEL #2/0, 6'–0" APART APPROXIMATELY 2'–0" BELOW GRADE. AVOID DAMAGE TO GRID AS MUCH AS POSSIBLE. IF IMPACTED DURING EXCAVATION, REPAIR GRID PER GENERAL REQUIREMENTS OR DIVISION 1 SPECIFICATIONS.
4. CORNER OF EXISTING MASONRY BUILDING.
5. EXISTING SPARE (16) ø4" PVC CONDUITS, 7 1/2" OC SPACING, 2x4 STACK, 2 PLACES. CONDUITS ARE CAPPED APPROXIMATELY 6'–0" SOUTH OF RM 1145 OUTSIDE WALL WITH TOP CONDUIT APPROXIMATELY 3'–0" BELOW GRADE
6. (8) ø4" PVC CONDUITS WITH CONDUCTORS (TOP ROW) AND (8) ø4" PVC CONDUITS ONLY (BOTTOM ROW), 7 1/2" OC SPACING, 2x4 STACK, 2 PLACES.
7. REPAIR CONCRETE CURB TO MATCH EXISTING UPON COMPLETION OF CONDUIT INSTALLATION.
8. CUT AND RE–ROUTE SECTION OF EXISTING 4" PVC IRRIGATION LINE TO AVOID DUCT BANK AS SHOWN. REPAIR TO MATCH EXISTING.

Not In Scope



KEY PLAN

SCALE: NONE

RELEASE 01–18–13 DATE JMK

EDP # S593062–EDP03

WARNING – CALL TWO WORKING DAYS BEFORE YOU DIG 1–800–424–5555

ALL UNDERGROUND UTILITIES AND STRUCTURES ARE NOT SHOWN. THE LOCATION OF THOSE SHOWN ARE APPROXIMATE. THE CONTRACTOR IS RESPONSIBLE TO FIELD VERIFY BOTH UNDERGROUND & ABOVE GROUND EXISTING CONDITIONS. NOTIFY BATTELLE CONSTRUCTION MANAGER FOR RESOLUTION OF CONFLICTS.

UNDERGROUND SCANNING MUST BE COMPLETED BEFORE YOU DIG

SEE CONSTRUCTION SPEC S593062–SPCC03 DIVISION 1100.

DRAWING NO	DRAWING TITLE
WS9611	PROJECT LEGEND/ABBREV
WS9610	PROJECT TITLE/DWG LIST
S593062–SPCC03	CONSTRUCTION SPEC

REFERENCE DRAWINGS

NEXT USED ON

RR	QA BY / DATE	ENGR BY / DATE	CHK BY / DATE	REV BY / DATE	DESCRIPTION	REV NO

REVISIONS

DRAWN	KS KOSCHIK	DATE 11/15/11
CHECKED		
ENGR	DK DA KOONTZ	1/18/13
APVD		
OTHER		
OTHER		
APVD FOR IMPLEMENTATION BY	NA ON WORKSHEET	

U. S. DEPARTMENT OF ENERGY
PACIFIC NORTHWEST SITE OFFICE

Pacific Northwest Division — Battelle — Richland, Washington 99352

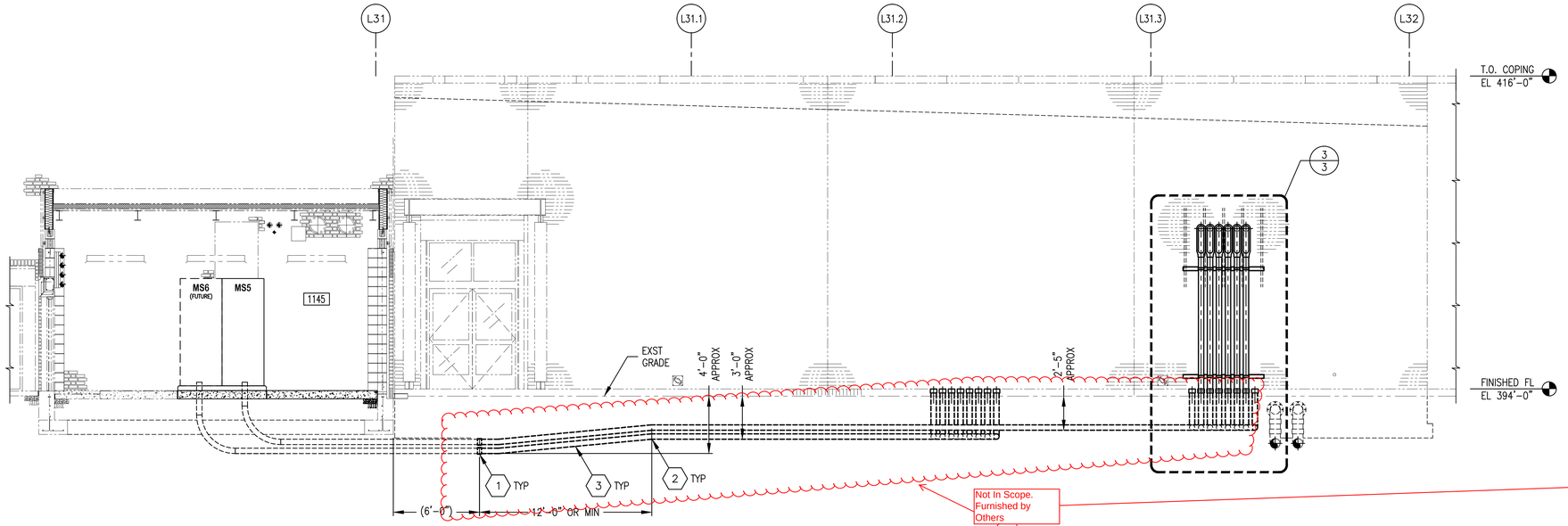
CIVIL
SOUTH POWER FEED PARTIAL SITE PLAN

PROJ TITLE: HPCS–4 POWER & COOLING

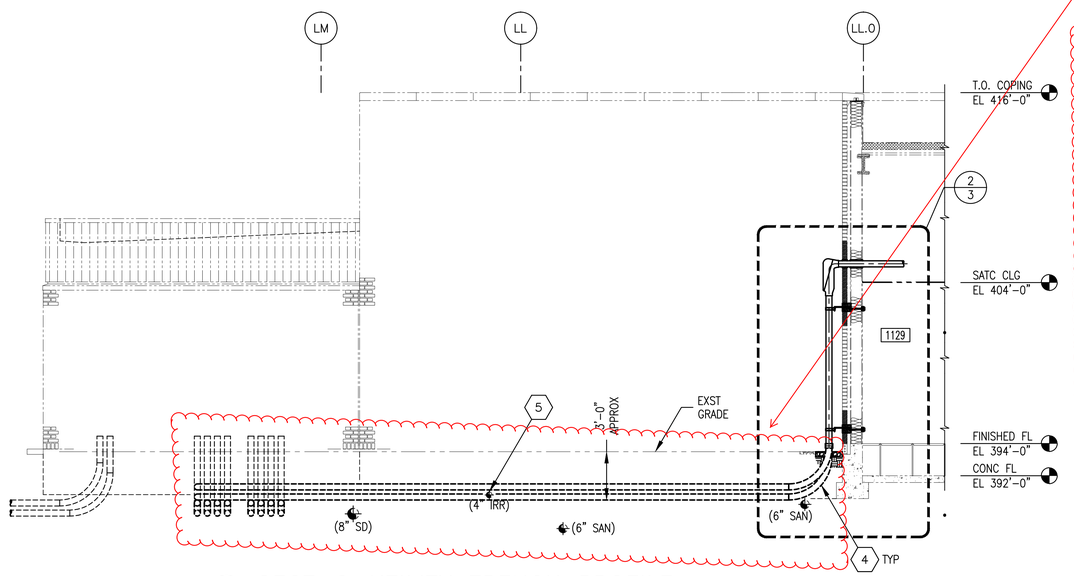
SIZE	INDEX NO	BLDG NO	DWG NO	REV NO
F	0107 7301	EMSL	WS9620	0

SCALE SHOWN — SHEET 1 OF 3

Z0000513–R10–5/07

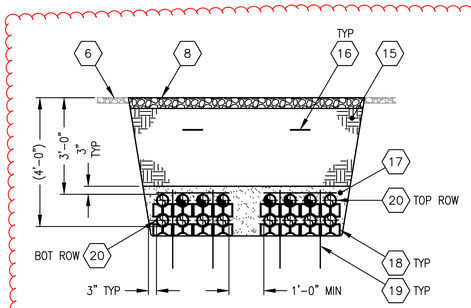


A 1 SECT @ UTILITY TRENCH PROFILE
SCALE: 1/4" = 1'-0"



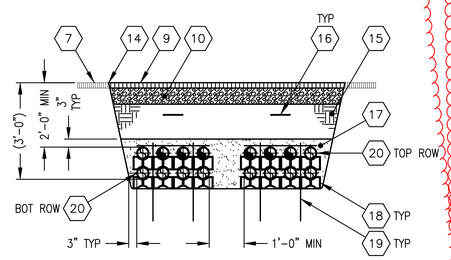
B 1 SECT @ UTILITY TRENCH PROFILE
SCALE: 1/4" = 1'-0"

Not In Scope. Furnished by Others



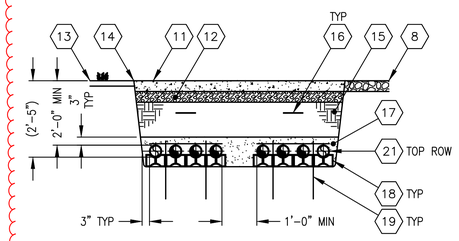
(ROCK, SIM @ GRAVEL/GRASS)
(ø4" 2x4 STACK)

C 1 SECT @ TRENCH
SCALE: 1/2" = 1'-0"



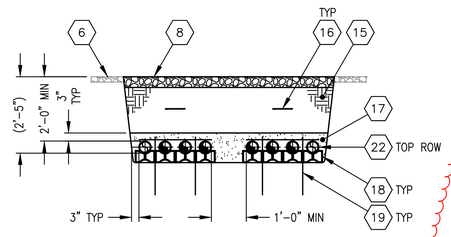
(ASPHALT WALKWAY)
(ø4" 2x4 STACK)

D 1 SECT @ TRENCH
SCALE: 1/2" = 1'-0"



(CONC WALKWAY)
(ø4" 1x4 STACK)

E 1 SECT @ TRENCH
SCALE: 1/2" = 1'-0"



(ROCK)
(ø4" 1x8 STACK)

F 3 SECT @ TRENCH
SCALE: 1/2" = 1'-0"

SHEET NOTES

1. REMOVE EXISTING CAP AND EXTEND (16) ø4" PVC CONDUITS.
2. CONTOUR TRENCH BOTTOM TO ALLOW FOR A GRADUAL, EVEN BEND IN CONDUITS AT CHANGE IN ELEVATION (FIELD ROUTE).
3. SLOPE CONDUIT AS REQD (FIELD ROUTE).
4. 2'-6" CONDUIT RADIUS.
5. EXISTING 4" PVC IRRIGATION LINE TO BE MODOFIED, SEE PLAN AND NOTES ON SH 1.
6. EXISTING LANDSCAPE ROCK, GRAVEL OR GRASS.
7. EXISTING ASPHALT WALKWAY.
8. 4" THICK LAYER OF LANDSCAPE ROCK OR GRAVEL TO MATCH EXISTING. PROVIDE NEW SOD AT GRASS LOCATIONS.
9. 2" THICK ASPHALT CONCRETE PAVING AT WALKWAY.
10. 6" THICK LAYER OF COMPACTED TOP COURSE MATERIAL.
11. 4" THICK CONCRETE AT WALKWAY.
12. 4" THICK LAYER OF COMPACTED BASE COURSE MATERIAL.
13. GRASS SOD REPAIR.
14. SAWCUT EXISTING ASPHALT OR CONCRETE WALKWAY AT TRENCH LOCATIONS. UPON COMPLETION OF CONDUIT INSTALLATION REPAIR TO MATCH EXISTING SURFACE.
15. BACKFILL WITH NATIVE SOIL AND COMPACT. AT GRASS LOCATIONS, REMOVE ALL ROCKS LARGER THAN 1" IN THE TOP 1'-0" OF FILL
16. DETECTABLE DIRECT BURY MARKER TAPE PLACED 1'-0" BELOW GRADE OVER CONDUIT.
17. PROVIDE CONTINUOUS CDF BEDDING FOR CONDUIT DUCT BANK.
18. DUCT SPACER, 7 1/2" OC SPACING.
19. ANCHOR AS NEEDED TO MAINTAIN POSITION DURING BACKFILLING.
20. (8) ø4" PVC CONDUITS, 7 1/2" OC SPACING, 2x4 STACK. NOTE CONDUIT SYMBOL, SOLID = CONDUCTORS, EMPTY = SPARES.
21. (8) ø4" PVC CONDUITS, 7 1/2" OC SPACING, 1x4 STACK, 2 PLACES. NOTE CONDUIT SYMBOL, SOLID = CONDUCTORS, EMPTY = SPARES.
22. (8) ø4" PVC CONDUITS, 7 1/2" OC SPACING, 1x8 STACK. NOTE CONDUIT SYMBOL, SOLID = CONDUCTORS, EMPTY = SPARES.

RELEASE
01-18-13
DATE
JMK

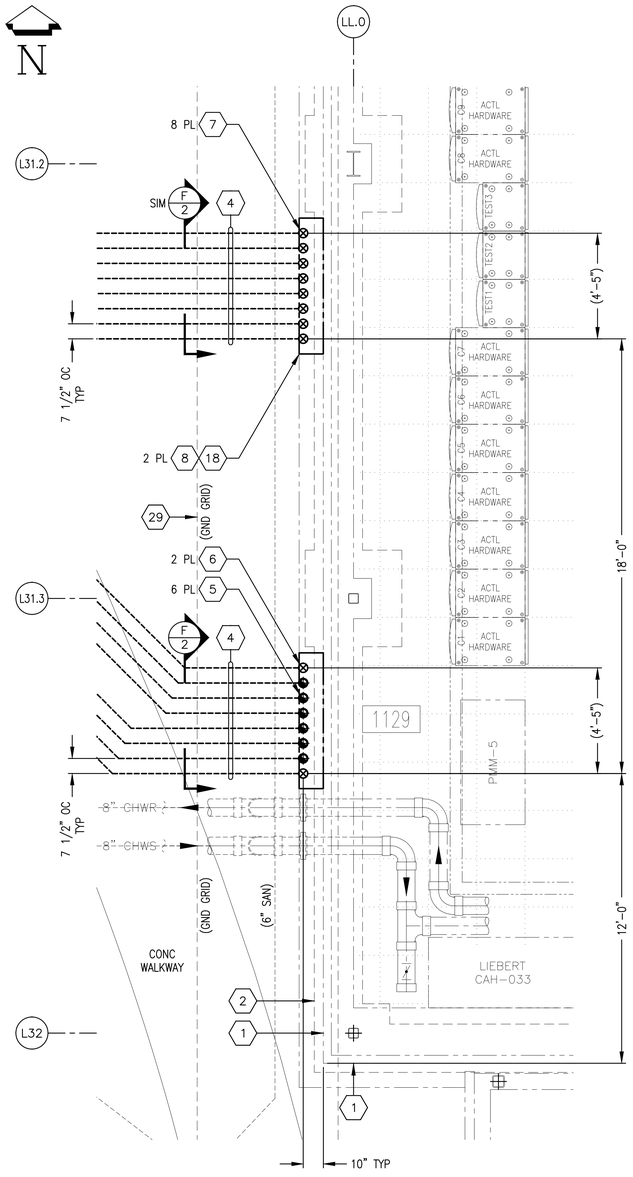
EDP # S593062-EDP03

DRAWING NO	DRAWING TITLE
REFERENCE DRAWINGS	
NEXT USED ON	

RR	QA BY / DATE	ENGR BY / DATE	CHK BY / DATE	REV BY / DATE	DESCRIPTION	REV NO
REVISIONS						

DRAWN KS KOSCHIK	DATE 11/15/11	U. S. DEPARTMENT OF ENERGY PACIFIC NORTHWEST SITE OFFICE
CHECKED		Pacific Northwest Division — Battelle — Richland, Washington 99352
ENGR DK DA KOONTZ	1/18/13	CIVIL SOUTH POWER FEED PROFILE/TRENCH SECT
APVD		PROJ TITLE: HPCS-4 POWER & COOLING
OTHER		SIZE F; INDEX NO 0107 7301; BLDG NO EMSL; DWG NO WS9620; REV NO 0; SCALE SHOWN; SHEET 2 OF 3
OTHER		
APVD FOR IMPLEMENTATION BY NA ON WORKSHEET		

Z0000513-R10-5/07

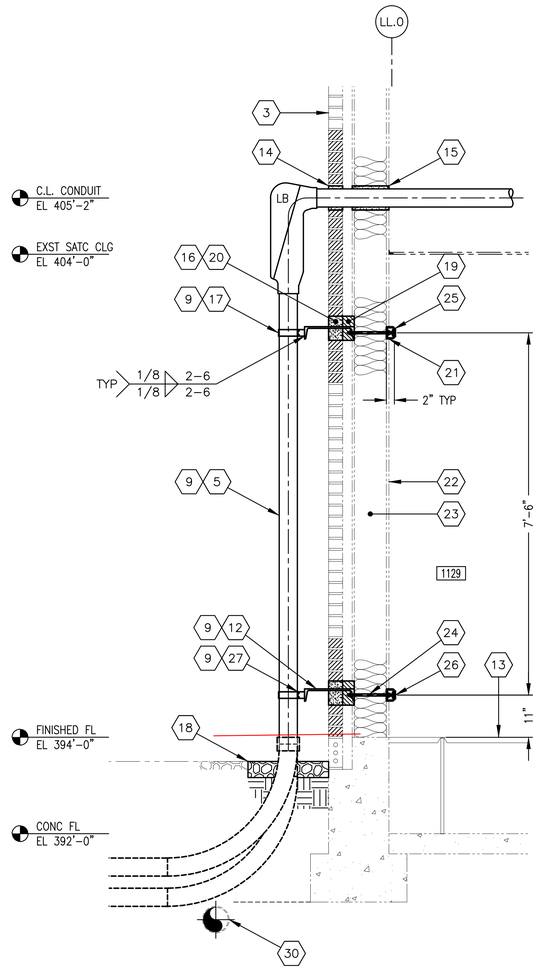


1 / 1 DETAIL @ ENLARGED SITE PLAN

3/8" = 1'-0"

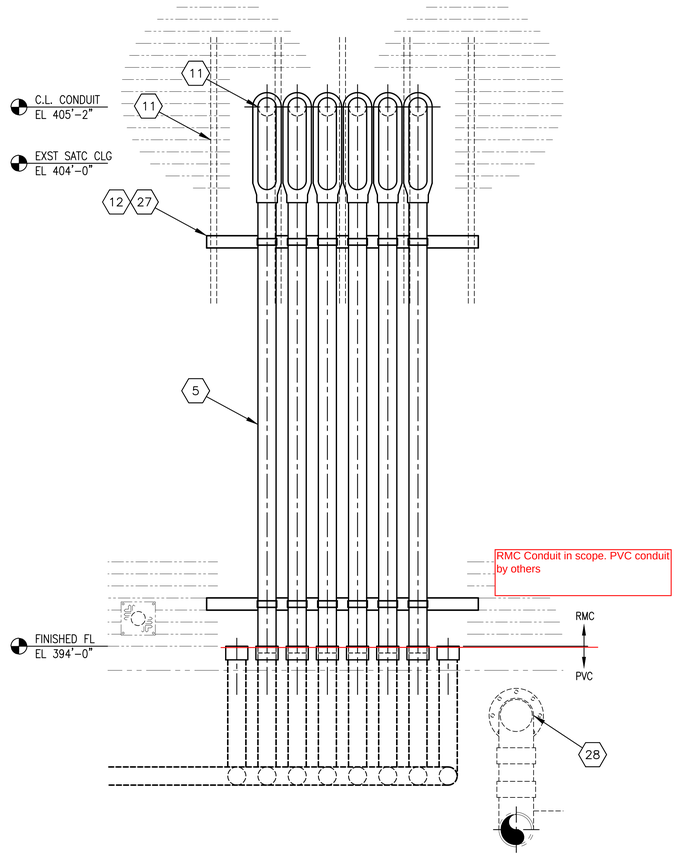
0' 2' 4' 8'

SCALE FEET



2 / 2 DETAIL @ ENLARGED SECTION

SCALE: 3/4" = 1'-0"



3 / 2 DETAIL @ ENLARGED ELEVATION

SCALE: 3/4" = 1'-0"

SHEET NOTES

1. EXISTING FACE OF MASONRY AND STEM WALL BELOW.
2. EXISTING FACE OF FOOTING BELOW.
3. EXISTING BRICK VENEER EXTERIOR WALL.
4. (8) ø4" PVC CONDUITS TO 6" ABOVE GRADE.
5. (6) ø4" RMC CONDUITS ROUTED UP WALL.
6. EXTEND CONDUITS 6" ABOVE GRADE AND PROVIDE PVC CAP, NON-GLUED (TYP 2 PL).
7. EXTEND CONDUITS 6" ABOVE GRADE AND PROVIDE PVC CAP, NON-GLUED (TYP 8 PL).
8. REMOVE SECTION OF EXISTING CONCRETE MOW STRIP AS CONDUIT EXTENDS ABOVE GRADE. PROVIDE NEW LAYER OF LANDSCAPE ROCK SIMILAR TO EXISTING AFTER BACKFILLING CONDUITS (TYP 2 PL).
9. ALL EXPOSED SURFACES OF CONDUIT, STRUCTURAL SUPPORTS, COMPONENTS AND FITTINGS TO BE PAINTED. SEE ARCHITECTURAL SPECIFICATIONS FOR PAINT AND COLOR (TYP).
10. EXISTING COMPUTER RM RAISED FLOOR.
11. EXISTING WALL STUDS AT 16" OC – LOCATE CONDUITS TO CLEAR STUDS PRIOR TO CORING BRICK VENEER (TYP 6 PL).
12. C12 x 20.7 x LENGTH TO SPAN ACROSS STUD ADJACENT EACH SIDE OF CONDUIT BANK (TYP 2 PL).
13. EXISTING RAISED FLOOR TILE SYSTEM.
14. PROVIDE FOAM BACKER ROD AND POLYSULFIDE SEALANT AROUND CONDUIT. SEALANT COLOR TO MATCH BRICK AS CLOSELY AS POSSIBLE (TYP).
15. PACK ANNULAR SPACE AROUND CONDUIT WITH INSULATION (TYP).
16. REMOVE BRICK VENEER AND SHEATHING AS NEEDED TO CLEAR NEW C12 (TYP).
17. CONDUIT CLAMP (TYP)
18. PROVIDE LANDSCAPE ROCK AS NEEDED TO MATCH EXISTING.
19. PROVIDE DAMMING MATERIAL AS NEEDED TO ALLOW FOR GROUTING AROUND C12 (TYP).
20. GROUT CAVITY SOLID (TYP).
21. TRIM GWB AND FINSH AROUND TUBING FOR A TIGHT FIT (TYP).
22. EXISTING 8" METAL STUDS @ 16" OC.
23. EXISTING 5/8" GWB.
24. ø3/8" A307 THREADED ROD WITH WASHERS AND BOLTS @ EACH STUD. TYP @ EACH END OF C12 AND EACH INTERMEDIATE STUD (TYP).
25. HSS 3 x 2 x 1/4" x LENGTH TO MATCH C12. PROVIDE FULLY WELDED 1/4" END CAP PLATES, GROUND SMOOTH, AND PAINTED TO MATCH WALL COLOR (TYP).
26. PROVIDE 1 1/2" HOLES IN HSS AT EACH ROD LOCATION FOR INSTALLATION. PROVIDE HORIZONTAL SLOTTED HOLES FOR ROD AS NEEDED TO FACILITATE INSTALLATION. PROVIDE 1 1/2" FLUSH PLASTIC PLUG AT EACH HOLE, PAINTED TO MATCH WALL COLOR (TYP).
27. PROVIDE FRAMING CHANNEL X LENGTH AS NEEDED FOR ATTACHMENT OF CONDUITS (TYP).
28. EXISTING 6" CHWS/CHWR PIPE PENETRATION INTO BLDG.
29. EXISTING GROUND GRID AROUND PERIMETER OF BUILDING, HAS (2) EACH PARALLEL #2/0, 6'-0" APART APPROXIMATELY 2'-0" BELOW GRADE. AVOID DAMAGE TO GRID AS MUCH AS POSSIBLE. IF IMPACTED DURING EXCAVATION, REPAIR GRID PER GENERAL REQUIREMENTS OR DIVISION 1 SPECIFICATIONS.
30. EXISTING 6" SANITARY SEWER LINE APPROXIMATE DEPTH SHOWN (FIELD VERIFY), AVOID IMPACT DURING EXCAVATION AND CONDUIT INSTALLATION.

RELEASE 01-18-13 DATE JMK

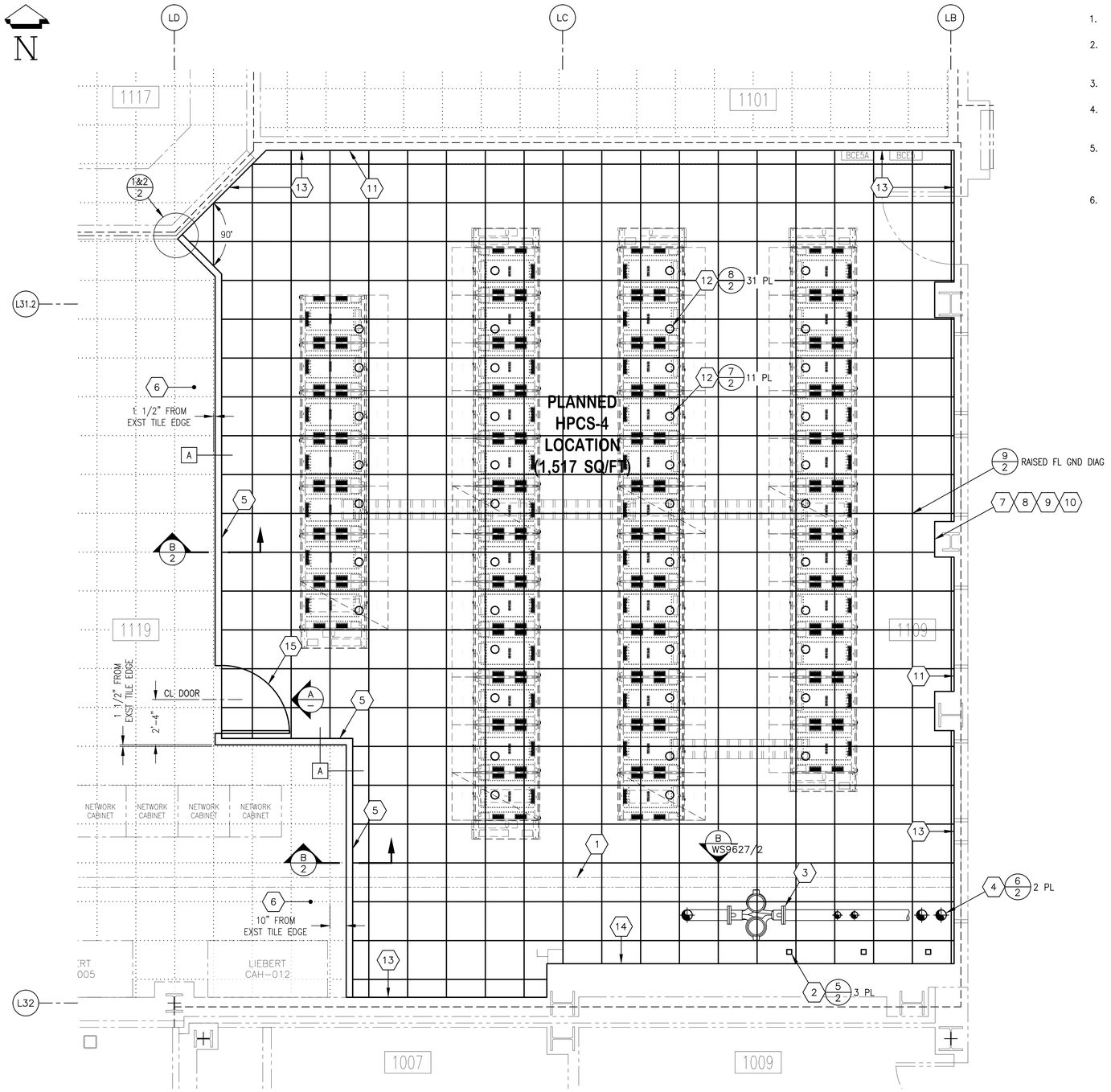
EDP # S593062-EDP03

DRAWING NO	DRAWING TITLE
REFERENCE DRAWINGS	
NEXT USED ON	

RR	QA BY / DATE	ENGR BY / DATE	CHK BY / DATE	REV BY / DATE	DESCRIPTION	REV NO
REVISIONS						

DRAWN KS KOSCHIK	DATE 11/15/11	U. S. DEPARTMENT OF ENERGY PACIFIC NORTHWEST SITE OFFICE	
CHECKED		Pacific Northwest Division Battelle Richland, Washington 99352	
ENGR DK DA KOONTZ	1/18/13	CIVIL SOUTH POWER FEED ENLARGED DETAILS	
APVD		PROJ TITLE HPCS-4 POWER & COOLING	
OTHER		SIZE F / INDEX NO 0107 7301 / BLDG NO EMSL / DWG NO WS9620 / REV NO 0	
OTHER		SCALE SHOWN / SHEET 3 OF 3	
APVD FOR IMPLEMENTATION BY NA ON WORKSHEET			

Z0000513-R10-5/07



COMPUTER RM PARTIAL PLAN – NEW RAISED FLOOR

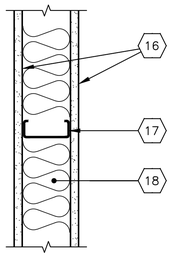
3/8" = 1'–0" SCALE: 0' 2' 4' 8' FEET

NOTE: ALL COMPUTER CABINET EQUIPMENT NOT SHOWN.

GENERAL NOTES

(UNLESS OTHERWISE SPECIFIED)

1. DIMENSIONS ARE IN FEET AND INCHES UNLESS OTHERWISE SPECIFIED.
2. FIELD VERIFY DIMENSIONS AND REPORT DISCREPANCIES WITH FIELD CONDITIONS TO BATTELLE CONSTRUCTION MANAGER PRIOR TO ANY CONSTRUCTION.
3. WORK SHALL BE COORDINATED WITH THE BATTELLE CONSTRUCTION MANAGER.
4. SURFACES DAMAGED DURING CONSTRUCTION SHALL BE REPAIRED TO MATCH CONDITION OF EXISTING.
5. NOT ALL SYMBOLS SHOWN IN LEGEND OR ABBREVIATIONS IN LIST ARE USED ON PROJECT DRAWINGS. ADDITIONAL ABBREVIATIONS (NOT SHOWN) ARE IN ACCORDANCE WITH ASME Y14.38–1999. SEE WORKSHEET WS9611.
6. PENETRATIONS IN FIRE BARRIERS MUST BE RESEALED WITH EITHER A TEMPORARY FIRESTOP PRODUCT (IF PENETRATION IS TO BE REUSED) OR PERMANENT FIRESTOP SEAL. EXISTING WALLS IN THE PROJECT AREA OF RM 1109 ARE 1–HOUR RATED FIRE BARRIERS, CAUTION SHOULD BE EXERCISED TO PREVENT DAMAGE TO FIRE BARRIERS. REPAIR DAMAGED AREAS IN ACCORDANCE WITH REQUIRED STANDARDS AND UL LISTED DETAILS.

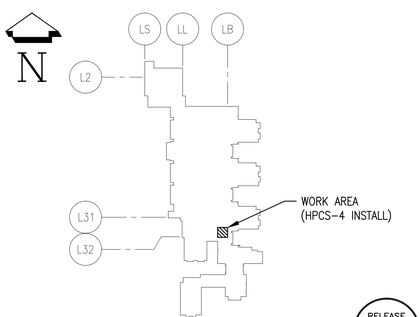


A WALL TYPE "A"
SCALE: 3" = 1'–0"
NOTE: NOT FIRE–RATED.

A DOOR ELEVATION
SCALE: 1/2" = 1'–0"

SHEET NOTES

1. EXST 6x6 CONCRETE CURB BELOW FLOOR.
2. HSS 3x3 PIPING SUPPORT, TYPICAL 3 LOCATIONS PAINTED DARK GRAY IN COLOR. SEE MECH WKSH WS9628.
3. MECHANICAL PIPING. SEE MECH WKSH WS9627.
4. 8"ø PENETRATION FOR 6"ø PIPE, TYIPCAL 2 LOCATIONS. SEE MECH WKSH WS9627.
5. PROVIDE BARRIER FROM GALV STEEL ANGLE BELOW WALL, ANCHORED AND SEALED TO FLOOR. SEAL AND COPE AROUND OBSTRUCTIONS AS REQD TO FORM WATER–TIGHT SEAL. THIS ISOLATION BARRIER SHALL BE INSTALLED AS LEAK DETECTION DAM FOR HPCS–4.
6. EXISTING RAISED FLOOR TILE SYSTEM.
7. REINSTALL RAISED FLOOR TILE SYSTEM IN ORIGINAL LOCATION PER MANUFACTURERS WRITTEN INSTALLATION INSTRUCTIONS. ALL TILES SHALL BE SOLID. CONTRACTOR SHALL REINSTALL ALL EXISTING SOLID (UNDAMAGED WITHOUT PENETRATIONS) TILES. CONTRACTOR TO PROCURE AND INSTALL NEW SOLID TILES AND UNDERSTRUCTURE AS NECESSARY TO COMPLETE THE INSTALLATION INCLUDING INFILL AT AREAS OF REMOVED LIEBERT UNITS. IN ADDITION, THE CONTRACTOR SHALL SUPPLY (10) SPARE FLOOR TILES AND ALL ASSOCIATED UNDERSTRUCTURE FOR COMPLETE INSTALLATION TO BATTELLE CONSTRUCTION MANAGER. NOTE: THE EXISTING FLOOR IS CONCORE 1000, NEVAMAR MR 6001 GRAY MATRIX PLASTIC LAMINATE WITH TOP SET TRIM, BOLTED STRINGER UNDERSTRUCTURE, BY TATE ACCESS FLOORS. RECONNECT GROUNDING GRID AS NECESSARY. SEE SHEET 2.
8. FLOOR TILES SHALL BE CUT TO FIT SNUG, TRUE AND SQUARE AROUND ALL NECESSARY OBSTRUCTIONS AND RM PERIMETER. CUT PER MANUFACTURERS WRITTEN INSTRUCTIONS.
9. VERTICAL PEDESTAL SUPPORTS SHALL BE ELECTRICALLY GROUNDED WITH COPPER WIRE AND LUGS, TO MATCH EXISTING, SEE DETAIL 9 ON SHEET 2.
10. REPAIR OR REPLACE EXISTING WALLS IN THE AREAS ABOVE THE FLOOR AND BELOW THE SATC WHERE DAMAGED OR WHERE CONDUIT SUPPORTS WERE REMOVED, TO MATCH EXISTING.
11. REPAIR FIRE WALL PENETRATIONS WITH A FIRESTOP SYSTEM, TO MATCH EXISTING.
12. 5"ø PENETRATIONS WITH PLASTIC ACCESS FLOOR GROMMET SLEEVES IN RAISED FLOOR TILE TO ACCOMMODATE COMPUTER PIPING, TYPICAL AT 42 LOCATIONS. SEE DETAILS 7 AND 8 ON SHEET 2. COMPUTER RACK LAYOUT SHOWN IS DIAGRAMMATIC AND MAY CHANGE SLIGHTLY. FINAL LAYOUT SHALL BE COORDINATED WITH COMPUTER VENDOR AND FIELD VERIFIED WITH BATTELLE CONSTRUCTION MANAGER.
13. PATCH WALLS AS REQD. PAINT, TO MATCH, "EMSL WHITE" UNO.
14. PATCH WALLS AS REQD. PAINT ACCENT WALL, LIGHT GRAY IN COLOR.
15. INSTALL 3'–6" x 8'–0" HOLLOW METAL DOOR AND FRAME, PAINTED. INSTALL HARDWARE.
16. PRE–FINISHED GYPSUM BOARD.
17. 400S 150–33 METAL STUDS AT 16" O.C.
18. THERMAL INSULATION.
19. 30" WIDE x 36" HEIGHT LITE FROM 1/4"THICK TEMPERED GLASS.
20. LITE KIT, 20 GAGE STEEL, SIMILAR TO ANEMOSTAT LO–PRO, PAINTED TO MATCH DOOR.



KEY PLAN
SCALE: NONE

RELEASE 01–18–13 DATE JMK

EDP # S593062–EDP03

DRAWN	DATE
KS KOSCHIK	11/15/11
CHECKED	
ENGR GCT	
GC TURPEN	18 JAN 13
APVD	
OTHER	
OTHER	
APVD FOR IMPLEMENTATION BY	
NA ON WORKSHEET	

U. S. DEPARTMENT OF ENERGY
PACIFIC NORTHWEST SITE OFFICE

Pacific Northwest Division — Battelle — Richland, Washington 99352

ARCHITECTURAL RAISED FL & PARTITION RM 1109 PARTIAL PLAN

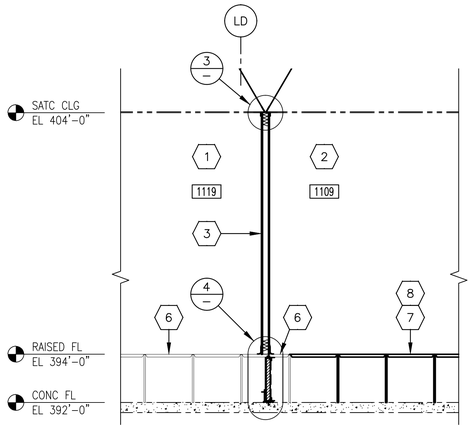
PROJ TITLE: HPCS–4 POWER & COOLING

SIZE	INDEX NO	BLDG NO	DWG NO	REV NO
F	0800	EMSL	WS9623	0

SCALE SHOWN — SHEET 1 OF 2

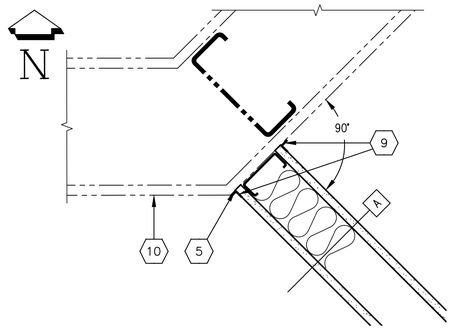
REFERENCE DRAWINGS	
DRAWING NO	DRAWING TITLE
WS9611	PROJECT LEGEND/ABBREV
WS9610	PROJECT TITLE/DWG LIST
S593062–SPCC03	CONSTRUCTION SPEC
NEXT USED ON	

REVISIONS						
	QA BY / DATE	ENGR BY / DATE	CHK BY / DATE	REV BY / DATE	DESCRIPTION	REV NO
RR						

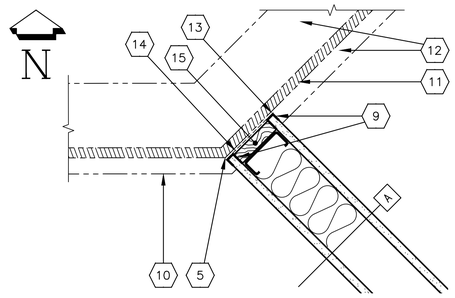


B/1 SECTION
SCALE: 3/8" = 1'-0"

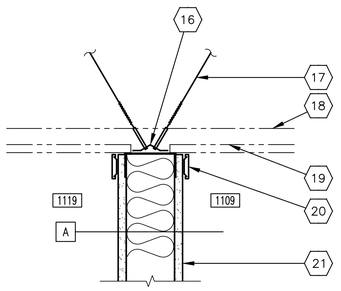
NOTE: ALL EXISTING BELOW FLOOR DEVICES OR OBSTRUCTIONS NOT SHOWN FOR CLARITY.



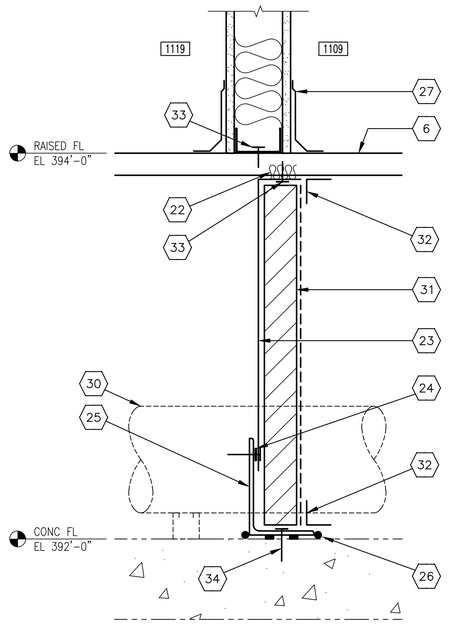
1/1 WALL DETAIL
SCALE: 3" = 1'-0"



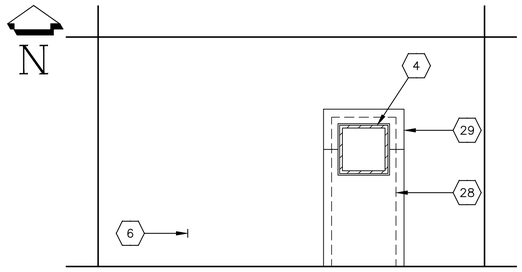
2/1 WALL DETAIL
SCALE: 3" = 1'-0"



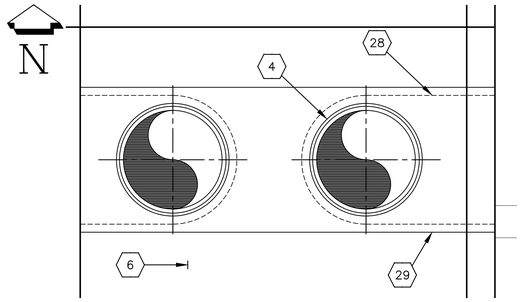
3/– WALL DETAIL
SCALE: 3" = 1'-0"



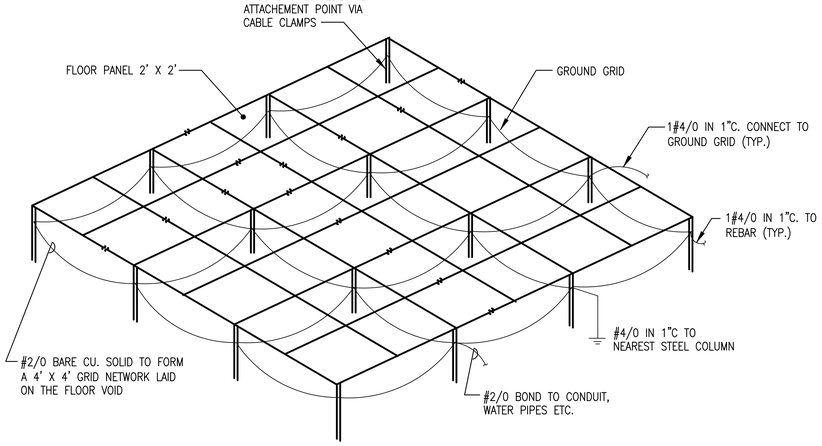
4/– WALL DETAIL
SCALE: 3" = 1'-0"



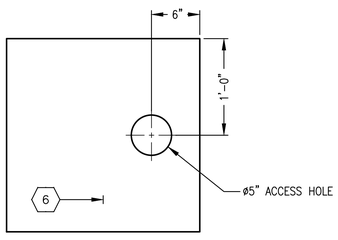
5/1 COLUMN PENETRATION DETAIL @ TILE
SCALE: 3" = 1'-0"



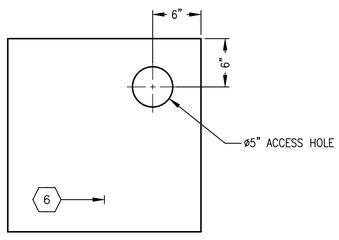
6/1 PIPE PENETRATION DETAIL @ TILE
SCALE: 3" = 1'-0"



9/1 RAISED FL GROUNDING DIAG
SCALE: NONE



7/1 HOLE PENETRATION DETAIL @ TILE
SCALE: 1 1/2" = 1'-0"



8/1 HOLE PENETRATION DETAIL @ TILE
SCALE: 1 1/2" = 1'-0"

SHEET NOTES

1. CLEAN SIDE OF COMPUTER RM. MINIMIZE DEBRIS DURING RELOCATION WORK.
2. CONSTRUCTION SIDE OF COMPUTER RM. INCLUDES DEMOLITION, RELOCATION OR NEW WORK. GUIDANCE TO CONTRACTOR – DUST OR DEBRIS THAT IS GENERATED DURING DEMOLITION OR CONSTRUCTION SHALL NOT BE INTRODUCED TO THE BELOW FLOOR AIR SYSTEM ON THE CLEAN SIDE OF COMPUTER RM.
3. INSTALL WALL.
4. STEEL STRUCTURE OR PIPE (TYPICAL). COORDINATE WITH MECHANICAL ELEMENTS.
5. ALIGN GWB WITH CORNER OF GLASS.
6. EXISTING RAISED FLOOR TILE SYSTEM.
7. REINSTALL RAISED FLOOR TILE SYSTEM IN ORIGINAL LOCATION.
8. ALL NEW FLOOR TILES SHALL BE CUT TO FIT SNUG, TRUE AND SQUARE AROUND ALL NECESSARY OBSTRUCTIONS AND RM PERIMETER. CUT PER MANUFACTURERS WRITTEN INSTRUCTIONS.
9. CORNER BEAD AND/OR "J" GYPSUM BEAD.
10. EXISTING WALL.
11. FACE OF EXISTING GLASS.
12. PAINTED GWB SILL.
13. SEALANT, TYPICAL BOTH SIDES.
14. 1/8" BLACK NEOPRENE RUBBER BETWEEN GLASS AND SPACER.
15. WOOD SPACER, FIELD FIT.
16. DRYWALL CLIP WITH #10 SELF DRILLING SCREWS, TYPICAL TOP OF WALL AND AT BOTTOM OF DECK
17. #9 WIRE SUPPORT AT 12'-0" C/C. ATTACH TO STRUCTURE AT 30°-60° ANGLE (TYP 2 WIRES).
18. SATC GRID BEYOND.
19. CUT SATC TILE AS REQUIRED TO RECEIVE SUPPORT.
20. SNAP ON TRIM.
21. NEW WALL.
22. SPRAY FOAM INSULATION TO FILL VOIDS.
23. 24 GA SHEET METAL, 1.5" RETURN AT TOP, 1.5 OVERLAP WITH 1" ELASTOMERIC JOINT TAPE AT SPLICES, SECURED AT 12" C/C TYPICAL.
24. 1" ELASTOMERIC JOINT TAPE.
25. 4" x 6" x 12 GAGE GALVANIZED STEEL ANGLE, SET IN 2 ROWS OF ELASTOMERIC SEALANT OR JOINT TAPE. COPE AND SEAL TO AND AROUND PIPING, CURB ETC WHERE OCCURS.
26. SEALANT.
27. RESILIENT BASE.
28. CUT ACCESS FLOOR TILE AROUND PIPE OR STEEL (TYPICAL).
29. 20 GAGE STAINLESS STEEL CLOSURE FROM 2 AND/OR 3 PIECES, ADHERE WITH SEALANT.
30. EXISTING PIPING BELOW FLOOR (SOUTH OF CONCRETE CURB) SHOWN FOR REF ONLY.
31. 2" THICK FRK FACED RIGID FIBERGLASS INSULATION BOARD (WITH FRK FACE AT 1109 SIDE) SIMILAR TO OWENS CORNING 705 SERIES. INSTALL WITH APPROVED ADHESIVE.
32. FOIL TAPE ALL JOINTS, (TYPICAL).
33. #12 SELF-DRILLING SCREW AT 16" OC (TYPICAL).
34. POWDER ACTUATED PIN AT 16" OC (TYPICAL).

RELEASE
01-18-13
DATE
JMK

EDP # S593062-EDP03

DRAWN	DATE
KS KOSCHIK	11/15/11
CHECKED	
ENGR GCT	
GC TURPEN	18 JAN 13
APVD	
OTHER	
OTHER	
APVD FOR IMPLEMENTATION BY	
NA ON WORKSHEET	

U. S. DEPARTMENT OF ENERGY
PACIFIC NORTHWEST SITE OFFICE
Pacific Northwest Division — Battelle — Richland, Washington 99352

ARCHITECTURAL RAISED FL & PARTITION RM 1109 DETAILS

PROJ TITLE: HPCS-4 POWER & COOLING

SIZE	INDEX NO	BLDG NO	DWG NO	REV NO
F	0800	EMSL	WS9623	0

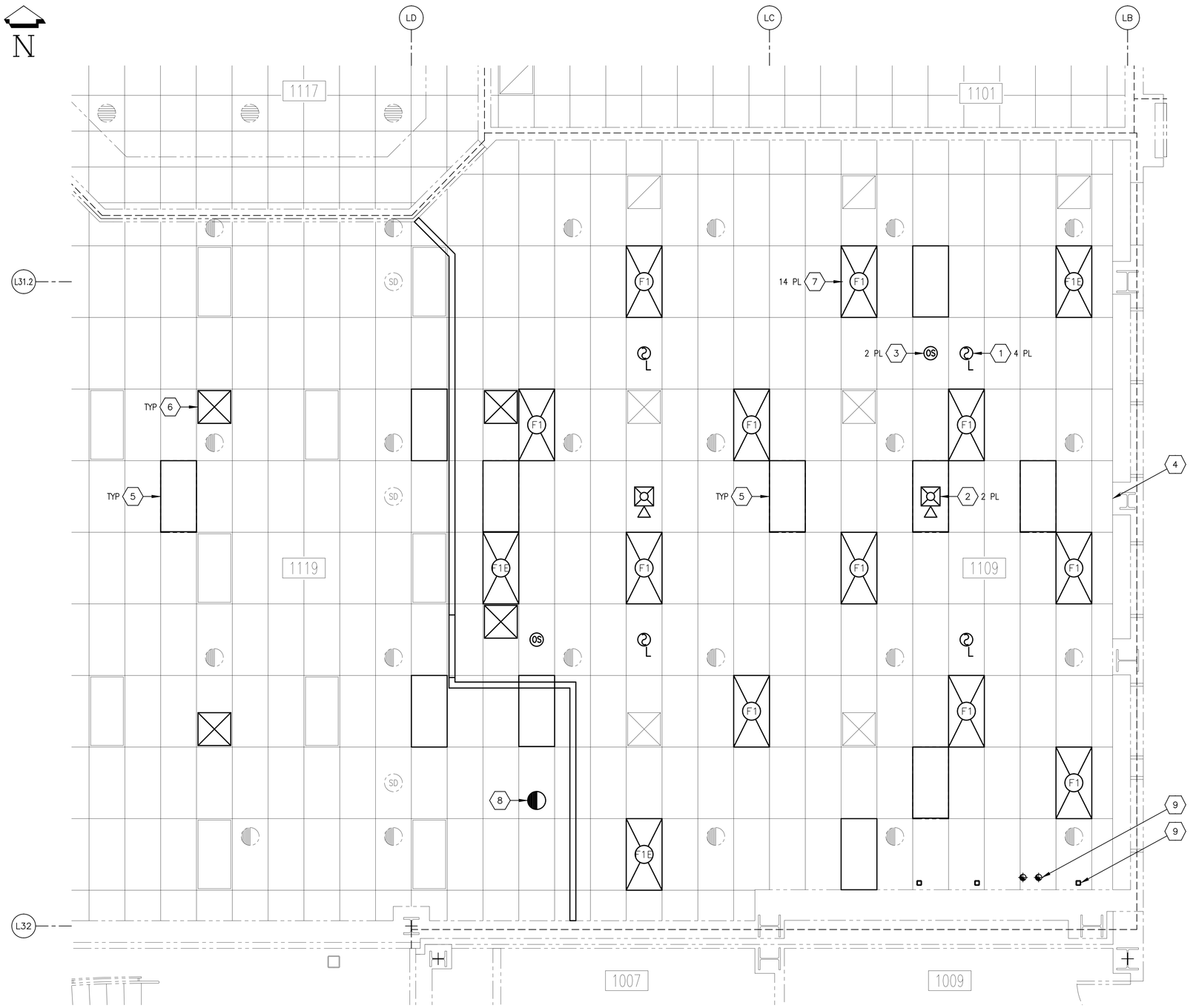
SCALE SHOWN — SHEET 2 OF 2

DRAWING NO	DRAWING TITLE
REFERENCE DRAWINGS	
NEXT USED ON	

RR	QA BY / DATE	ENGR BY / DATE	CHK BY / DATE	REV BY / DATE	DESCRIPTION	REV NO

REVISIONS

20000513-R10-5/07



COMPUTER RM PARTIAL PLAN – REFLECTED CEILING

3/8" = 1'–0" SCALE 0' 2' 4' 8' FEET

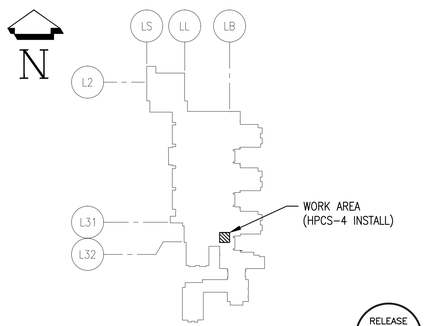
GENERAL NOTES

(UNLESS OTHERWISE SPECIFIED)

1. DIMENSIONS ARE IN FEET AND INCHES UNLESS OTHERWISE SPECIFIED.
2. FIELD VERIFY DIMENSIONS AND REPORT DISCREPANCIES WITH FIELD CONDITIONS TO BATTELLE CONSTRUCTION MANAGER PRIOR TO ANY CONSTRUCTION.
3. WORK SHALL BE COORDINATED WITH THE BATTELLE CONSTRUCTION MANAGER.
4. SURFACES DAMAGED DURING CONSTRUCTION SHALL BE REPAIRED TO MATCH CONDITION OF EXISTING.
5. NOT ALL SYMBOLS SHOWN IN LEGEND OR ABBREVIATIONS IN LIST ARE USED ON PROJECT DRAWINGS. ADDITIONAL ABBREVIATIONS (NOT SHOWN) ARE IN ACCORDANCE WITH ASME Y14.38–1999. SEE WORKSHEET WS9611.

SHEET NOTES

1. CEILING MOUNTED LASER SMOKE DETECTOR. SEE FIRE ALARM WKSH WS9635.
2. CEILING MOUNTED SPEAKER STROBES. SEE FIRE ALARM WKSH WS9635.
3. CEILING MOUNTED OCCUPANCY SENSOR. SEE ELEC LIGHTING WKSH WS9633.
4. EXISTING REFLECTED CEILING PLAN. TO FACILITATE THE INSTALLATION OF NEW MECHANICAL AND ELECTRICAL COMPONENTS A PORTION OF THE SUSPENDED ACOUSTICAL TILE CEILING SYSTEM WILL BE REQUIRED TO BE TEMPORARILY REMOVED AND REINSTALLED, INCLUDING LIGHTING, CONDUIT, HVAC GRILLES, SENSORS, DETECTORS, FIRE PROTECTION TRIMS, ETC. CONTRACTOR TO DETERMINE THE AMOUNT OF CEILING AREA TO BE WORKED AS NECESSARY. NOTE: CONTRACTOR OPTION TO REINSTALL OR REPLACE WITH NEW TO MATCH EXISTING, SEE SPECIFICATION.
5. PROVIDE 2x4 LAY–IN CEILING TILES IN LOCATIONS WHERE COMPONENT DEMOLITION OCCURED.
6. RELOCATED SUPPLY DIFFUSER LOCATIONS. SEE MECH WKSH WS9629/1.
7. NEW LIGHT FIXTURE LOCATIONS. SEE ELEC LIGHTING WKSH WS9633/1
8. RELOCATED FIRE SPRINKLER LOCATION. SEE FIRE MOD WKSH WS9637/1
9. PROVIDE ESCUTCHEON AND SEALANT AROUND STRUCTURAL MEMBERS AND/OR PIPING THRU SATC (TYP). SEE MECH WKSH WS9627 AND WS9628.



KEY PLAN

SCALE: NONE

RELEASE 01–18–13 DATE JMK

EDP # S593062–EDP03

DRAWN KS KOSCHIK	DATE 11/15/11	U. S. DEPARTMENT OF ENERGY PACIFIC NORTHWEST SITE OFFICE	
CHECKED		Pacific Northwest Division Battelle Richland, Washington 99352	
ENGR GCT GC TURPEN	18 JAN 13	ARCHITECTURAL REFLECTED CLG RM 1109 PARTIAL PLAN	
APVD		PROJ TITLE HPCS–4 POWER & COOLING	
OTHER		SIZE F / INDEX NO 0800 / BLDG NO EMSL / DWG NO WS9625 / REV NO 0	
OTHER		SCALE SHOWN / SHEET 1 OF 1	
APVD FOR IMPLEMENTATION BY NA ON WORKSHEET			

DRAWING NO	DRAWING TITLE
WS9611	PROJECT LEGEND/ABBREV
WS9600	PROJECT TITLE/DWG LIST
S593062–SPCC03	CONSTRUCTION SPEC

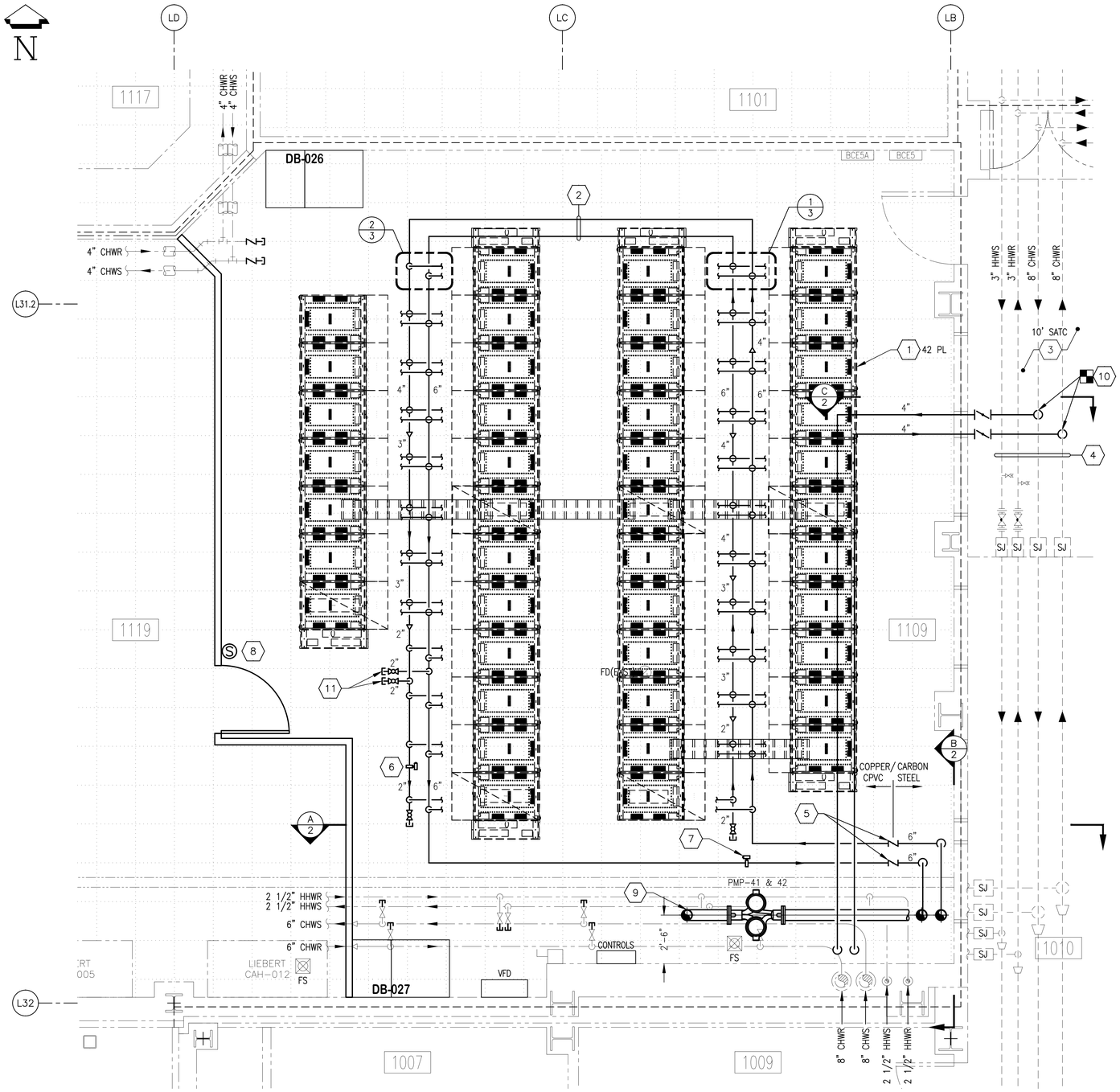
REFERENCE DRAWINGS

NEXT USED ON

RR	QA BY / DATE	ENGR BY / DATE	CHK BY / DATE	REV BY / DATE	DESCRIPTION	REV NO

REVISIONS

Z0000513–R10–5/07



COMPUTER RM PARTIAL PLAN – CHWS/CHWR

3/8" = 1'–0" SCALE 0' 2' 4' 8' FEET

NOTE: ALL EXISTING BELOW FLOOR DEVICES OR OBSTRUCTIONS NOT SHOWN.

SHEET NOTES

1. SERVERS AND CHILLER DOORS SHOWN FOR REF ONLY, ALL ITEMS ARE OFOI.
2. SUPPORT PIPING WITH 1 5/8" FRAMING CHANNEL AT 6'–0" OC (TYP). (B–LINE, UNISTRUT, OR APPROVED EQUAL)
3. CONNECT TO EXISTING CHWS/CHWR HEADER IN CORRIDOR 1010 WHERE SATC CEILING HEIGHT IS 10'–0" ABOVE FINISHED FLOOR.
4. EXISTING CHWS/CHWR & HHWS/HHWR PIPING HEADERS ABOVE CEILING SPACE, RUNNING NORTH–SOUTH ABOVE CORRIDOR 1010.
5. PROVIDE FLANGE CONNECTION AT TRANSITION FROM CPVC TO BLACK STEEL. METAL TO PLASTIC CONNECTIONS SHALL BE MADE USING A METAL TO FLANGE TO PLASTIC FLANGE WITH 1/8" THICK, 60 DUROMETER NEOPRENE GASKET.
6. DIFFERENTIAL PRESSURE TRANSMITTER.
7. FLOW METER, ONICON F–1211, INSTALL PER HOT TAP METHOD. CONNECT TO ALERTON CONTROL SYSTEM. PROVIDE 5 PIPE DIAMETERS DOWNSTREAM AND 20 PIPE DIAMETERS UPSTREAM OF STRAIT PIPE BETWEEN VALVE AND FLOW METER, SEE DETAIL 2 SHEET 4. FLOW METER RATED FOR CHILLED WATER WITH 35% PROPYLENE GLYCOL, SCH. 40 CPVC PIPE, FLOW RATE MAX OF 600 GPM, EXPECTED FLOW RATE OF 500 GPM, 0–10 V OUTPUT.
8. PROVIDE ALTERTON TEMPERATURE SENSOR WITH DIGITAL DISPLAY.
9. SOME PIPING ABOVE FLOOR NOT SHOW, SEE ELEVATION A SHEET 2.
10. CONNECT TO EXISTING CHILLED WATER SUPPLY AND RETURN MAINS WITH WET TAP. SEE SHEET 2 FOR ADDITIONAL INFORMATION.
11. 2" VALVE AND CAP.

GENERAL NOTES

(UNLESS OTHERWISE SPECIFIED)

1. DIMENSIONS ARE IN FEET AND INCHES UNLESS OTHERWISE SPECIFIED.
2. FIELD VERIFY DIMENSIONS AND REPORT DISCREPANCIES WITH FIELD CONDITIONS TO BATTELLE CONSTRUCTION MANAGER PRIOR TO ANY CONSTRUCTION.
3. WORK SHALL BE COORDINATED WITH THE BATTELLE CONSTRUCTION MANAGER.
4. SURFACES DAMAGED DURING CONSTRUCTION SHALL BE REPAIRED TO MATCH CONDITION OF EXISTING.
5. NOT ALL SYMBOLS SHOWN IN LEGEND OR ABBREVIATIONS IN LIST ARE USED ON PROJECT DRAWINGS. ADDITIONAL ABBREVIATIONS (NOT SHOWN) ARE IN ACCORDANCE WITH ASME Y14.38–1999. SEE WORKSHEET WS9611.
6. THE PIPING SHOWN ON THE DRAWINGS IS DIAGRAMMATIC IN NATURE AND DOES NOT NECESSARILY SHOW ALL REQUIRED FITTINGS AND/OR ACTUAL ROUTING. ALL OBSTRUCTIONS MAY NOT BE SHOWN ON DRAWINGS. PROVIDE ALL MATERIAL FOR A COMPLETE INSTALLATION.
7. TESTING ADJUSTING AND BALANCING BY BATTELLE
8. ROUTE AND POSITION PIPING, TUBING, CONDUIT, FRAMING CHANNEL AND PIPING SUPPORTS LEVEL AND PERPENDICULAR TO THE BUILDING STRUCTURE. ROUTING SHALL BE AS INDICATED ON THE DRAWINGS AND IN A CLEAN AND ORDERLY MANNER. COORDINATE WITH ARCHITECT / ENGINEER FOR ROUTING OF ITEMS NOT SHOWN. REFER TO ARCHITECTURAL PAINTING SPECIFICATION FOR COLORS AND FINISHES OF ITEMS INDICATED ABOVE. NOT ALL CONTROLS COMPONENTS ARE SHOWN.
9. NOT ALL CONTROL DEVICES ARE INDICATED FOR CLARITY. SEE CONTROLS SPECIFICATION AND SEQUENCE OF OPERATIONS FOR ADDITIONAL INFORMATION.
10. INSTALL PIPING SUPPORTS PRIOR TO INSTALLATION OF PIPING.

CENTRIFUGAL PUMP SCHEDULE

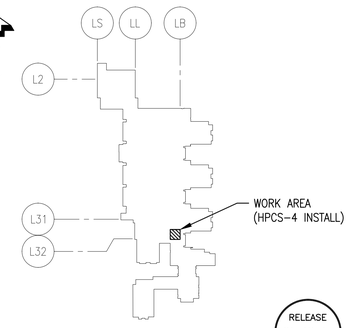
EQUIPMENT IDENTIFICATION NUMBER	MANUFACTURER & MODEL NO	SERVICE	TYPE	GPM	TOTAL HEAD (FT WC)	MAXIMUM PUMP RPM / IMPELLOR DIA.	MOTOR HP	ELECTRICAL DATA			PUMP OPERATING WEIGHT (LB)	PUMP EFFICIENCY	PUMP SIZE (IN)	NOTES
								VOLT	PHASE	HZ				
3020–PCHW–PMP–41 AND 3020–PCHW–PMP–42	ARMSTRONG 4302	PROCESS LOOP VFD DRIVEN	VERTICAL INLINE – DUAL ARM	550	60	3600 / 6.19	15	480	3	60	550	ASHRAE 90.1	6X6X6	REFER TO SPECIFICATION SECTION 200513 AND 232123 FOR ADDITIONAL INFORMATION

CONTROL VALVE SCHEDULE

EQUIPMENT IDENTIFICATION NUMBER	MANUFACTURER & MODEL NO	MEDIUM	FLOW (GPM)	Cv	SIZE (IN)	NORMAL POSITION	FAIL POSITION	ACTUATOR	ACTUATOR TYPE	VALVE TYPE	NOTES
3020–PCHW–FCV–001	BELIMO G680C	GLYCOL 35%	250	113.39	3"	OPEN	OPEN	NVF24–MFT–US	ECLECTIC 24V	GLOBE	–

AUTOMATIC FLOW CONTROL VALVE SCHEDULE

EQUIPMENT IDENTIFICATION NUMBER	MANUFACTURER & MODEL NO	UNIT SERVED	FLOW SETTING (GPM)	SPRING RANGE (PSI)	LINE SIZE (IN)	FEATURES
3020–PCHW–FCV–001	HAYS 2524	CHILLED DOORS	13	2–80	1"	PROVIDE WITH HANDLE, PRESSURE AND TEMPERATURE PORTS AND STAINLESS STEEL, TAG–CHAIN. TYPICAL OF 42 PROVIDE (3) SPARES



KEY PLAN

SCALE: NONE

RELEASE 01–18–13 DATE JMK

EDP # S593062–EDP03

DRAWN	DATE
KS KOSCHIK	11/15/11
CHECKED	
ENGR STEVE GOURLEY	1/18/13
SE GOURLEY	
APVD	
OTHER	
OTHER	
APVD FOR IMPLEMENTATION BY	
NA ON WORKSHEETS	

U. S. DEPARTMENT OF ENERGY
PACIFIC NORTHWEST SITE OFFICE

Pacific Northwest Division — Battelle — Richland, Washington 99352

MECHANICAL
CHWS/CHWR
LAB 1109 PARTIAL PLAN

PROJ TITLE: HPCS–4 POWER & COOLING

SIZE	INDEX NO	BLDG NO	DWG NO	REV NO
F	8516	EMSL	WS9627	0

SCALE SHOWN — SHEET 1 OF 3

DRAWING NO	DRAWING TITLE
WS9611	PROJECT LEGEND/ABBREV
WS9610	PROJECT TITLE/DWG LIST
S593062–SPCC03	CONSTRUCTION SPEC

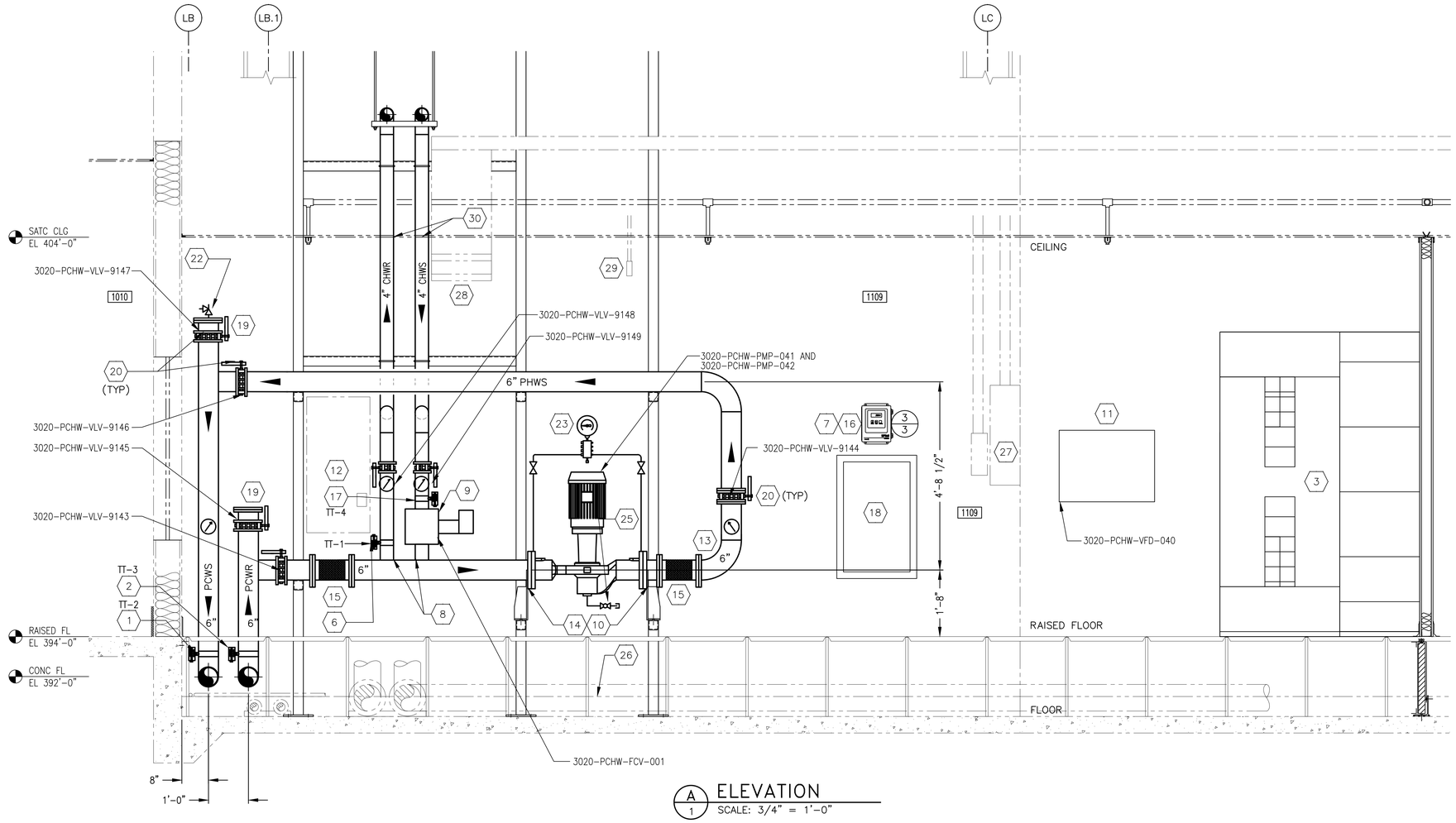
REFERENCE DRAWINGS

NEXT USED ON

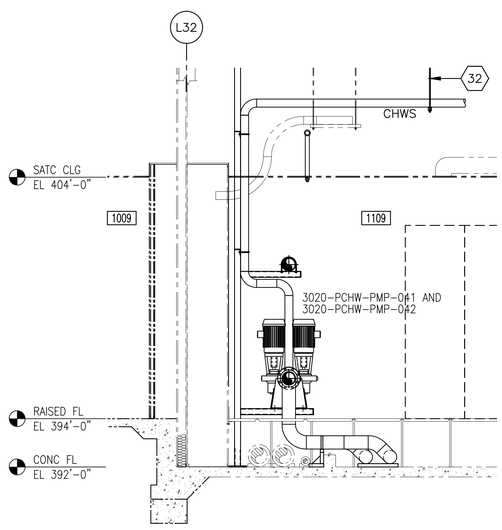
RR	QA BY / DATE	ENGR BY / DATE	CHK BY / DATE	REV BY / DATE	DESCRIPTION	REV NO

REVISIONS

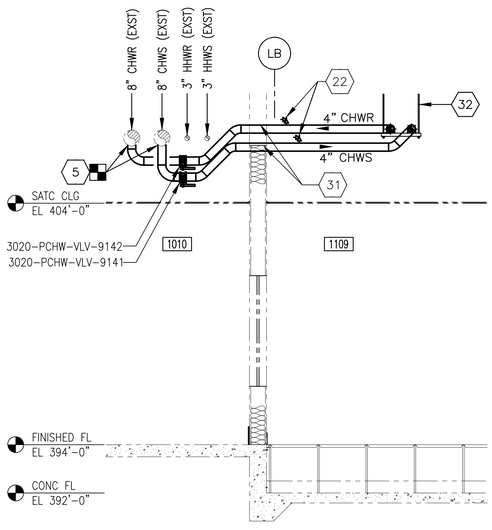
20000513–R10–5/07



A 1 ELEVATION
SCALE: 3/4" = 1'-0"



B 1 ELEVATION
SCALE: 3/8" = 1'-0"



C 1 ELEVATION
SCALE: 3/8" = 1'-0"

SHEET NOTES

1. PROVIDE PROCESS LOOP SUPPLY TEMPERATURE TRANSMITTER, TT-2.
2. PROVIDE PROCESS LOOP RETURN TEMPERATURE TRANSMITTER, TT-3.
3. SWITCH BOARD (SEE ELECTRICAL FOR ADDITIONAL INFORMATION).
4. PROVIDE 5 PIPE DIAMETERS DOWNSTREAM AND 20 PIPE DIAMETERS UPSTREAM OF STRAIT PIPE BETWEEN VALVE AND FLOW METER, SEE DETAIL 2 SHEET 4.
5. CONNECT TO EXISTING 8" CHWR PIPE WITH 4" WET TAP. DEMOLISH SHEET ROCK, PATCH AND REPAIR LAY-IN CEILING TO MATCH EXISTING AS REQUIRED FOR INSTALLATION OF WET TAPS, PIPING AND VALVES.
6. PROVIDE CHILLED WATER SUPPLY TEMPERATURE TRANSMITTER, TT-1.
7. PROVIDE ONICON SYSTEM-10-BAC, 24 VOLT POWER FEED FROM CONTROL TRANSFORMER. PROVIDE WITH F-1211 FLOW METER. FLOW METER RATED FOR CHILLED WATER WITH 35% PROPYLENE GLYCOL, SCH. 40 CARBON STEEL PIPE, FLOW RATE MAX OF 275 GPM, EXPECTED FLOW RATE OF 200 GPM, 0-10 V OUTPUT.
8. PROVIDE (6) PIPE DIAMETERS OF CONTINUOUS STRAIT PIPE UPSTREAM AND DOWN STREAM OF TEE.
9. 3" CONTROL VALVE
10. SEE STRUCTURAL DRAWINGS FOR PUMP SUPPORT DETAILS.
11. PROVIDE VFD, DANFOSS FC, 15 HP, PROVIDE WITH THREE INTERLOCK CONTACTOR, BACnet MS/TP COMMUNICATIONS, DC LINE REACTOR, CONTRACTOR MOTOR SELECTOR (DUAL MOTOR), START-UP ONSITE BY FACTORY REP AND 3-YEAR WARRANTY AND OWNER/OPEATOR TRAINING. CONNECT TO FMCS WITH BACnet MS/TP, SEE CONTROL DRAWINGS. THE FOLLOWING TESTS SHALL BE CARRIED OUT, DOCUMENTED & SUBMITTED TO CONSTRUCTION MANAGER:
    A. POLARITY/PHASE VERIFICATION AT MOTORS.
    B. VARIABLE FREQUENCY DRIVES TO BE TESTED IN ACCORDANCE WITH NETA ATS-2007 OR OTHER ENGINEER APPROVED METHOD.
12. EXISTING CHWS/CHWR ACCESS PANEL, DO NOT BLOCK.
13. PROVIDE LONG RADIUS PIPE ELBOW.
14. SUPPORT PUMP WITH VIBRO ACOUSTICS SIPS-6 (6" PIPE), SIPS-8 (8" PIPE). SEE STRUCTURAL DRAWINGS FOR ADDITIONAL DETAIL.
15. METRAFLEX SLP FLEXIBLE METAL HOSE PUMP CONNECTOR.
16. PROVIDE AND INSTALL BTU METER (TT-1) PER DETAIL 3, SHEET 3.
17. PROVIDE TEMPERATURE TRANSMITTER (TT-4) WITH THERMOWELL IN EXST CHWS & CHWR PIPING, SEE DETAIL 1 SHEET 3.
18. PROVIDE 24"W X 36"H FMCS CONTROLS ENCLOSURE WITH WINDOW, REFER TO PAINTING SPECIFICATION FOR COLOR, SEE CONTROL DRAWINGS FOR INSTALLATION / CONNECTION DETAILS OF CONTROLLERS.
19. PROVIDE CAP FOR FUTURE CONNECTION.
20. PROVIDE BUTTERFLY ISOLATION VALVE, SEE SPECIFICATION SECTION 200523.
21. PROVIDE BI-METALIC THERMOMETER, SEE SPECIFICATION SECTION 200519(2.2).
22. MANUAL AIR VENT.
23. PROVIDE STAINLESS STEEL MULTIPORT PRESSURE INDICATOR (4-PORT).
24. PROVIDE 1/4" O.D. STAINLESS STEEL TUBING W/ COMPRESSION FITTINGS (TYP).
25. PROVIDE BALL VALVE, HOSE BIBB AND CAP, TYPICAL. MATCH CONNECTION SIZE ON DEVICE.
26. EXISTING 6"x6" CONCRETE CURB.
27. EXISTING DISCONNECT, 3" CONDUIT AND LB.
28. EXISTING CABLE TRAY.
29. EXISTING CONDUIT AND LB.
30. PROVIDE STAINLESS STEEL ESCUTCHEON AT CEILING PENETRATION.
31. WHERE PIPING PENETRATE THE FIRE RATED WALL, FLOOR OR CEILING, THE OPENING AROUND THE PIPING SHALL BE SEALED WITH CAULK CP 25 OR FIRE BARRIER MOLDABLE PUTTY AS MANUFACTURED BY 3M. PENETRATION TO BE A UL LISTED FIRE STOP SYSTEM ASSEMBLY IN THE UL FIRE RESISTANCE DIRECTORY. APPROVAL TO BE BY PNNL FIRE PROTECTION ENGINEER.
32. SUPPORT PIPING FROM ROOF DECKING PER SPEC. SEE MECH PIPING WKSH WS9627.

RELEASE
01-18-13
DATE
JMK

EDP # S593062-EDP03

DRAWN	DATE
KS KOSCHIK	11/15/11
CHECKED	
ENGR STEVE GOURLEY	
SE GOURLEY	1/18/13
APVD	
OTHER	
OTHER	
APVD FOR IMPLEMENTATION BY	
NA ON WORKSHEET	

U. S. DEPARTMENT OF ENERGY
PACIFIC NORTHWEST SITE OFFICE

Pacific Northwest Division — Battelle — Richland, Washington 99352

MECHANICAL CHWS/CHWR SECT & DETAILS

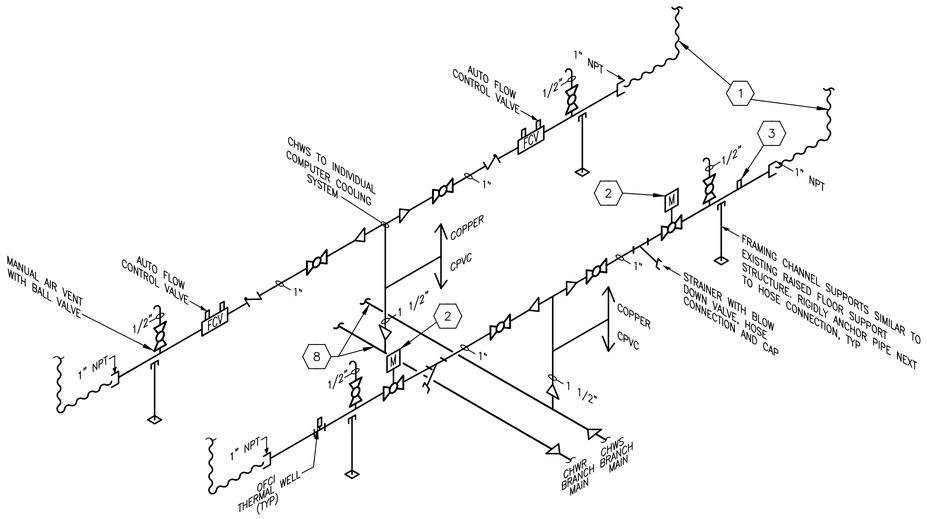
PROJ TITLE: HPCS-4 POWER & COOLING

SIZE	INDEX NO	BLDG NO	DWG NO	REV NO
F	8516	EMSL	WS9627	0

SCALE SHOWN — SHEET 2 OF 3

DRAWING NO	DRAWING TITLE
REFERENCE DRAWINGS	
NEXT USED ON	

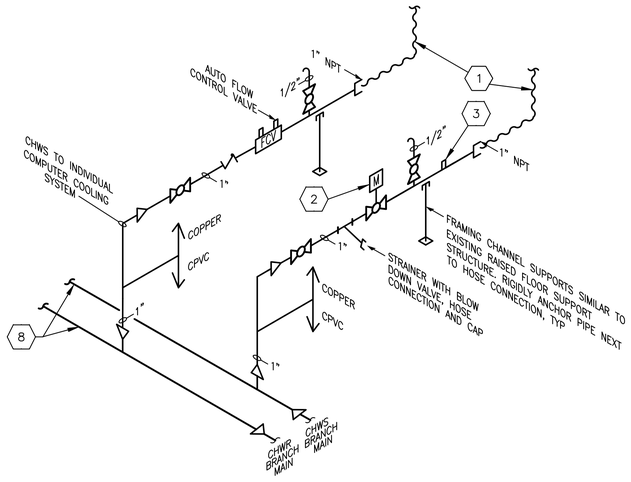
RR	QA BY / DATE	ENGR BY / DATE	CHK BY / DATE	REV BY / DATE	DESCRIPTION	REV NO
REVISIONS						



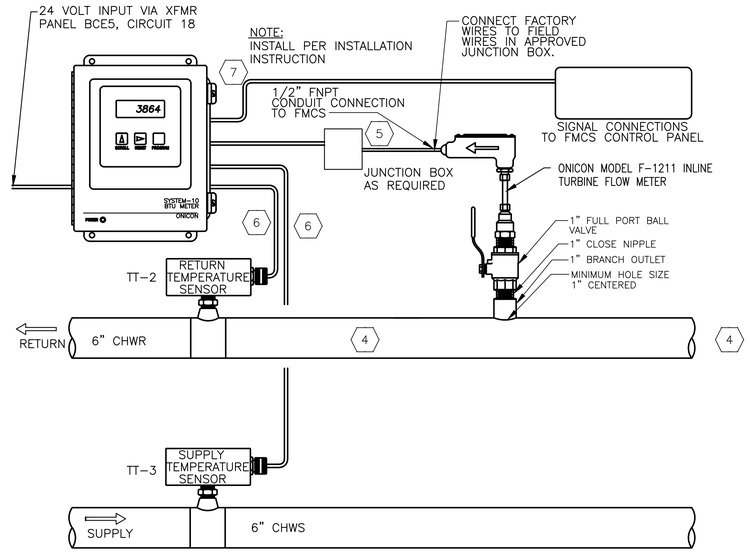
1/1 CHWS/CHWR ISO PIPING DIAGRAM (DOUBLE BRANCH)
DIAGRAMMATIC

SHEET NOTES

1. OFCI HOSE TO INTEGRAL COMPUTER RACK COOLING SYSTEM. COORDINATE WITH MOTIVAIR INSTALLATION TECHNICIAN AS REQUIRED FOR CONNECT TYPE. PIPING PRESSURE TEST TO BE DONE ONCE SYSTEM IS COMPLETE, INCLUDING OWNER FURNISHED CONTRACTOR INSTALLED EQUIPMENT. PERFORM PRESSURE TEST PER SPECIFICATION, SUBMIT RESULTS TO BATTELLE CM. CONNECT HOSE ENDS TO PERFORM LEAK TEST PRIOR TO INSTALLATION OF CHILLED DOORS.
2. OWNER FURNISHED, CONTRACTOR INSTALLED. COORDINATE WITH COMPUTER VENDOR FOR SIZE AND CONNECTION TYPE OF CONTROL VALVE. CONTROL VALVE CONTROL BY CHILLED DOOR. CONTROL WIRING BY OTHERS.
3. THERMAL WELL, OFCI.
4. PROVIDE 5 PIPE DIAMETERS DOWNSTREAM, 20 PIPE DIAMETERS UPSTREAM.
5. PROVIDE 18–22 GA SHIELDED CABLE IN 1/2" FNPT COUNDUIT. CONNECT WIRE TO CONTRACTOR PROVIDED WIRES IN APPROPRIATE JUNCTION BOX.
6. PROVIDE 18–22 GA SHIELDED CABLE (3 CONDUCTORS).
7. PROVIDE CAT 5 eCABLE.
8. SUPPORT CPVC SUPPLY AND RETURN MAINS WITH 1–5/8" FRAMING CHANNEL AT INTERVALS AS SPECIFIED.



2/1 CHWS/CHWR ISO PIPING DIAGRAM (SINGLE BRANCH)
DIAGRAMMATIC



3/2 BTU METER DETAIL
DIAGRAMMATIC

RELEASE
01-18-13
DATE
JMK

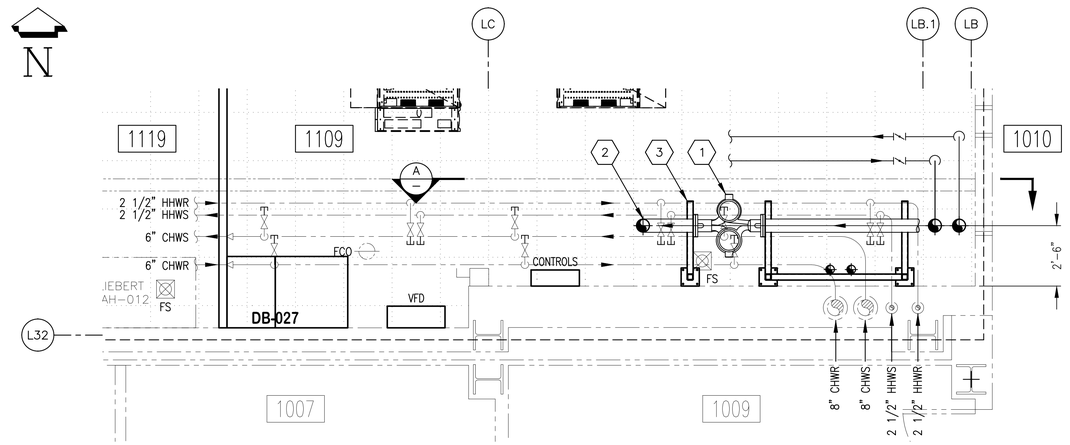
EDP # S593062-EDP03

DRAWN KS KOSCHIK	DATE 11/15/11	U. S. DEPARTMENT OF ENERGY PACIFIC NORTHWEST SITE OFFICE	
CHECKED		Pacific Northwest Division — Battelle — Richland, Washington 99352	
ENGR STEVE GOURLEY SE GOURLEY	1/18/13	MECHANICAL CHWS/CHWR SECT & DETAILS	
APVD			
OTHER		PROJ TITLE HPCS-4 POWER & COOLING	
OTHER		SIZE F — INDEX NO 8516 — BLDG NO EMSL — DWG NO WS9627 — REV NO 0	
APVD FOR IMPLEMENTATION BY NA ON WORKSHEET		SCALE SHOWN — SHEET 3 OF 3	

DRAWING NO	DRAWING TITLE
REFERENCE DRAWINGS	
NEXT USED ON	

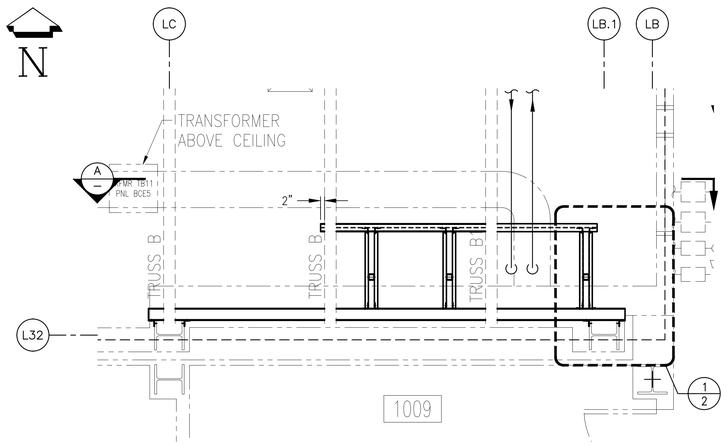
RR	QA BY / DATE	ENGR BY / DATE	CHK BY / DATE	REV BY / DATE	DESCRIPTION	REV NO
REVISIONS						

Z0000513-R10-5/07



COMPUTER RM PARTIAL PLAN – CHWS/CHWR (BELOW CLG)

3/8" = 1'–0" SCALE 0' 2' 4' 8' FEET



COMPUTER RM PARTIAL PLAN – CHWS/CHWR (ABOVE CLG)

3/8" = 1'–0" SCALE 0' 2' 4' 8' FEET

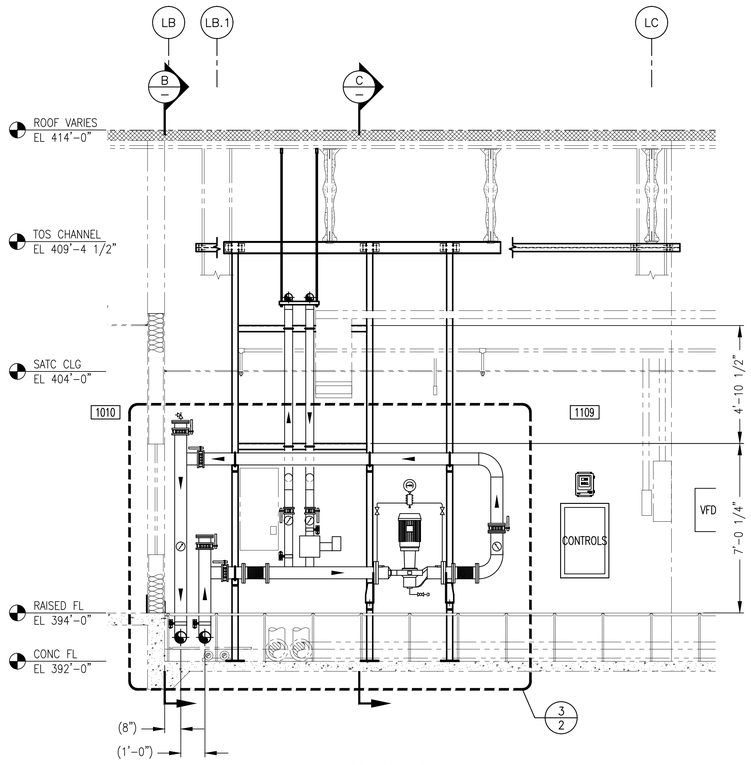
GENERAL NOTES

(UNLESS OTHERWISE SPECIFIED)

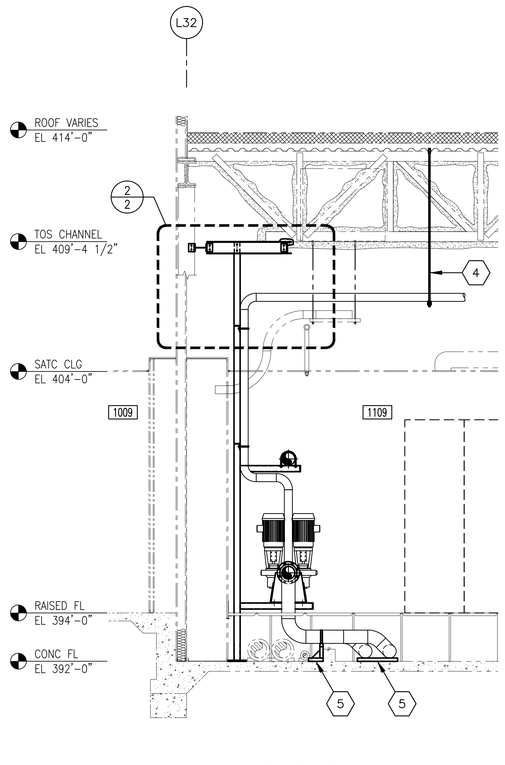
1. DIMENSIONS ARE IN FEET AND INCHES UNLESS OTHERWISE SPECIFIED.
2. FIELD VERIFY DIMENSIONS AND REPORT DISCREPANCIES WITH FIELD CONDITIONS TO BATTELLE CONSTRUCTION MANAGER PRIOR TO ANY CONSTRUCTION.
3. WORK SHALL BE COORDINATED WITH THE BATTELLE CONSTRUCTION MANAGER.
4. SURFACES DAMAGED DURING CONSTRUCTION SHALL BE REPAIRED TO MATCH CONDITION OF EXISTING.
5. NOT ALL SYMBOLS SHOWN IN LEGEND OR ABBREVIATIONS IN LIST ARE USED ON PROJECT DRAWINGS. ADDITIONAL ABBREVIATIONS (NOT SHOWN) ARE IN ACCORDANCE WITH ASME Y14.38–1999. SEE WORKSHEET WS9611.
6. THE PIPING AND CONDUIT SHOWN ON THE DRAWINGS IS DIAGRAMMATIC IN NATURE AND DOES NOT NECESSARILY SHOW ALL REQUIRED FITTINGS AND/OR ACTUAL ROUTING. ALL OBSTRUCTIONS MAY NOT BE SHOWN ON DRAWINGS. PROVIDE ALL MATERIAL FOR A COMPLETE INSTALLATION.
7. DEMOLITION WHICH LEAVES OPEN PENETRATIONS IN FIRE BARRIERS MUST BE RESEALED WITH EITHER A TEMPORARY FIRESTOP PRODUCT (IF PENETRATION IS TO BE REUSED) OR PERMANENT FIRESTOP SEAL. ALL WALLS IN THE PROJECT AREA OF RM 1109 ARE 1–HOUR RATED FIRE BARRIERS, CAUTION SHOULD BE EXERCISED TO PREVENT DAMAGE TO FIRE BARRIERS. REPAIR DAMAGED AREAS IN ACCORDANCE WITH REQUIRED STANDARDS AND UL LISTED DETAILS.

SHEET NOTES

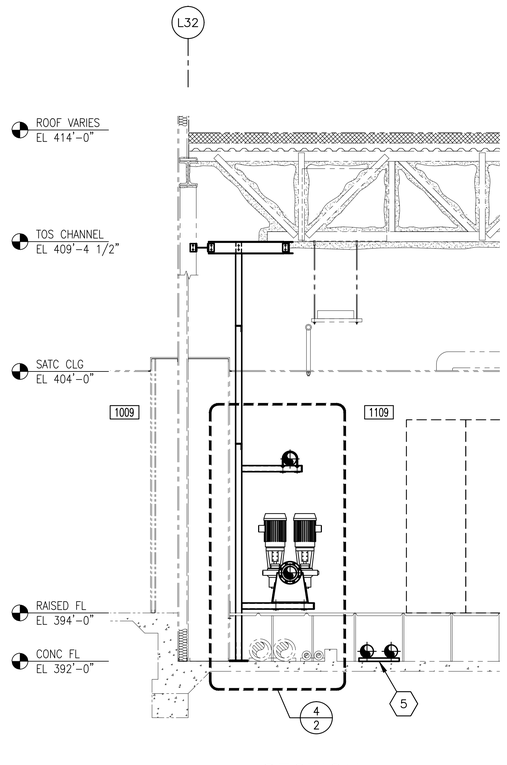
1. CHWS/CHWR PUMP.
2. CHWS/CHWR PIPING.
3. CHWS/CHWR PUMP AND PIPING SUPPORT.
4. SUPPORT PIPING FROM ROOF STRUCTURE PER SPEC. SEE MECH PIPING WKSH WS9627.
5. SUPPORT PIPING AT FLOOR WITH FRAMING CHANNEL PER SPEC. SEE MECH PIPING WKSH WS9627.



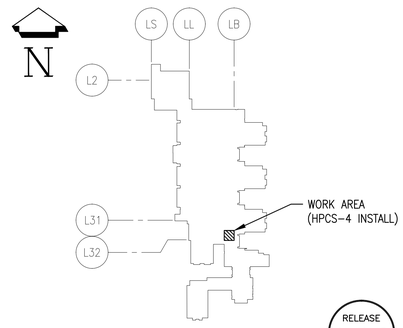
A SECTION
SCALE: 3/8" = 1'–0"



B SECTION
SCALE: 3/8" = 1'–0"



C SECTION
SCALE: 3/8" = 1'–0"



KEY PLAN
SCALE: NONE

RELEASE
01–18–13
DATE
JMK

EDP # S593062–EDP03

DRAWN	DATE
KS KOSCHIK	11/15/11
CHECKED	
ENGR DK DA KOONTZ	1/18/13
APVD	
OTHER	
OTHER	
APVD FOR IMPLEMENTATION BY NA ON WORKSHEETS	

U. S. DEPARTMENT OF ENERGY
PACIFIC NORTHWEST SITE OFFICE

Pacific Northwest Division — Battelle — Richland, Washington 99352

MECHANICAL CHWS/CHWR SUPPORTS & DETAILS

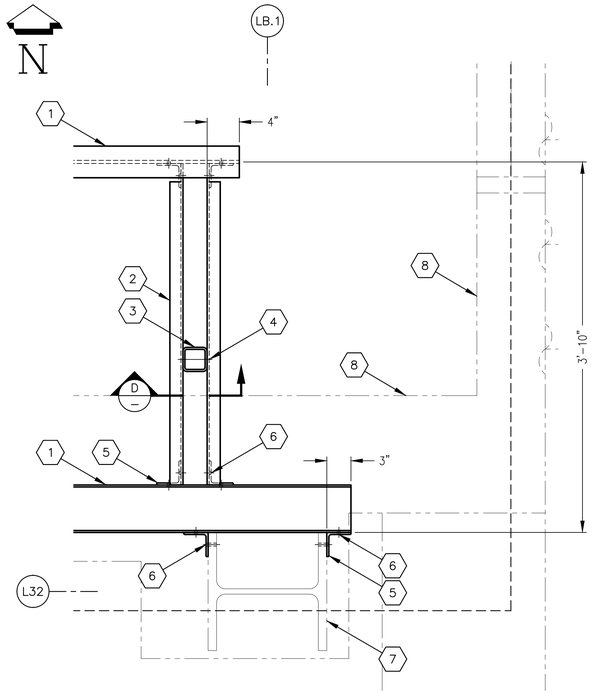
PROJ TITLE: HPCS–4 POWER & COOLING

SIZE	INDEX NO	BLDG NO	DWG NO	REV NO
F	8516	EMSL	WS9628	0

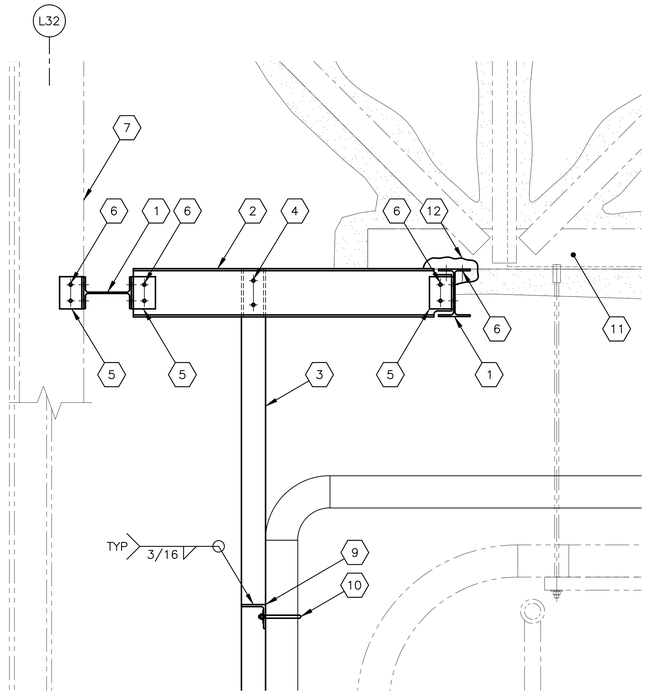
SCALE SHOWN — SHEET 1 OF 2

REFERENCE DRAWINGS	
DRAWING NO	DRAWING TITLE
WS9611	PROJECT LEGEND/ABBREV
WS9610	PROJECT TITLE/DWG LIST
S593062–SPCC03	CONSTRUCTION SPEC
NEXT USED ON	

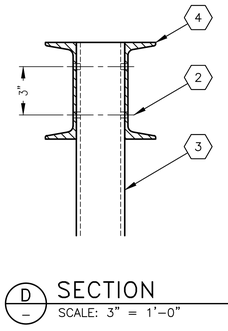
REVISIONS						
RR	QA BY / DATE	ENGR BY / DATE	CHK BY / DATE	REV BY / DATE	DESCRIPTION	REV NO



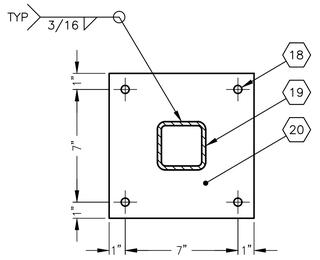
1/1 DETAIL
SCALE: 1 1/2" = 1'-0"



2/1 DETAIL
SCALE: 1 1/2" = 1'-0"



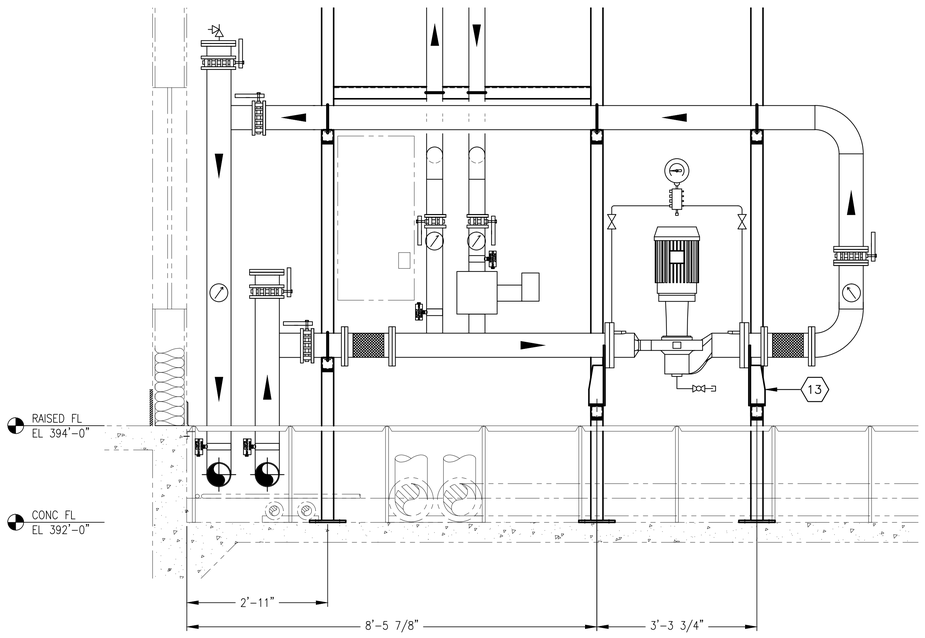
D/– SECTION
SCALE: 3" = 1'-0"



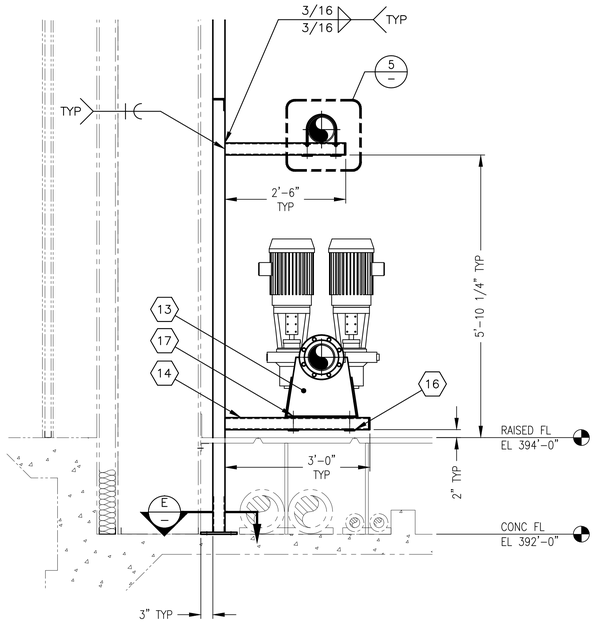
E/– SECTION
SCALE: 3" = 1'-0"

SHEET NOTES

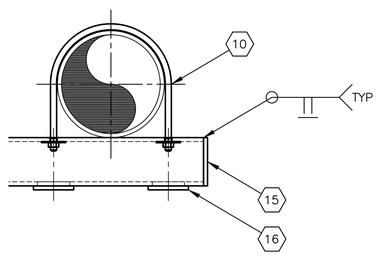
1. W6 x 9.
2. C6 x 8.2 (TYP)
3. HSS 3 x 3 x 1/4" UPRIGHT (TYP).
4. ø9/16" FOR ø1/2" ASTM A307 THROUGH-BOLT WITH WASHERS AND NUT. (TYP 2 PER UPRIGHT).
5. L3 x 3 x 1/4" x 4" CLIP (TYP).
6. ø9/16" HOLE FOR ø1/2" ASTM A307 BOLT, WASHER AND NUT (TYP).
7. EXISTING W12 COLUMN.
8. EXISTING FACE OF FINISHED WALL BELOW.
9. L3 x 3 x 1/4".
10. ø3/8" U-BOLT OR OTHER ATTACHMENT PER MECH SPECIFICATION.
11. EXISTING WT5 x 11 TRUSS LOWER CHORD MEMBER WITH FIREPROOFING (TYP).
12. REMOVE EXISTING FIRE-PROOFING FOR INSTALLATION OF NEW SUPPORT. REPLACE COATING TO EQUAL THICKNESS PER SPECIFICATION (TYP).
13. VIBRO-ACOUSTICS MODEL # SIPS-6 SEISMIC PUMP STAND WITH NEOPRENE GROMMET WASHERS AND OPTIONAL VIBRATION ISOLATION PADS (TYP).
14. HSS 3 x 3 x 1/4" OUTRIGGER (TYP).
15. 1/4" x 3 x 3 END CAP PLATE (TYP).
16. ø2" HOLE FOR BOLT INSTALLATION. PROVIDE COLOR MATCHED FLUSH PLASTIC PLUG (TYP).
17. ø5/8" ASTM A307 BOLT WITH WASHERS AND NUT (TYP).
18. ø9/16" HOLE FOR 1/2" x EMBED HILTI KWIK BOLT 3 (TYP 4 PER PLATE).
19. HSS 3 x 3 CENTERED ON PLATE.
20. 9" x 9" x 1/2" BASE PLATE (TYP).



3/1 DETAIL
SCALE: 3/4" = 1'-0"



4/1 DETAIL
SCALE: 3/4" = 1'-0"



5/– DETAIL
SCALE: 3" = 1'-0"

RELEASE
01-18-13
DATE
JMK

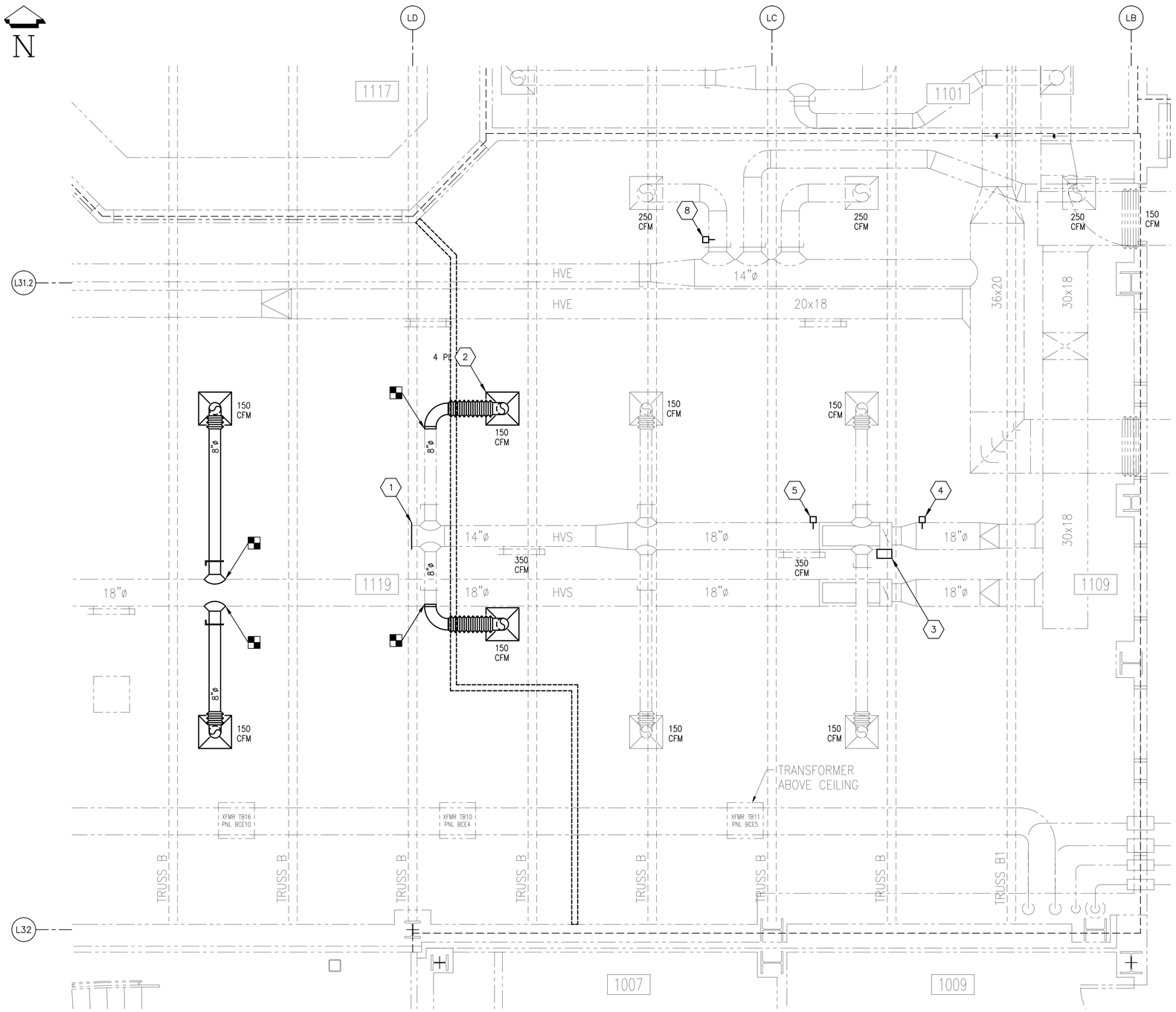
EDP # S593062-EDP03

DRAWN KS KOSCHIK	DATE 11/15/11	U. S. DEPARTMENT OF ENERGY, PACIFIC NORTHWEST SITE OFFICE
CHECKED		Pacific Northwest Division — Battelle — Richland, Washington 99352
ENGR DK DA KOONTZ	1/18/13	MECHANICAL CHWS/CHWR SUPPORTS & DETAILS
APVD		
OTHER		PROJ TITLE: HPCS-4 POWER & COOLING
OTHER		SIZE F; INDEX NO 8516; BLDG NO EMSL; DWG NO WS9628; REV NO 0
APVD FOR IMPLEMENTATION BY NA ON WORKSHEETS		SCALE SHOWN; SHEET 2 OF 2

DRAWING NO	DRAWING TITLE
REFERENCE DRAWINGS	
NEXT USED ON	

REV	QA BY / DATE	ENGR BY / DATE	CHK BY / DATE	REV BY / DATE	DESCRIPTION	REV NO
RR					REVISIONS	

Z0000513-R10-5/07



COMPUTER RM PARTIAL PLAN – SUPPLY DUCT (ABOVE CLG)

3/8" = 1'–0" 0' 2' 4' 8' SCALE FEET

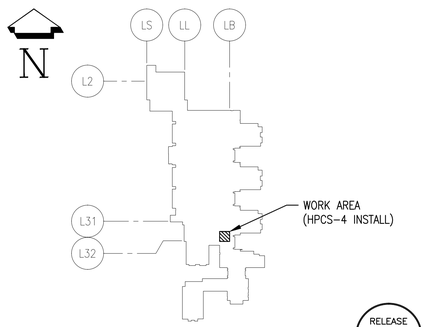
GENERAL NOTES

(UNLESS OTHERWISE SPECIFIED)

1. DIMENSIONS ARE IN FEET AND INCHES UNLESS OTHERWISE SPECIFIED.
2. FIELD VERIFY DIMENSIONS AND REPORT DISCREPANCIES WITH FIELD CONDITIONS TO BATTELLE CONSTRUCTION MANAGER PRIOR TO ANY CONSTRUCTION.
3. WORK SHALL BE COORDINATED WITH THE BATTELLE CONSTRUCTION MANAGER.
4. SURFACES DAMAGED DURING CONSTRUCTION SHALL BE REPAIRED TO MATCH CONDITION OF EXISTING.
5. NOT ALL SYMBOLS SHOWN IN LEGEND OR ABBREVIATIONS IN LIST ARE USED ON PROJECT DRAWINGS. ADDITIONAL ABBREVIATIONS (NOT SHOWN) ARE IN ACCORDANCE WITH ASME Y14.38–1999. SEE WORKSHEET WS9611.
6. FIELD ADJUST RELOCATED DUCT AND SUPPLY DIFFUSER AS REQUIRED. SUPPORT MECHANICAL PER SMACNA.
7. TESTING, ADJUSTING AND BALANCING BY BATTELLE.

SHEET NOTES

1. BLANK–OFF EXISTING DUCT (AIR–TIGHT) IN LOCATION SHOWN.
2. RELOCATE EXISTING SUPPLY DIFFUSER TO LOCATION SHOWN AND PROVIDE FLEX DUCT AS REQUIRED. SEE ARCH WKSH WS9620 FOR REFLECTED CEILING PLAN.
3. PROVIDE ALERTON TERMINAL UNIT CONTROLLER IN LOCATION SHOWN. CONNECT TO BACnet MS/TP TRUNK FROM BCM.
4. AMC VELTRO DPT 2500 AND VOLU–PROBE. CONNECT TO CONTROL SYSTEM.
5. AIR TEMPERATURE SENSOR.



KEY PLAN

SCALE: NONE

RELEASE 01–18–13 DATE JMK

EDP # S593062–EDP03

WS9611	PROJECT LEGEND/ABBREV
WS9610	PROJECT TITLE/DWG LIST
S593062–SPCC03	CONSTRUCTION SPEC
DRAWING NO	DRAWING TITLE

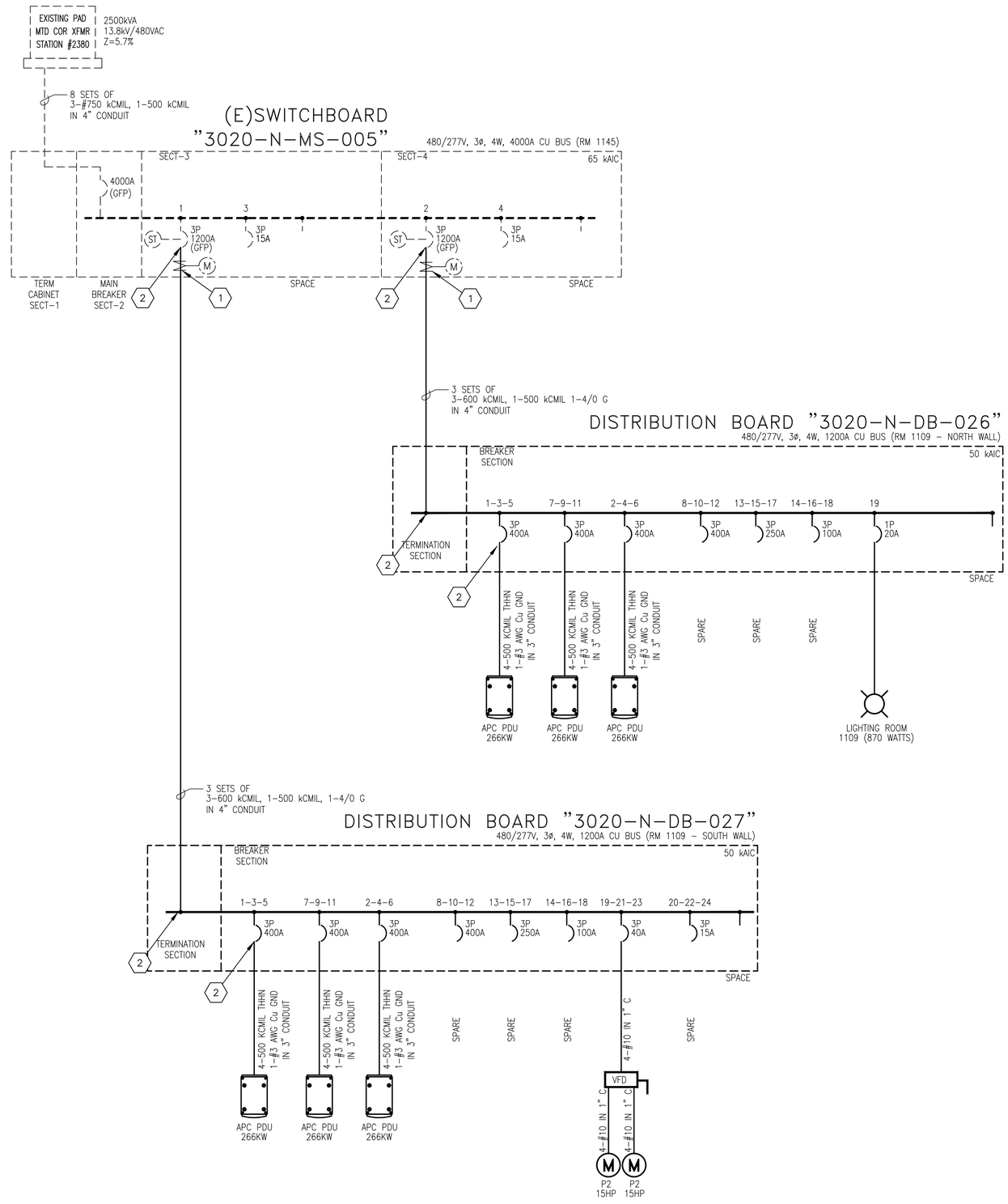
REFERENCE DRAWINGS

NEXT USED ON

RR	QA BY / DATE	ENGR BY / DATE	CHK BY / DATE	REV BY / DATE	DESCRIPTION	REV NO

REVISIONS

DRAWN KS KOSCHIK	DATE 11/15/11	U. S. DEPARTMENT OF ENERGY PACIFIC NORTHWEST SITE OFFICE
CHECKED		Pacific Northwest Division Battelle Richland, Washington 99352
ENGR STEVE GOURLEY SE GOURLEY	1/18/13	MECHANICAL ABOVE CEILING RM 1109 PARTIAL PLAN
APVD		PROJ TITLE HPCS–4 POWER & COOLING
OTHER		SIZE F · INDEX NO 8900 · BLDG NO EMSL · DWG NO WS9629 · REV NO 0
OTHER		SCALE SHOWN · SHEET 1 OF 1
APVD FOR IMPLEMENTATION BY NA ON WORKSHEET		



GENERAL NOTES

(UNLESS OTHERWISE SPECIFIED)

1. NOT ALL SYMBOLS SHOWN IN LEGEND OR ABBREVIATIONS IN LIST ARE USED ON PROJECT DRAWINGS. ADDITIONAL ABBREVIATIONS (NOT SHOWN) ARE IN ACCORDANCE WITH ASME Y14.38-1999.

SHEET NOTES

(1) CONNECT CT'S LEADS FOR VERIS METERS AROUND FEEDER CONDUCTORS.

(2) ALL LUGS TO BE TORQUED PER THE MANUFACTURER'S RECOMMENDED VALUES WITH A CALIBRATED TORQUE WRENCH OR USING NETA VALUES BASED ON THE SIZE OF THE LUG. PROVIDE DOCUMENTATION TO CONSTRUCTION MANAGER.

WS9611	PROJECT LEGEND/ABBREV
WS9610	PROJECT TITLE/DWG LIST
S593062-SPCC03	CONSTRUCTION SPEC
DRAWING NO	DRAWING TITLE

REFERENCE DRAWINGS

NEXT USED ON

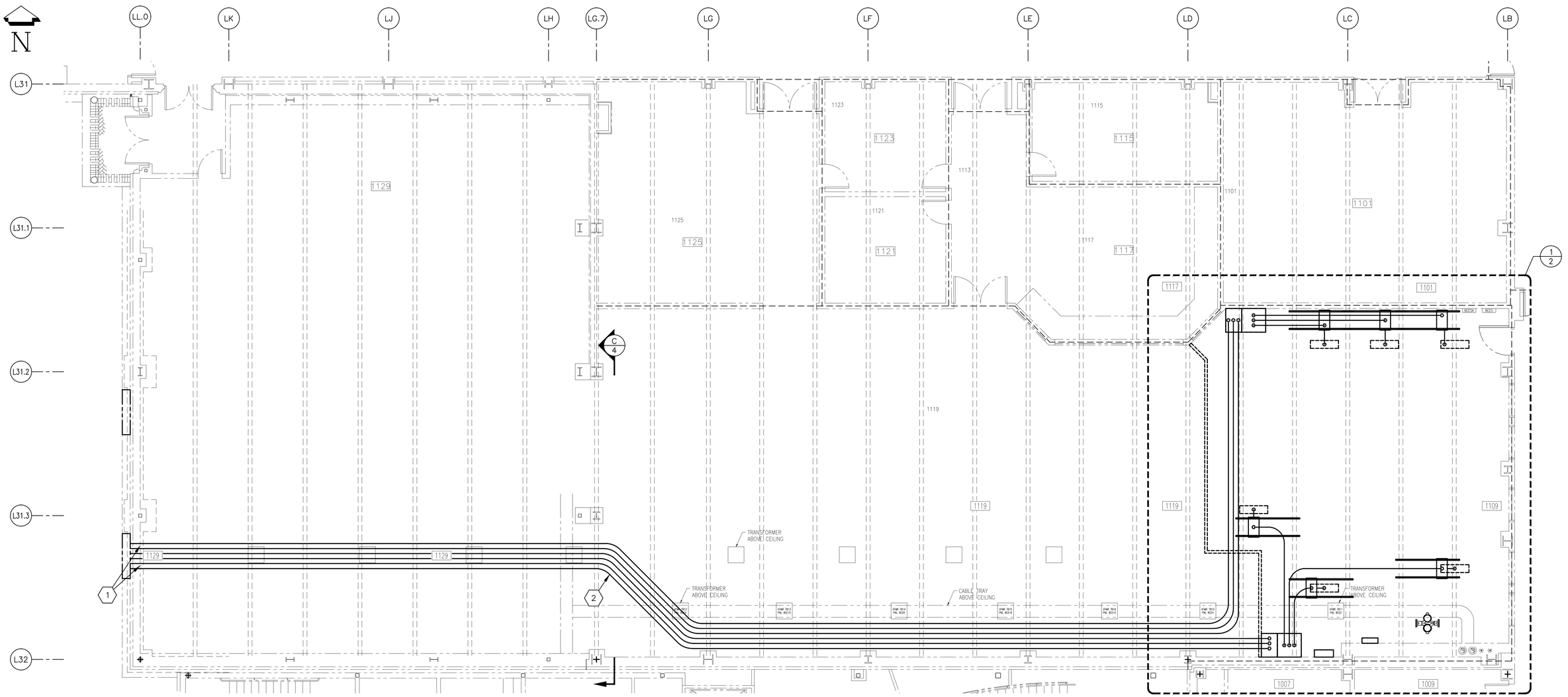
RR	QA BY / DATE	ENGR BY / DATE	CHK BY / DATE	REV BY / DATE	DESCRIPTION	REV NO

REVISIONS

RELEASE
01-18-13
DATE
JMK

EDP # S593062-EDP03

DRAWN KS KOSCHIK	DATE 11/15/11	U. S. DEPARTMENT OF ENERGY PACIFIC NORTHWEST SITE OFFICE
CHECKED		Pacific Northwest Division **Battelle** Richland, Washington 99352
ENGR BG BJ GRAF	1/18/13	ELECTRICAL DIST BD 026 & 027 ONE-LINE DIAGRAM
APVD		PROJ TITLE: HPCS-4 POWER & COOLING
OTHER		SIZE F · INDEX NO 7201 · BLDG NO EMSL · DWG NO WS9631 · REV NO 0
OTHER		SCALE NONE · SHEET 1 OF 1
APVD FOR IMPLEMENTATION BY NA ON WORKSHEETS		



COMPUTER RM OVERALL PLAN – POWER ABOVE CLG

3/16" = 1'-0" SCALE 0' 4' 8' 16' FEET

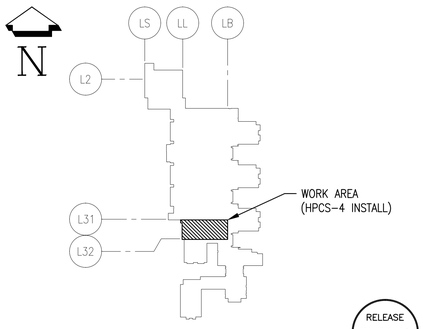
GENERAL NOTES

(UNLESS OTHERWISE SPECIFIED)

1. DIMENSIONS ARE IN FEET AND INCHES UNLESS OTHERWISE SPECIFIED.
2. FIELD VERIFY DIMENSIONS AND REPORT DISCREPANCIES WITH FIELD CONDITIONS TO BATTELLE CONSTRUCTION MANAGER PRIOR TO ANY CONSTRUCTION.
3. WORK SHALL BE COORDINATED WITH THE BATTELLE CONSTRUCTION MANAGER.
4. SURFACES DAMAGED DURING CONSTRUCTION SHALL BE REPAIRED TO MATCH CONDITION OF EXISTING.
5. NOT ALL SYMBOLS SHOWN IN LEGEND OR ABBREVIATIONS IN LIST ARE USED ON PROJECT DRAWINGS. ADDITIONAL ABBREVIATIONS (NOT SHOWN) ARE IN ACCORDANCE WITH ASME Y14.38–1999. SEE WORKSHEET WS9611.
6. THE CONDUIT SHOWN ON THE DRAWINGS IS DIAGRAMMATIC IN NATURE AND DOES NOT NECESSARILY SHOW ALL REQUIRED FITTINGS AND/OR ACTUAL ROUTING. ALL OBSTRUCTIONS MAY NOT BE SHOWN ON DRAWINGS. PROVIDE ALL MATERIAL FOR A COMPLETE INSTALLATION.
7. ALL WORK ABOVE EXISTING COMPUTING OVER ANY AREA OF THIS PLAN SHALL BE DONE PER AN APPROVED PLAN PRIOR TO LIFTING OR MOUNTING (DEMO OR NEW) ABOVE EXISTING RACKS/EQUIPMENT. SEE DIVISION 1 FOR REQUIREMENTS.

SHEET NOTES

1. CONDUIT POINT–OF–ENTRY INTO BUILDING.
2. OFFSET CONDUITS TO CLEAR EXISTING CONDUITS AND BUILDING CONTROL PANELS.



KEY PLAN

SCALE: NONE

RELEASE 01–18–13 DATE JMK

EDP # S593062–EDP03

DRAWN	DATE
ZF LUTHER	11/15/11
CHECKED	
ENGR BG BJ GRAF	1/18/13
APVD	
OTHER	
OTHER	
APVD FOR IMPLEMENTATION BY NA ON WORKSHEETS	

U. S. DEPARTMENT OF ENERGY
PACIFIC NORTHWEST SITE OFFICE

Pacific Northwest Division — Battelle — Richland, Washington 99352

ELECTRICAL POWER
RM 1109 OVERALL PLAN

PROJ TITLE: HPCS–4 POWER & COOLING

SIZE	INDEX NO	BLDG NO	DWG NO	REV NO
F	7301	EMSL	WS9632	0

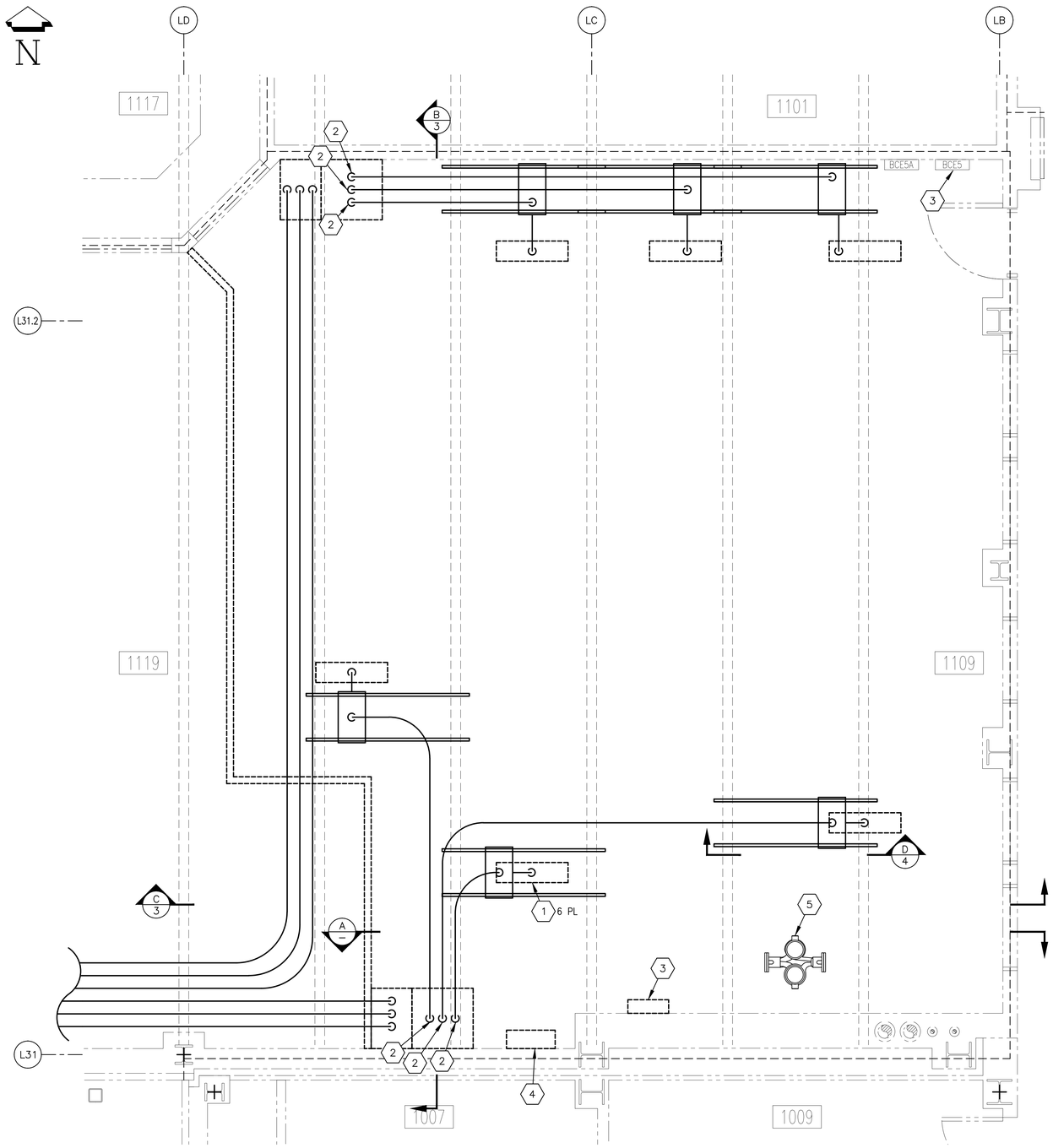
SCALE SHOWN — SHEET 1 OF 4

DRAWING NO	DRAWING TITLE
WS9611	PROJECT LEGEND/ABBREV
WS9610	PROJECT TITLE/DWG LIST
S593062–SPCC03	CONSTRUCTION SPEC

REFERENCE DRAWINGS
NEXT USED ON

RR	QA BY / DATE	ENGR BY / DATE	CHK BY / DATE	REV BY / DATE	DESCRIPTION	REV NO

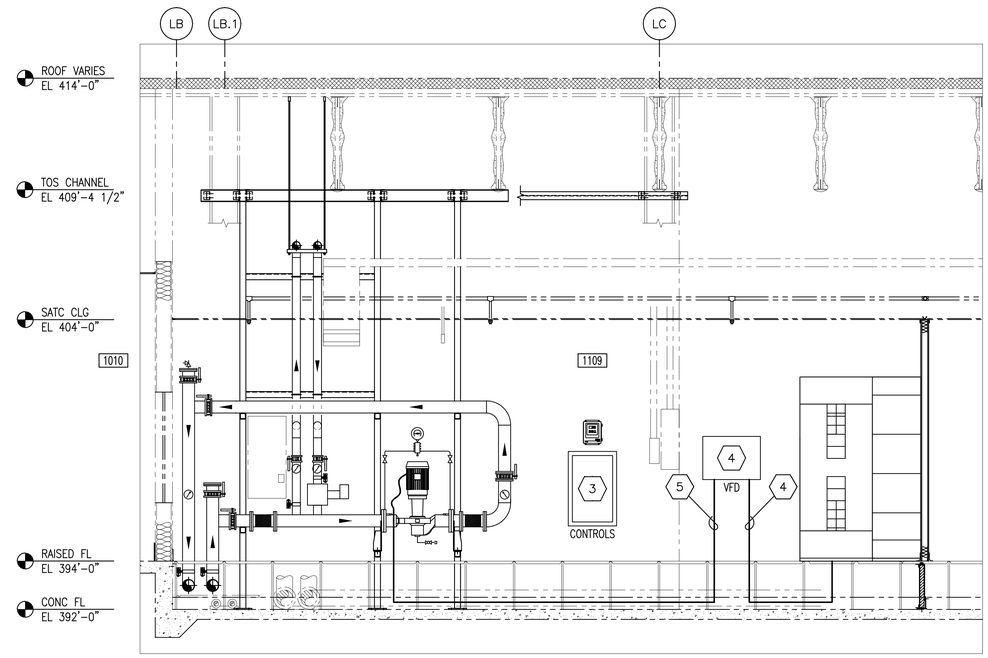
REVISIONS



1 / 1 COMPUTER RM PARTIAL POWER PLAN
SCALE: 3/8" = 1'-0"

SHEET NOTES

1. PROVIDE HOFFMAN ASE30X30X16NK ENCLOSURE WITH COVER. COIL 8 FEET OF COILED UP CONDUCTOR IN PULL BOX FOR FUTURE CONNECTION TO APC PDU. CONTRACTOR TO MAKE CONNECTION TO PDU PRIOR TO COMPUTER VENDOR START-UP.
2. ROUTE ABOVE SUSPENDED CEILING, 4-500KCMIL, 1-#3 GROUND IN 3" EMT CONDUIT FROM DISTRIBUTION PANEL 400A BREAKER TO PULL BOX FOR EACH FUTURE PDU LOCATION.
3. ROUTE 3-#12 IN 3/4" CONDUIT UNDER FLOOR FROM EXISTING 20A BREAKER (CIRCUIT 18) IN PANEL BCE5 TO SMALL ENCLOSURE-MOUNTED 100VA 24 VOLT WITH PRIMARY AND SECONDARY FUSING. ROUTE 24V OUTPUT TO ALERTON CONTROLLER POWER SUPPLY TO ONICON INPUT POWER TERMINALS, AND TO MIXING CONTROL VALVE. UPDATE CIRCUIT DIRECTORY.
4. ROUTE 4-#10 IN 3/4" CONDUIT FROM 40A BREAKER IN DB-027 TO VARIABLE FREQUENCY DRIVE AND TERMINATE.
5. ROUTE 4-#10 IN 3/4" CONDUIT FROM VARIABLE FREQUENCY DRIVE AND TERMINATE ON EACH 15 HP PUMP MOTOR LEADS (TWO TOTAL). USE FLEXIBLE CONDUIT FROM WALL TO MOTOR.



A / – ELEVATION
SCALE: 3/8" = 1'-0"

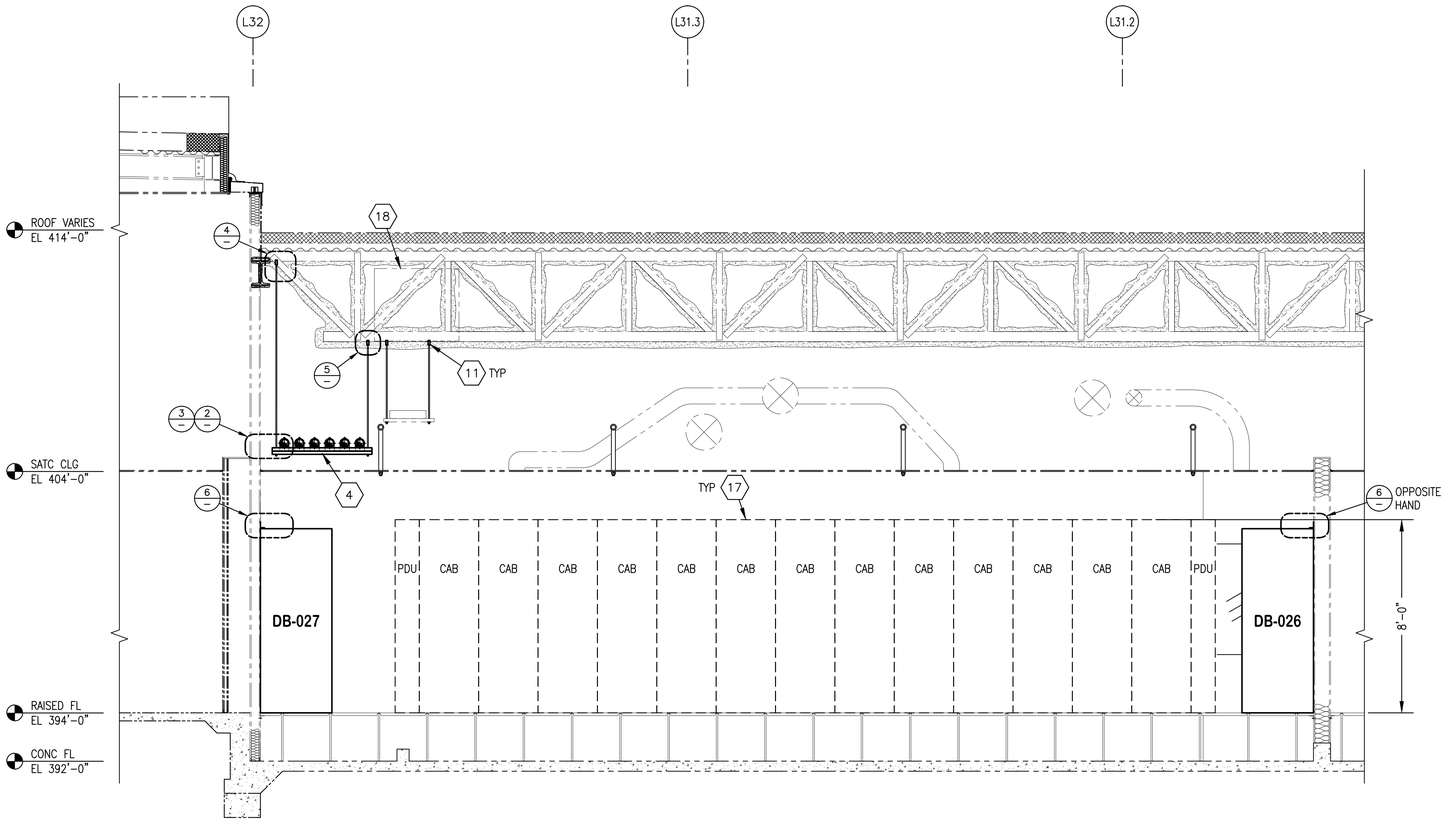
RELEASE
01-18-13
DATE
JMK

EDP # S593062-EDP03

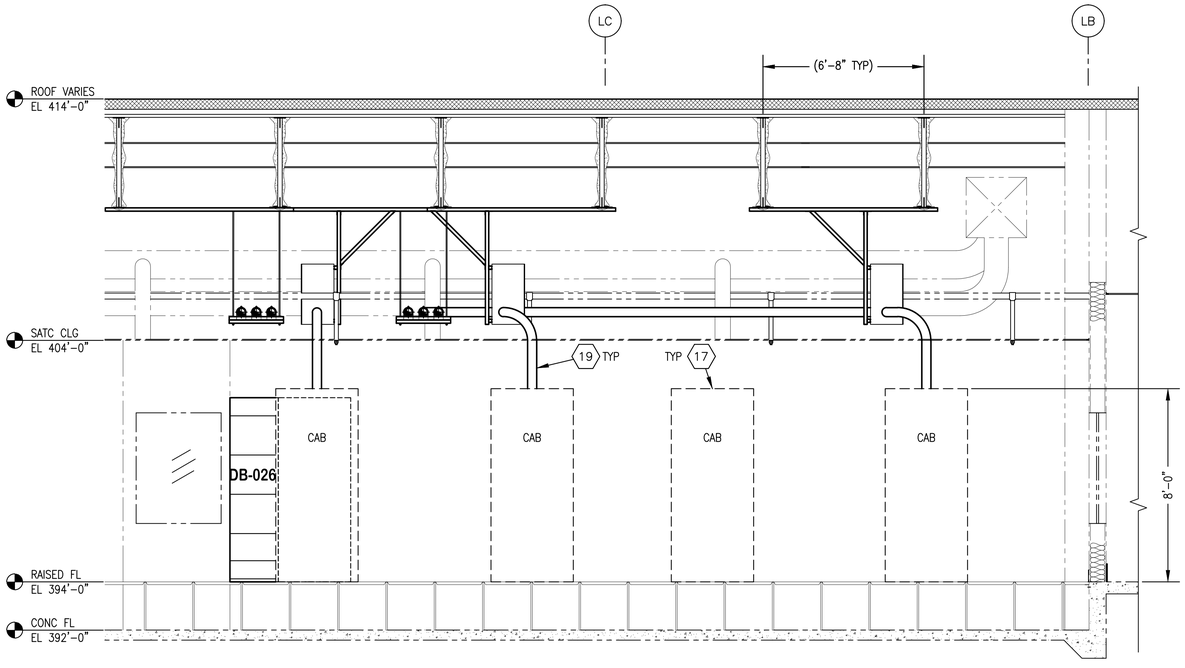
DRAWN ZF LUTHER	DATE 11/15/11	U. S. DEPARTMENT OF ENERGY PACIFIC NORTHWEST SITE OFFICE	
CHECKED		Pacific Northwest Division — Battelle — Richland, Washington 99352	
ENGR BG BJ GRAF	1/18/13	ELECTRICAL POWER RM 1109 PARTIAL PLAN	
APVD			
OTHER		PROJ TITLE HPCS-4 POWER & COOLING	
OTHER		SIZE F / INDEX NO 7301 / BLDG NO EMSL / DWG NO WS9632 / REV NO 0	
APVD FOR IMPLEMENTATION BY NA ON WORKSHEETS		SCALE SHOWN / SHEET 2 OF 4	

DRAWING NO	DRAWING TITLE
REFERENCE DRAWINGS	
NEXT USED ON	

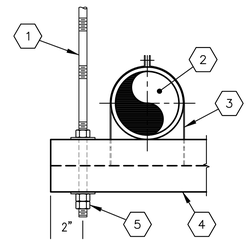
RR	QA BY / DATE	ENGR BY / DATE	CHK BY / DATE	REV BY / DATE	DESCRIPTION	REV NO
REVISIONS						



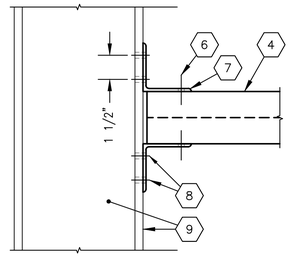
B/2 ELEVATION
SCALE: 3/8" = 1'-0"



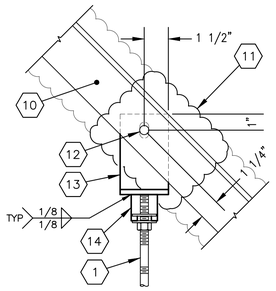
C/2 ELEVATION
SCALE: 3/8" = 1'-0"



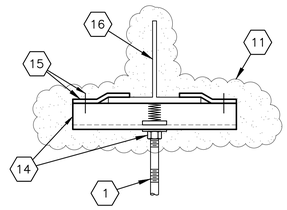
2/– DETAIL
SCALE: 3" = 1'-0"



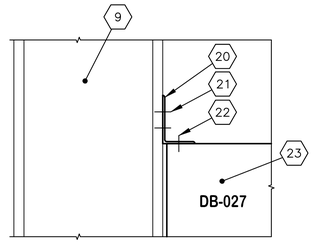
3/– DETAIL
SCALE: 3" = 1'-0"



4/– DETAIL
SCALE: 3" = 1'-0"



5/– DETAIL
SCALE: 3" = 1'-0"



6/– DETAIL
SCALE: 3" = 1'-0"

SHEET NOTES

1. 3/8" ASTM A36 OR A307 THREADED ROD.
2. 4" CONDUIT.
3. 1-5/8" FRAMING CHANNEL CONDUIT CLAMP (TYP).
4. DOUBLE 1-5/8" FRAMING CHANNEL SUPPORT BEAM. SEE DETAIL X FOR WALL ATTACHMENT EVERY FOURTH BEAM.
5. 3/8" NUT AND WASHERS WITH DOUBLE NUT ON BOTTOM (TYP).
6. 3/8" ASTM A307 BOLT THROUGH WITH WASHERS AND NUTS (TYP).
7. ∠3" X 3" X 3/16" X 1'-8" LONG TO SPAN BETWEEN TWO EXISTING ADJACENT STUDS (TYP).
8. (2) #12 SELF-DRILLING SCREWS TO EXISTING STUD (TYP AT EACH CONNECTION).
9. EXISTING 8" STUDS AT 1'-4" OC WITH 5/8" GYPSUM WALL BOARD.
10. EXISTING DOUBLE ∠3" X 3" X 1/4" TRUSS DIAGONAL WITH FIREPROOFING.
11. WHERE NEW PIPE OR ELECTRICAL SUPPORTS ARE TO BE ATTACHED TO THE EXISTING STRUCTURAL STEEL, CAREFULLY CUT AND REMOVE THE EXISTING FIREPROOF COATING PRIOR TO INSTALLATION OF THE NEW SUPPORT. REMOVE ONLY ENOUGH COATING AS NEEDED TO INSTALL THE NEW SUPPORT. UPON INSTALLATION OF SUPPORT, REPAIR THE FIREPROOF COATING WITH WR GRACE MONOKOTE Z-106 MEDIUM DENSITY FIREPROOFING. REPAIR COATING IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS. COATING DEPTH SHALL MATCH THE EXISTING AT A MINIMUM AND SHALL PROVIDE COMPLETE COVERAGE OF THE EXISTING STRUCTURAL STEEL AND NEW ATTACHMENT.
12. ø9/16" HOLE THROUGH DOUBLE ∠3" X 3" AND ø9/16" X 1" SLOTTED HOLE IN WT5.
13. WT5" X 11" X 3" LONG.
14. 1-5/8" FRAMING CHANNEL 6" LONG WITH FRAMING NUT, WASHER AND LOCK NUT.
15. 1-5/8" FRAMING CHANNEL BEAM CLAMP AND NUT/BOLT (TYP 2).
16. EXISTING WT5" X 11" TRUSS LOWER CHORD WITH FIREPROOFING.
17. NEW HPCS-4 COMPUTER EQUIPMENT CABINETS INSTALLED BY OTHERS ON RAISED FLOOR, SHOWN FOR REFERENCE ONLY.
18. EXISTING TRANSFORMER.
19. FLEXIBLE CONDUIT.
20. ∠3" X 2" X 1/8" X 2" LONG CLIP, PRIMED AND PAINTED TO MATCH WALL COLOR (TYP 2 PER DB CABINET SECTION).
21. #10 SELF DRILLING SCREW TO METAL STUD (TYP 2 PER CLIP).
22. 3/8" BOLT WITH WASHER AND NUT TO DB CABINET.
23. DISTRIBUTION BOARD CABINET.

RELEASE
01-18-13
DATE JMK

EDP # S593062-EDP03

DRAWN ZF LUTHER	DATE 11/15/11
CHECKED	
ENGR BG BJ GRAF	1/18/13
APVD	
OTHER	
OTHER	
APVD FOR IMPLEMENTATION BY NA ON WORKSHEETS	

U. S. DEPARTMENT OF ENERGY
PACIFIC NORTHWEST SITE OFFICE
Pacific Northwest Division — Battelle — Richland, Washington 99352

ELECTRICAL POWER
RM 1109 SECTIONS

PROJ TITLE: HPCS-4 POWER & COOLING

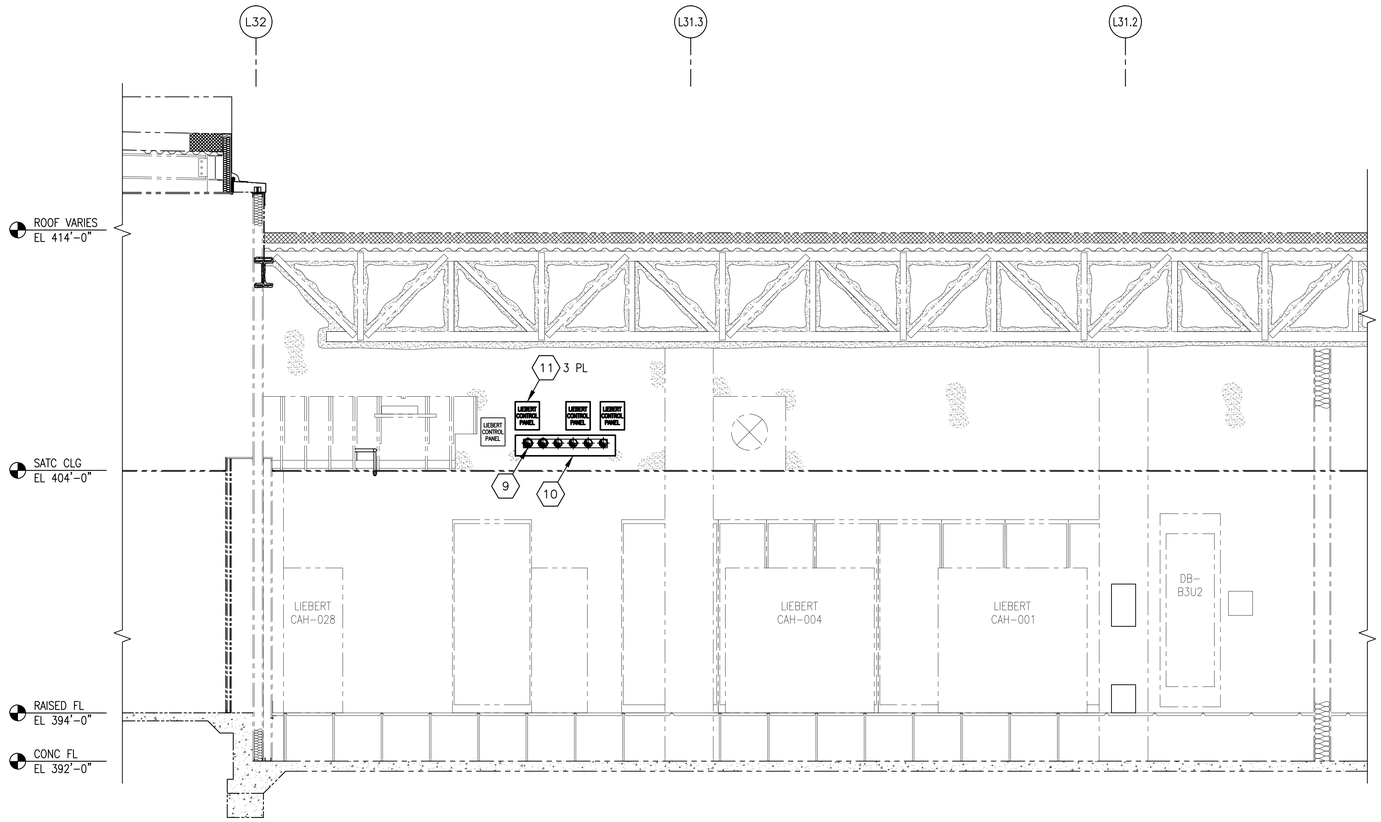
SIZE	INDEX NO	BLDG NO	DWG NO	REV NO
F	7301	EMSL	WS9632	0

SCALE SHOWN — SHEET 3 OF 4

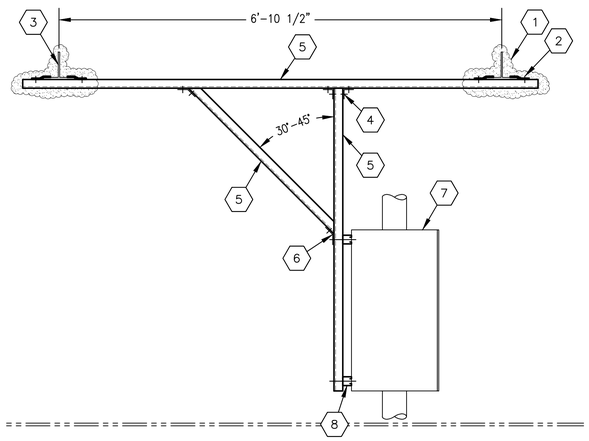
DRAWING NO	DRAWING TITLE
REFERENCE DRAWINGS	
NEXT USED ON	

RR	QA BY / DATE	ENGR BY / DATE	CHK BY / DATE	REV BY / DATE	DESCRIPTION	REV NO

REVISIONS



C/1 ELEVATION
SCALE: 3/8" = 1'-0"



D/2 SECTION
SCALE: 1" = 1'-0"

SHEET NOTES

1. REMOVE EXISTING FIREPROOFING FOR INSTALLATION OF NEW SUPPORT. REPLACE COATING WITH GRACE CONSTRUCTION PRODUCTS, MONOKOTE Z106G TO EQUAL THICKNESS PER MANUFACTURER'S INSTRUCTIONS.
2. 1-5/8" FRAMING CHANNEL BEAM CLAMP AND NUT/BOLT (TYP 2).
3. EXISTING WT5" X 11" TRUSS LOWER CHORD WITH FIREPROOFING.
4. 1-5/8" FRAMING CHANNEL 90° FITTING WITH 3/8" BOLTS, WASHERS AND NUTS (TYP 2 PER FRAME).
5. 1-5/8" FRAMING CHANNEL. PROVIDE TWO FRAMES AS SHOWN PER J-BOX SUPPORT (TYP).
6. 1-5/8" FRAMING CHANNEL ADJUSTABLE ANGLE FITTING WITH 3/8" BOLTS, WASHERS AND NUTS (TYP 2 PER FRAME).
7. J-BOX AND CONDUIT.
8. 1-5/8" FRAMING CHANNEL WITH 3/8" BOLT, WASHER AND FRAMING NUT BETWEEN FRAMES. PROVIDE LENGTH AND SPACING AS NEEDED FOR J-BOX ATTACHMENT.
9. TRANSITION CONDUITS AGAINST WALL ONCE CLEAR OF EXISTING WALL ABOVE CEILING.
10. CUT AWAY METAL FRAMING STUDS AND GYPSUM BOARD AS NECESSARY FOR CONDUIT PENETRATION.
11. DISCONNECT, RELOCATE AND RECONNECT 3 LIEBERT CONTROL BOXES TO AVOID INTERFERENCE WITH NEW CONDUIT WALL PENETRATION.

RELEASE
01-18-13
DATE
JMK

EDP # S593062-EDP03

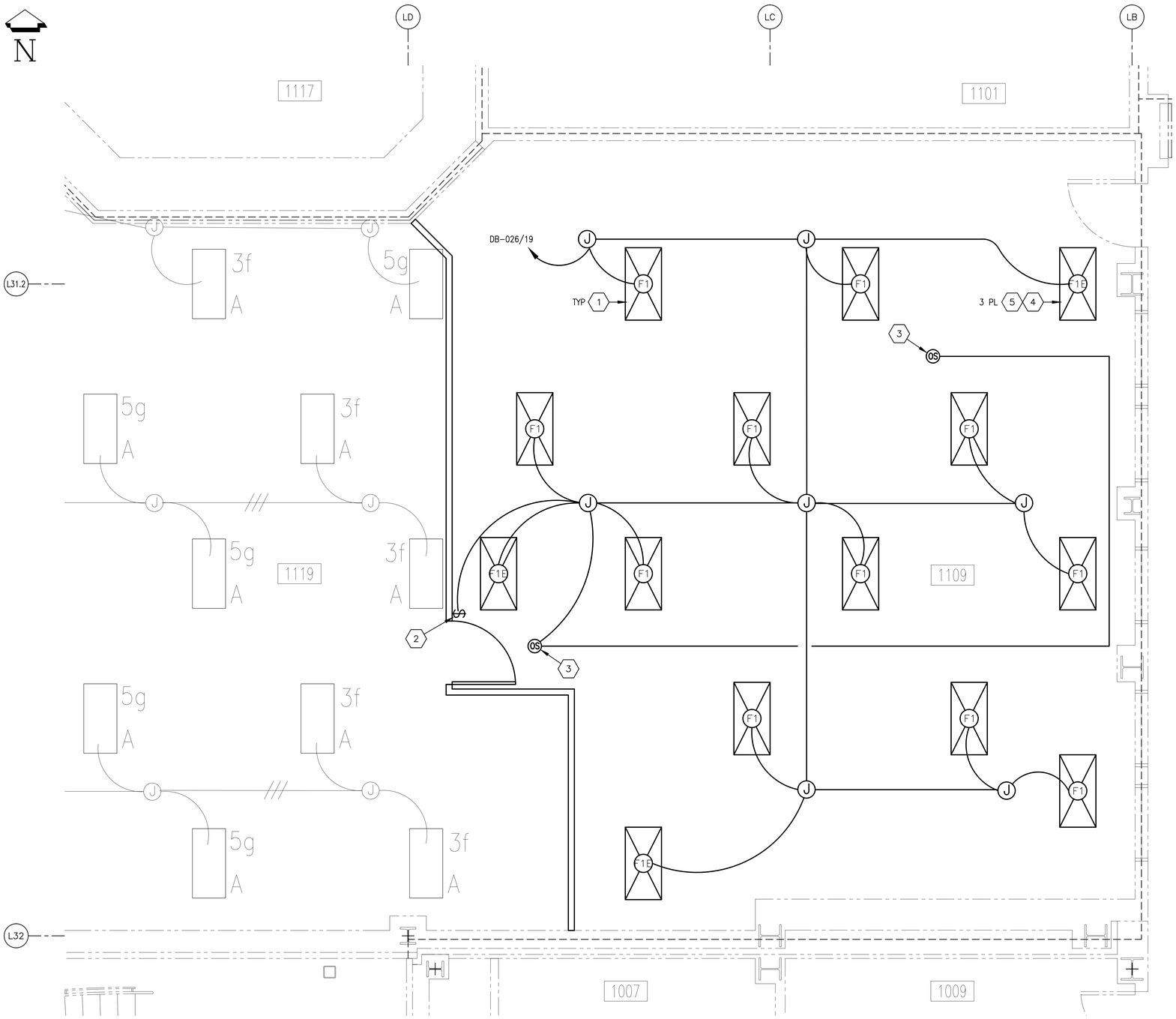
DRAWN ZF LUTHER	DATE 11/15/11	U. S. DEPARTMENT OF ENERGY PACIFIC NORTHWEST SITE OFFICE
CHECKED		Pacific Northwest Division — Battelle — Richland, Washington 99352
ENGR BG BJ GRAF	1/18/13	ELECTRICAL POWER RM 1109 SECTIONS
APVD		
OTHER		PROJ TITLE: HPCS-4 POWER & COOLING
OTHER		SIZE: F — INDEX NO: 7301 — BLDG NO: EMSL — DWG NO: WS9632 — REV NO: 0
APVD FOR IMPLEMENTATION BY NA ON WORKSHEETS		SCALE SHOWN — SHEET 4 OF 4

DRAWING NO	DRAWING TITLE
REFERENCE DRAWINGS	
NEXT USED ON	

REV NO	DESCRIPTION	QA BY / DATE	ENGR BY / DATE	CHK BY / DATE	REV BY / DATE
RR	REVISIONS				

APVD FOR IMPLEMENTATION BY
NA ON WORKSHEETS

Z0000513-R10-5/07



COMPUTER RM PARTIAL PLAN – LIGHTING

3/8" = 1'-0" SCALE 0' 2' 4' 8' FEET

GENERAL NOTES

(UNLESS OTHERWISE SPECIFIED)

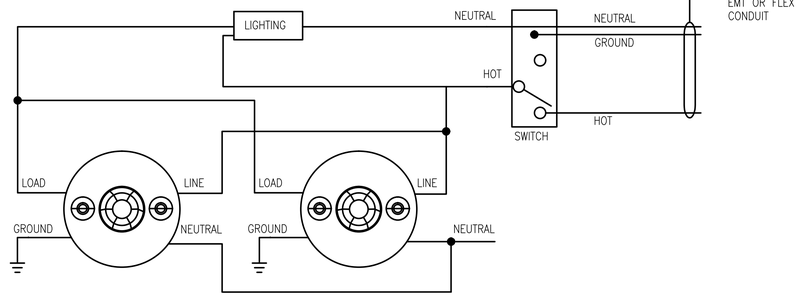
1. COORDINATE LIGHTING WITH ARCHITECTURAL REFLECTED CEILING PLAN. FOR REFLECTED CEILING PLAN SEE DRAWING WS9625.
2. INSTALL INDOOR LIGHTING PER NECA-500.
3. PROVIDE BLACK DEVICE AND STAINLESS STEEL FACEPLATES LABEL WITH PANEL AND CIRCUIT NUMBER.
4. FOR GENERAL NOTES, LEGEND, SEE DRAWING WS9611.

SHEET NOTES

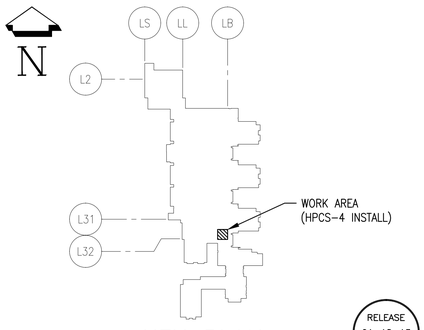
1. INSTALL LIGHTS IN LOCATION SHOWN.
2. INSTALL NEW LIGHT SWITCH IN LOCATION SHOWN. SWITCH TO BE HUBBELL HBL1221BK WITH SST SWITCH PLATE.
3. OCCUPANCY SENSORS TO BE SENSORSWITCH DUAL TECHNOLOGY, CMR-PDT-9-2P. SET INITIAL OCCUPANCY MODE TO "EITHER", SET MAINTAIN OCCUPANCY MODE TO "EITHER", SET RE-TRIGGER TO "PIR'. SET TIME DELAY TO 10 MINUTES. OCCUPANCY SENSORS WILL REDUCE LIGHT LEVEL TO 50% WHEN SPACE IS UNOCCUPIED.
4. CONNECT FIXTURE TYPE "F1E" BATTERY BALLAST TO UN-SWITCHED HOT LEG OF LIGHTING CIRCUIT.
5. PROVIDE FIXTURES WITH BATTERY BALLAST, PHENOLIC LABEL INDICATING EQUIPMENT IDENTIFICATION ON GRID NEAR FIXTURE (3 LOCATIONS).

LIGHTING FIXTURE SCHEDULE

LTR	MANUFACTURER NAME	MANUFACTURER CATALOG NO.	FIX VA	LAMP TYPE	MOUNTING	REMARKS	QTY
F1	LITHONIA	2RT5-28T5-MVOLT-GEB115S-LPM841P	58	(2)F28T5	GRID		11
F1E	LITHONIA	2RT5-28T5-MVOLT-GEB115S-LPM841P-EL14	58	(2)F28T5	GRID	EMERGENCY BATTERY PACK, BODINE REDITEST LP600STU	3



LIGHTING CONTROL WIRING DIAGRAM



KEY PLAN

SCALE: NONE

RELEASE 01-18-13 DATE JMK

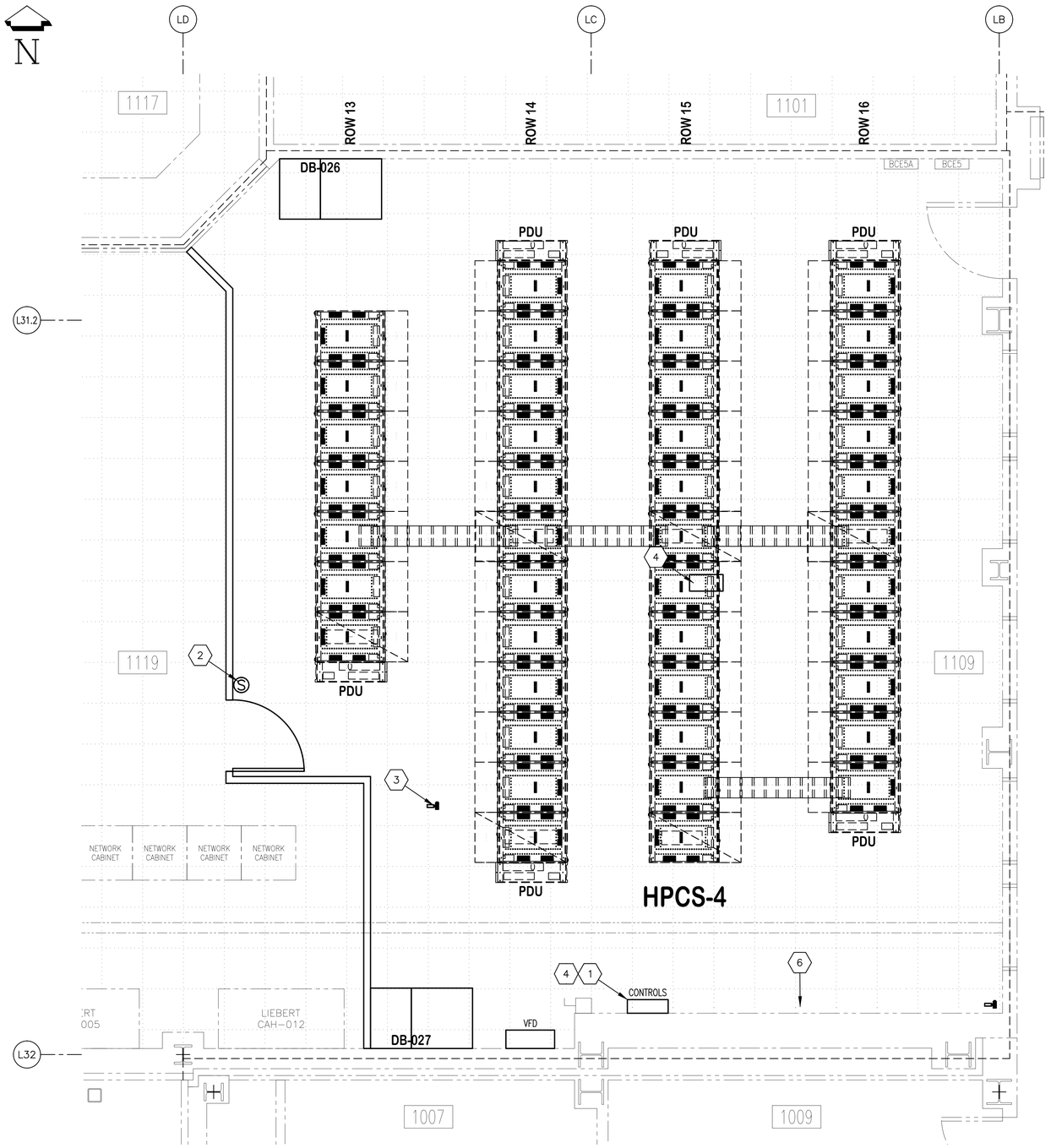
EDP # S593062-EDP03

DRAWN KS KOSCHIK	DATE 11/15/11	U. S. DEPARTMENT OF ENERGY PACIFIC NORTHWEST SITE OFFICE	
CHECKED		Pacific Northwest Division Battelle Richland, Washington 99352	
ENGR BG BJ GRAF	1/18/13	ELECTRICAL LIGHTING RM 1109 PARTIAL PLAN	
APVD		PROJ TITLE HPCS-4 POWER & COOLING	
OTHER		SIZE F / INDEX NO 0800 / BLDG NO EMSL / DWG NO WS9633 / REV NO 0	
OTHER		SCALE SHOWN / SHEET 1 OF 1	
APVD FOR IMPLEMENTATION BY NA ON WORKSHEET			

H-3-71316	LIGHTING MAIN LEVEL COMPUTER LAB 1
WS9611	PROJECT LEGEND/ABBREV
WS9600	PROJECT TITLE/DWG LIST
S593062-SPCC03	CONSTRUCTION SPEC
DRAWING NO	DRAWING TITLE
REFERENCE DRAWINGS	
NEXT USED ON	

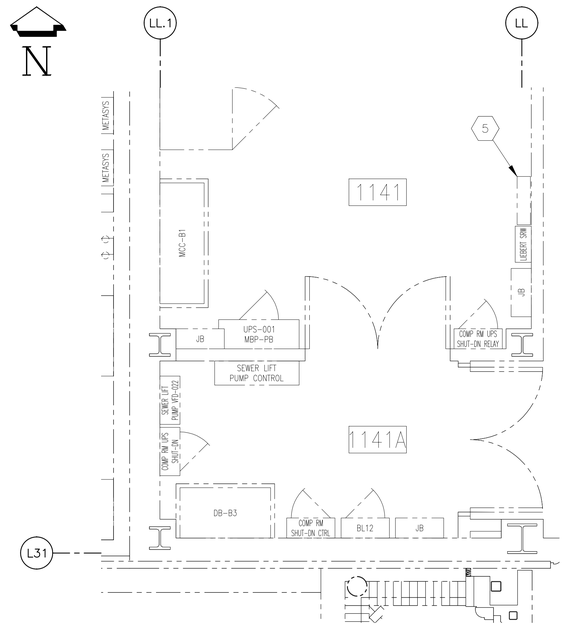
RR	QA BY / DATE	ENGR BY / DATE	CHK BY / DATE	REV BY / DATE	DESCRIPTION	REV NO
REVISIONS						

Z0000513-R10-S/07



COMPUTER RM PARTIAL PLAN – EQUPMENT PLAN

3/8" = 1'-0" SCALE 0' 2' 4' 8' FEET



PARTIAL FL PLAN – RM 1141

3/8" = 1'-0" SCALE 0' 2' 4' 8' FEET

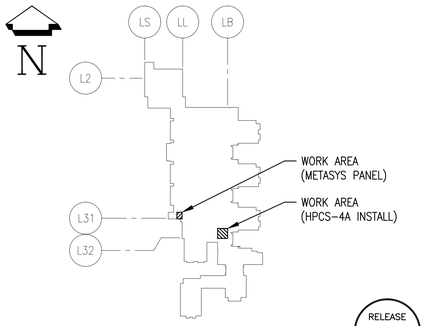
GENERAL NOTES

(UNLESS OTHERWISE SPECIFIED)

1. DIMENSIONS ARE IN FEET AND INCHES UNLESS OTHERWISE SPECIFIED.
2. FIELD VERIFY DIMENSIONS AND REPORT DISCREPANCIES WITH FIELD CONDITIONS TO BATTELLE CONSTRUCTION MANAGER PRIOR TO ANY CONSTRUCTION.
3. WORK SHALL BE COORDINATED WITH THE BATTELLE CONSTRUCTION MANAGER.
4. SURFACES DAMAGED DURING CONSTRUCTION SHALL BE REPAIRED TO MATCH CONDITION OF EXISTING.
5. NOT ALL SYMBOLS SHOWN IN LEGEND OR ABBREVIATIONS IN LIST ARE USED ON PROJECT DRAWINGS. ADDITIONAL ABBREVIATIONS (NOT SHOWN) ARE IN ACCORDANCE WITH ASME Y14.38–1999. SEE WORKSHEET WS9611.

SHEET NOTES

1. NEW CONTROL PANEL ENCLOSURE.
2. SPACE SENSOR. ROUTE CONDUCTORS TO CONTROL PANEL ENCLOSURE AND TERMINATE.
3. DIFFERENTIAL TRANSMITTER. ROUTE CONDUCTORS TO VFD FOR P–41 AND P42 AND TERMINATE.
4. TERMINAL UNIT LOCATED IN DUCTWORK. MAKE CONNECTIONS PER SHEET 4.
5. ROUTE CAT 5E CABLE FROM CONTROL PANEL ENCLOSURE TO NETWORK SWITCH LOCATED IN ROOM 1141 AND TERMINATE.
6. ALL OTHER INSTRUMENTATION IS LOCATED ON THE MECHANICAL ELEVATION A WS9627 SHEET 2.



KEY PLAN

SCALE: NONE

RELEASE 01–18–13 DATE JMK

EDP # S593062–EDP03

WS9611	PROJECT LEGEND/ABBREV
WS9610	PROJECT TITLE/DWG LIST
S593062–SPCC03	CONSTRUCTION SPEC
DRAWING NO	DRAWING TITLE

REFERENCE DRAWINGS

NEXT USED ON

RR	QA BY / DATE	ENGR BY / DATE	CHK BY / DATE	REV BY / DATE	DESCRIPTION	REV NO

REVISIONS

DRAWN KS KOSCHIK	DATE 11/15/11	U. S. DEPARTMENT OF ENERGY PACIFIC NORTHWEST SITE OFFICE	
CHECKED		Pacific Northwest Division Battelle Richland, Washington 99352	
ENGR BG BJ GRAF	1/18/13	ELECTRICAL CONTROL PLAN	
APVD			
OTHER		PROJ TITLE HPCS–4 POWER & COOLING	
OTHER		SIZE F / INDEX NO 7601 / BLDG NO EMSL / DWG NO WS9634 / REV NO 0	
APVD FOR IMPLEMENTATION BY NA ON WORKSHEETS		SCALE NONE / SHEET 1 OF 4	

Z0000513–R10–5/07

EXISTING ALERTON
CENTRAL OPERATOR WORKSTATION
LOCATION: PSF MDF ROOM
IP ADDRESS: 130.20.7.52
DEVICE INSTANCE: 599
ETHERNET NETWORK: 100

ALERTON WEB USER INTERFACE
OPERATES IN A VIRTUAL MACHINE ON THE CENTRAL OPERATOR WORKSTATION
IP ADDRESS: 130.20.7.53
DEVICE INSTANCE: 598
ETHERNET NETWORK: 100

EXISTING JCI PMI
OPERATOR WORKSTATION
LOCATION: DISTRIBUTED

PNNL FMCS DOT 7 NETWORK (EXST)

NAE55 (EXSTING)
LOCATION: 1141
IP ADDRESS: 130.20.7.XX
DEVICE INSTANCE: TBD
ETHERNET NETWORK: 100

LOCAL AREA NETWORK

NETWORK

VLX
LOCATION: TBD
IP ADDRESS: 130.20.7.X
DEVICE INSTANCE: TBD
ETHERNET NETWORK: 100
MS/TP NETWORK: TBD

BCM-ETH
LOCATION: 1109
IP ADDRESS: 130.20.7.xx
DEVICE INSTANCE: TBD
ETHERNET NETWORK: 100
MS/TP NETWORK: TBD

ONICON
SYSTEM 10
BTU METER

EXP-1048

PUMP P-41 & P-42
FC-102 VFD
DUAL ARM PUMP

PROCESS LOOP DIFF. PRESSURE

EXP-1048

MODBUS INTERFACE

REAR DOOR
(BY OTHERS)
HEAT EXCHANGERS (TYP OF 42)

PDU
(BY OTHERS)
(TYP OF 6)

TERMINAL UNIT
CONTROLLER

1 BACnet RISER DETAIL
DIAGRAMMATIC

RELEASE
01-18-13
DATE
JMK

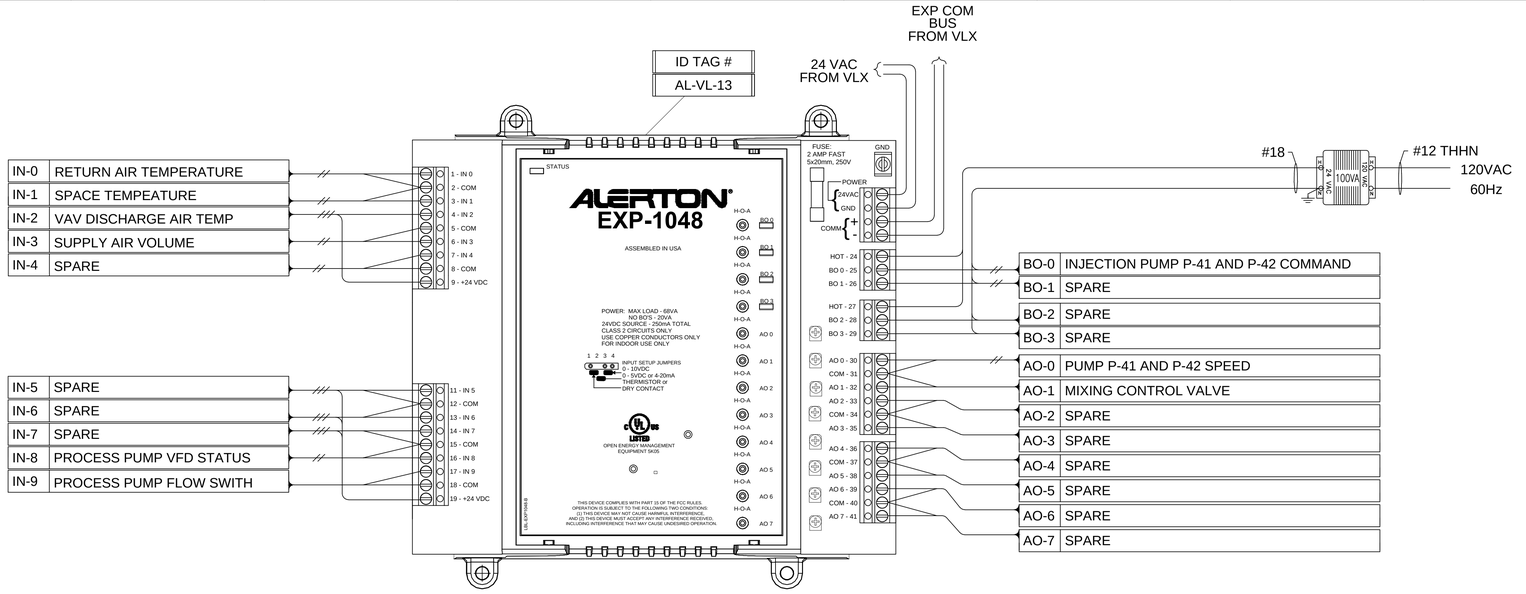
EDP # S593062-EDP03

DRAWN KS KOSCHIK	DATE 11/15/11	U. S. DEPARTMENT OF ENERGY PACIFIC NORTHWEST SITE OFFICE
CHECKED		Pacific Northwest Division — Battelle — Richland, Washington 99352
ENGR BG BJ GRAF	1/18/13	ELECTRICAL CONTROL BUS DIAGRAM
APVD		
OTHER		PROJ TITLE: HPCS-4 POWER & COOLING
OTHER		SIZE F; INDEX NO 7601; BLDG NO EMSL; DWG NO WS9634; REV NO 0
APVD FOR IMPLEMENTATION BY NA ON WORKSHEETS		SCALE NONE; SHEET 2 OF 4

DRAWING NO	DRAWING TITLE
REFERENCE DRAWINGS	
NEXT USED ON	

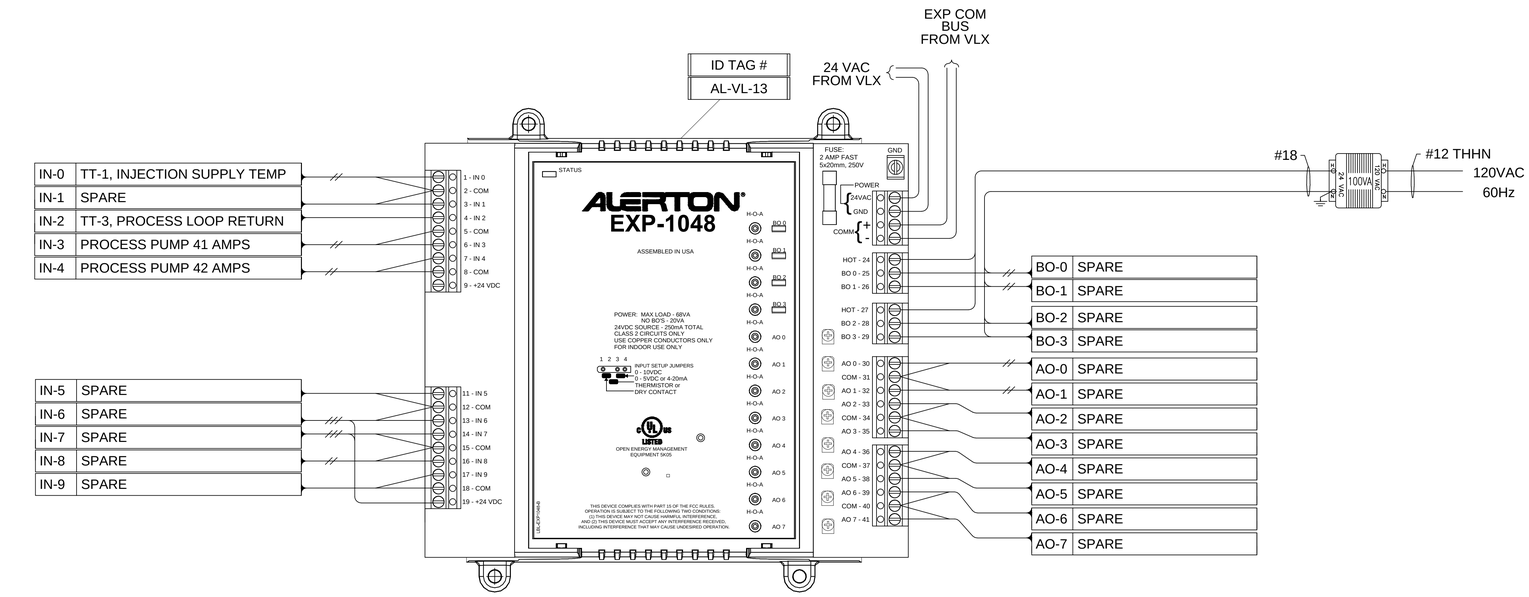
RR	QA BY / DATE	ENGR BY / DATE	CHK BY / DATE	REV BY / DATE	DESCRIPTION	REV NO
REVISIONS						

Z0000513-R10-5/07



1 — HYDRONIC LOOP EXP MODULE 0 WIRING DETAIL

DIAGRAMMATIC



2 — HYDRONIC LOOP EXP MODULE 1 WIRING DETAIL

DIAGRAMMATIC

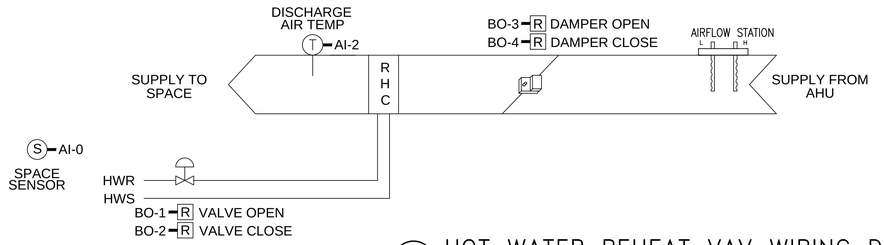
RELEASE
01-18-13
DATE
JMK

EDP # S593062-EDP03

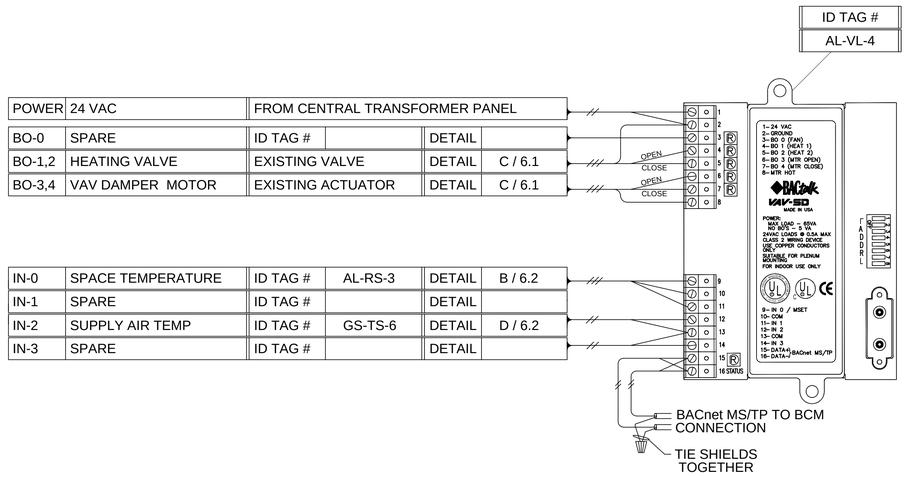
DRAWN KS KOSCHIK	DATE 11/15/11	U. S. DEPARTMENT OF ENERGY PACIFIC NORTHWEST SITE OFFICE	
CHECKED		Pacific Northwest Division — Battelle — Richland, Washington 99352	
ENGR BG BJ GRAF	1/18/13	ELECTRICAL CONTROL	
APVD		EXP MODULE WIRING DIAG	
OTHER		PROJ TITLE HPCS-4 POWER & COOLING	
OTHER		SIZE F / INDEX NO 7601 / BLDG NO EMSL / DWG NO WS9634 / REV NO 0	
APVD FOR IMPLEMENTATION BY NA ON WORKSHEETS		SCALE NONE / SHEET 3 OF 4	

DRAWING NO	DRAWING TITLE
REFERENCE DRAWINGS	
NEXT USED ON	

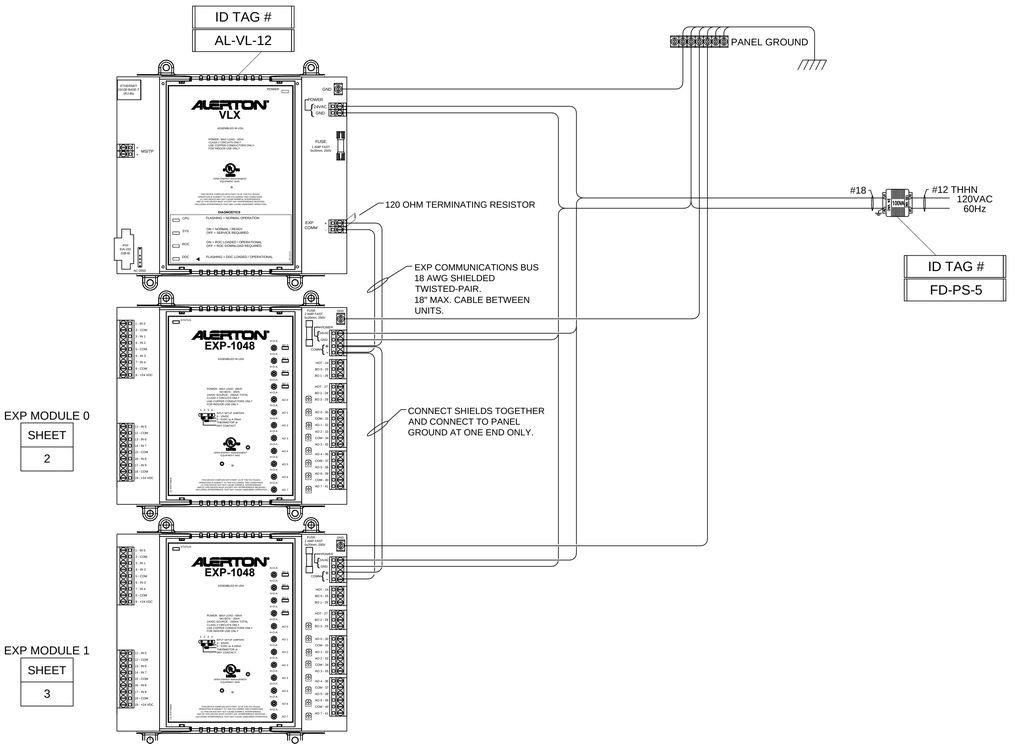
RR	QA BY / DATE	ENGR BY / DATE	CHK BY / DATE	REV BY / DATE	DESCRIPTION	REV NO
REVISIONS						



3 HOT WATER REHEAT VAV WIRING DETAIL
DIAGRAMMATIC



2 HOT WATER REHEAT VAV WIRING DETAIL
DIAGRAMMATIC



1 VLX AND EXP MODULE WIRING DETAIL
DIAGRAMMATIC

RELEASE 01-18-13 DATE JMK

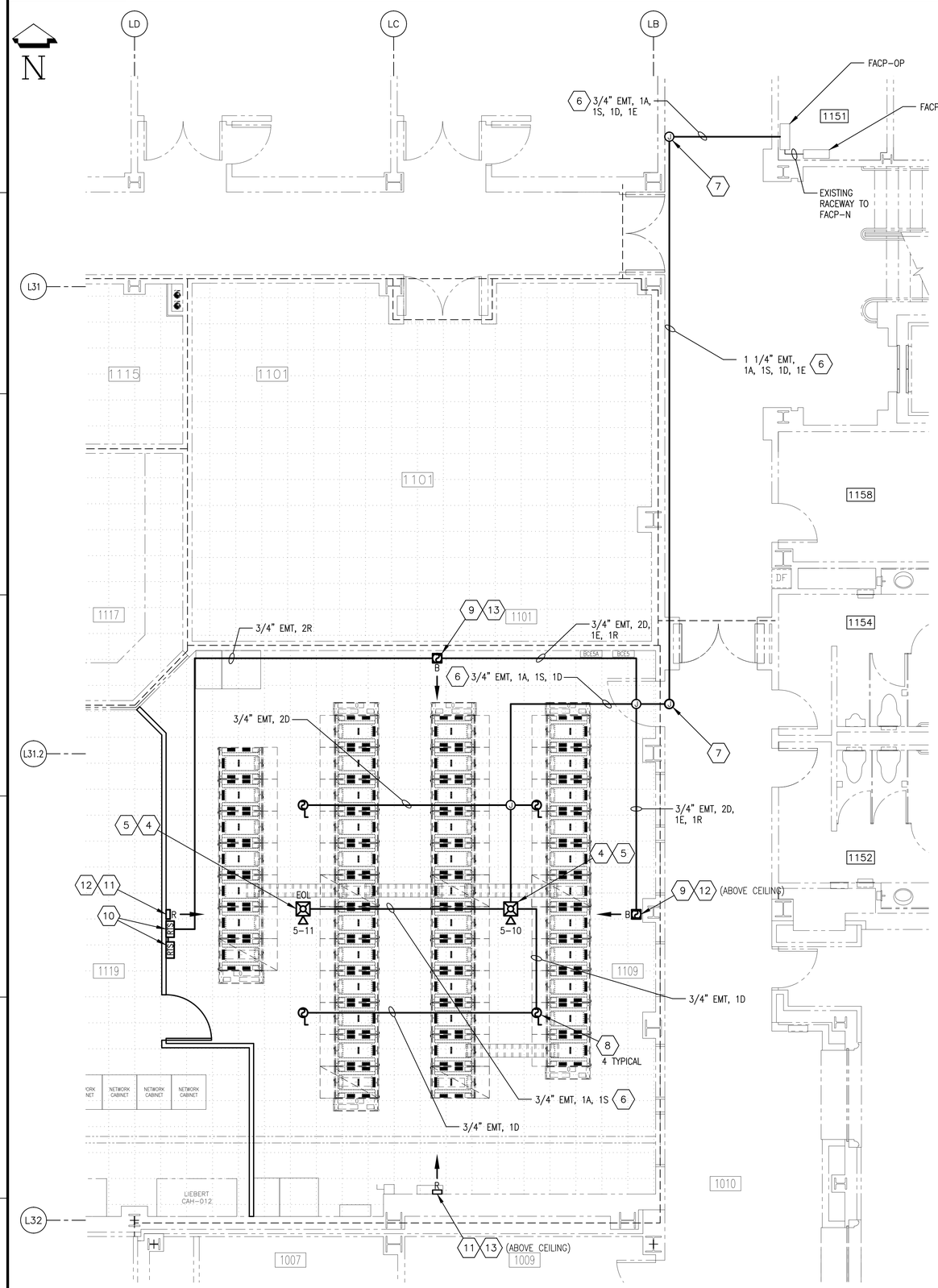
EDP # S593062-EDP03

DRAWN KS KOSCHIK	DATE 11/15/11	U. S. DEPARTMENT OF ENERGY PACIFIC NORTHWEST SITE OFFICE	
CHECKED		Pacific Northwest Division — Battelle — Richland, Washington 99352	
ENGR STEVE GOURLEY BJ GRAF	1/18/13	ELECTRICAL CONTROL WIRING DIAG	
APVD			
OTHER		PROJ TITLE HPCS-4 POWER & COOLING	
OTHER		SIZE F / INDEX NO 7601 / BLDG NO EMSL / DWG NO WS9634 / REV NO 0	
APVD FOR IMPLEMENTATION BY NA ON WORKSHEETS		SCALE NONE / SHEET 4 OF 4	

DRAWING NO	DRAWING TITLE
REFERENCE DRAWINGS	
NEXT USED ON	

RR	QA BY / DATE	ENGR BY / DATE	CHK BY / DATE	REV BY / DATE	DESCRIPTION	REV NO
REVISIONS						

20000513-R10-5/07



COMPUTER RM PARTIAL PLAN – EQUPMENT PLAN

1/4" = 1'-0" SCALE 0' 2' 4' 8' 12' FEET

WIRE LEGEND

SYMBOL	DESCRIPTION	
A	2#14AWG THHN	STROBE CIRCUIT, COMMERCIAL
S	2#14AWG TWISTED PAIR, SHIELDED	SPEAKER CIRCUIT, WEST PENN WIRE #60992B
D	2#14AWG TWISTED PAIR, UNSHIELDED	SIGNAL LINE CIRCUIT (SLC) WEST PENN WIRE #60993B
E	2#14AWG THHN	AUX, FUNCTION CIRCUIT (HVAC, 24VDC)
R	5#14AWG THHN	REMOTE TEST SWITCH, CIRCUIT

SHEET NOTES

1. NOT USED.
2. NOT USED.
3. NOT USED.
4. NOTIFICATION DEVICES SHALL BE NOTIFIER/SYSTEM SENSOR SPEAKER STROBE #SPSCR; CEILING MOUNTED, COLOR RED, STANDARD CANDELA OUTPUTS, ADJUSTABLE SPEAKER STROBE OUTPUT, INDOORS.
5. INSTALL CEILING MOUNT SPEAKER STROBES IN 4" x 4" x 2 1/8" DEEP STEEL ELECTRICAL BOX. STROBES SHALL BE CONNECTED TO FACP-OP, ACPS-610, OUTPUT #2. SPEAKER SHALL BE CONNECTED TO SPARE AUDIO OUTPUT AT FACP-OP, DAA2-7525 AMPLIFIER, OUTPUT #2, TB11. COORDINATE EXACT LOCATION WITH CONSTRUCTION MANAGER. INSTALLATION SHOULD BE ABOVE ISLES BETWEEN COMPUTERS AS SHOWN.
6. FIELD ROUTE CONDUITS IN CEILING SPACE FROM RM 1151 TO COMPUTER RM. FIRST CONDUIT SECTIONS ARE OVERSIZED TO PROVIDE SPACE FOR FUTURE WIRING.
7. PROVIDE PULL BOX. RECOMMEND 10" x 10" x 6" MINIMUM SIZE, STEEL W/SCREW COVER.
8. INSTALL LASER SMOKE DETECTOR, NOTIFIER #FSL-751, IN SUSPENDED CEILING USING PLUG-IN DETECTOR BASE, NOTIFIER #B210LP. MOUNT DETECTOR BASE TO 4" SQUARE STEEL BOX. DETECTOR ADDRESS SHALL BE DETERMINED BY PNNL FIRE PROTECTION ENGINEER. CONNECT TO SIGNAL LINE CIRCUIT (SLC) #2 AT FACP-OP IN ROOM 1151.
9. WALL MOUNT SINGLE ENDED, REFLECTION TYPE, BEAM SMOKE DETECTOR, NOTIFIER #FSB200S. MOUNT ABOUT 12" BELOW ROOF DECKING WHERE LINE OF SIGHT TO ASSOCIATED REFLECTOR IS POSSIBLE. SECURELY MOUNT TO ELIMINATE VIBRATIONS. RECOMMEND USING SURFACE MOUNT KIT, NOTIFIER #BEAMSMK. CONNECT TO SLC#2 FROM FACP-OP AND 24VDC FROM FACP-OP IN ROOM 1151. CONNECT TO WALL MOUNTED REMOTE TEST STATION. DETECTOR ADDRESS TO BE DETERMINED BY PNNL FIRE PROTECTION ENGINEER. COMPLETE ALIGNMENT ADJUSTMENTS AND SENSITIVITY TESTS PER MANUFACTURER'S INSTALLATION INSTRUCTIONS.
10. INSTALL NOTIFIER #RTS151, REMOTE TEST STATION. WALL MOUNT REMOTE TEST STATION AT 4' AFF TO BOTTOM OF UNIT. MOUNT IN RECESSED STEEL BOX. CONNECT WIRING TO BEAM SMOKE DETECTOR. SEE WIRING DIAGRAM ON SHEET 2.
11. INSTALL REFLECTOR FOR BEAM SMOKE DETECTOR. DIMENSION; APPROX 7.5" x 8.5". SECURELY MOUNT TO WALL OR 1 5/8" FRAMING CHANNEL SUPPORT AT SAME ELEVATION AS BEAM SMOKE DETECTOR TRANSMITTER. REFER TO MANUFACTURER'S INSTALLATION INSTRUCTIONS.
12. LOCATIONS MAY BE ADJUSTED TO ACHIEVE BEST LINE OF SIGHT BETWEEN TRUSS OPEN WEB. PROVIDE FRAMING CHANNEL SUPPORT FOR REFLECTOR MOUNTING. REFLECTIVE OBJECTS SHOULD BE 4 FT FROM LINE OF SIGHT BETWEEN REFLECTOR AND BEAM SMOKE DETECTOR TRANSMITTER. REFLECTIVE OBJECTS MAY NEED TO BE PAINTED TO REDUCE REFLECTIONS, IF PROBLEMS OCCUR DURING TESTING.
13. BEAM SMOKE DETECTOR AND REFLECTOR LOCATIONS SHOULD BE POSITIONED MIDWAY BETWEEN THE TRUSSES.

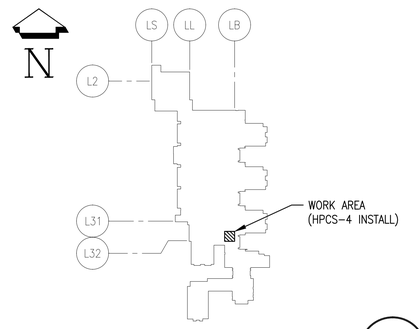
GENERAL NOTES

(UNLESS OTHERWISE SPECIFIED)

1. DIMENSIONS ARE IN FEET AND INCHES UNLESS OTHERWISE SPECIFIED.
2. FIELD VERIFY DIMENSIONS AND REPORT DISCREPANCIES WITH FIELD CONDITIONS TO BATTELLE CONSTRUCTION MANAGER PRIOR TO ANY CONSTRUCTION.
3. WORK SHALL BE COORDINATED WITH THE BATTELLE CONSTRUCTION MANAGER.
4. SURFACES DAMAGED DURING CONSTRUCTION SHALL BE REPAIRED TO MATCH CONDITION OF EXISTING.
5. ADDITIONAL ABBREVIATIONS (NOT SHOWN) ARE IN ACCORDANCE WITH ASME Y14.38-1999. SEE WORKSHEET WS9611.
6. THE CONDUIT SHOWN ON THE DRAWINGS IS DIAGRAMMATIC IN NATURE AND DOES NOT NECESSARILY SHOW ALL REQUIRED FITTINGS AND/OR ACTUAL ROUTING. ALL OBSTRUCTIONS MAY NOT BE SHOWN ON DRAWINGS. PROVIDE ALL MATERIAL FOR A COMPLETE INSTALLATION.
7. ALL PENETRATIONS IN FIRE BARRIERS MUST BE SEALED WITH PERMANENT FIRESTOP SEAL. ALL WALLS IN THE PROJECT AREA OF RM 1109 ARE 1-HOUR RATED FIRE BARRIERS, CAUTION SHOULD BE EXERCISED TO PREVENT DAMAGE TO FIRE BARRIERS. REPAIR DAMAGED AREAS IN ACCORDANCE WITH REQUIRED STANDARDS AND UL LISTED DETAILS.
8. AN ACCEPTANCE TEST PROCEDURE WILL BE REQUIRED AFTER INSTALLATION IS COMPLETED TO VERIFY THE FIRE ALARM SYSTEM IS OPERATIONAL.
9. PROGRAM REVISION OF NOTIFIER FIRE ALARM CONTROL PANEL WILL BE PERFORMED BY REDHAWK TECHNICIAN UNDER SUPERVISION OF PNNL FIRE PROTECTION ENGINEER.
10. FIRE ALARM LOW VOLTAGE WIRING SHALL BE INSTALLED IN DEDICATED RACEWAY NOT USED FOR ANY OTHER WIRING.
11. FIRE ALARM SYSTEM AND COMPONENTS SHALL BE INSTALLED IN ACCORDANCE WITH NFPA 72, 2010 EDITION.
12. OUTAGES OF EXISTING FIRE ALARM SYSTEM SHALL BE SCHEDULED AT LEAST 3 DAYS IN ADVANCE OF PROPOSED INTERRUPTION OF FIRE ALARM SERVICE.

LEGEND

- EXISTING BUILDING OR STRUCTURE
- NEW
- SPEAKER STROBE
- L — LASER SMOKE DETECTOR
- B — BEAM SMOKE DETECTOR
- R — REFLECTOR FOR BEAM SMOKE DETECTOR
- RTS — REMOTE TEST STATION



KEY PLAN
SCALE: NONE

RELEASE 01-18-13 DATE JMK

EDP # S593062-EDP03

WS9611	PROJECT LEGEND/ABBREV
WS9610	PROJECT TITLE/DWG LIST
S593062-SPCC03	CONSTRUCTION SPEC
DRAWING NO	DRAWING TITLE

REFERENCE DRAWINGS
NEXT USED ON

RR	QA BY / DATE	ENGR BY / DATE	CHK BY / DATE	REV BY / DATE	DESCRIPTION	REV NO

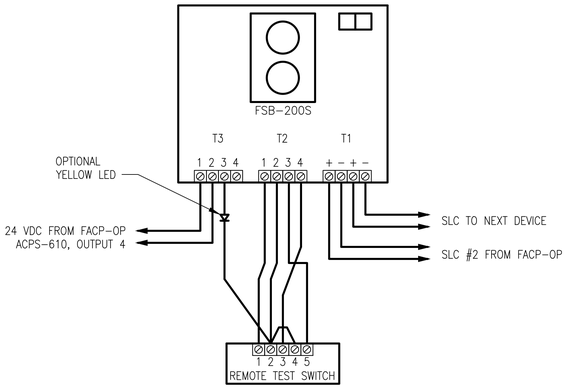
REVISIONS

DRAWN DS BOYLE	DATE 11/15/11	U. S. DEPARTMENT OF ENERGY PACIFIC NORTHWEST SITE OFFICE
CHECKED		Pacific Northwest Division Battelle Richland, Washington 99352
ENGR ALM AL MINTON	1/18/13	ELECTRICAL FIRE ALARM MODS PARTIAL PLAN RM 1109
APVD		PROJ TITLE HPCS-4 POWER & COOLING
OTHER		SIZE F / INDEX NO 7702 / BLDG NO EMSL / DWG NO WS9635 / REV NO 0
OTHER		SCALE NONE / SHEET 1 OF 2
APVD FOR IMPLEMENTATION BY NA ON WORKSHEET		

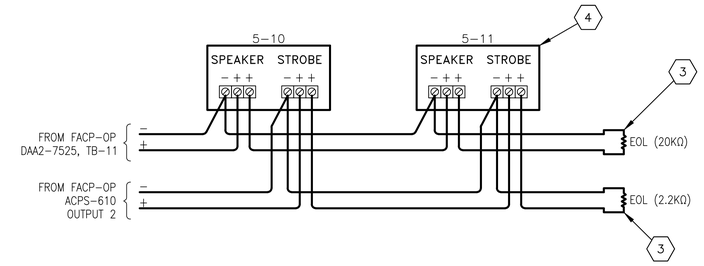
20000513-R10-5/07

SHEET NOTES

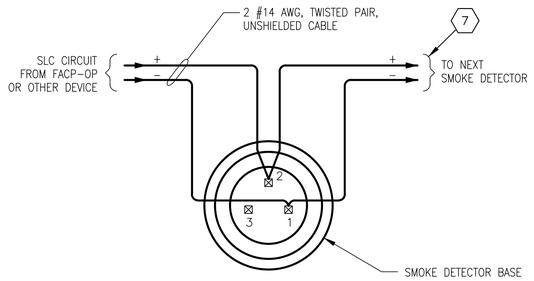
1. PROVIDE 2 #14 THHN FOR STROBE CIRCUITS.
2. PROVIDE 2 #14 AWG TWISTED PAIR, SHIELDED CABLE FOR SPEAKER CIRCUIT TO COMPUTER ROOM.
3. INSTALL EOL DEVICE FOR SPEAKER AND STROBE CIRCUITS AT LAST DEVICE ON CIRCUIT. PLEASE NOTE SPEAKER AND STROBE EOL HAVE DIFFERENT RESISTANCE.
4. PROVIDE ADHESIVE LABEL WITH DEVICE NUMBER WHERE NOTIFICATION DEVICES INSTALLED.
5. SLC CIRCUIT MAY BE T-TAPPED AT A JUNCTION BOX OR AT FACP-OP.
6. PROVIDE 2 #14 THHN FOR COMPUTER ROOM BEAM SMOKE DETECTORS, 24 VDC SUPPLY.
7. NO EOL DEVICE IS REQUIRED ON SLC CIRCUIT.



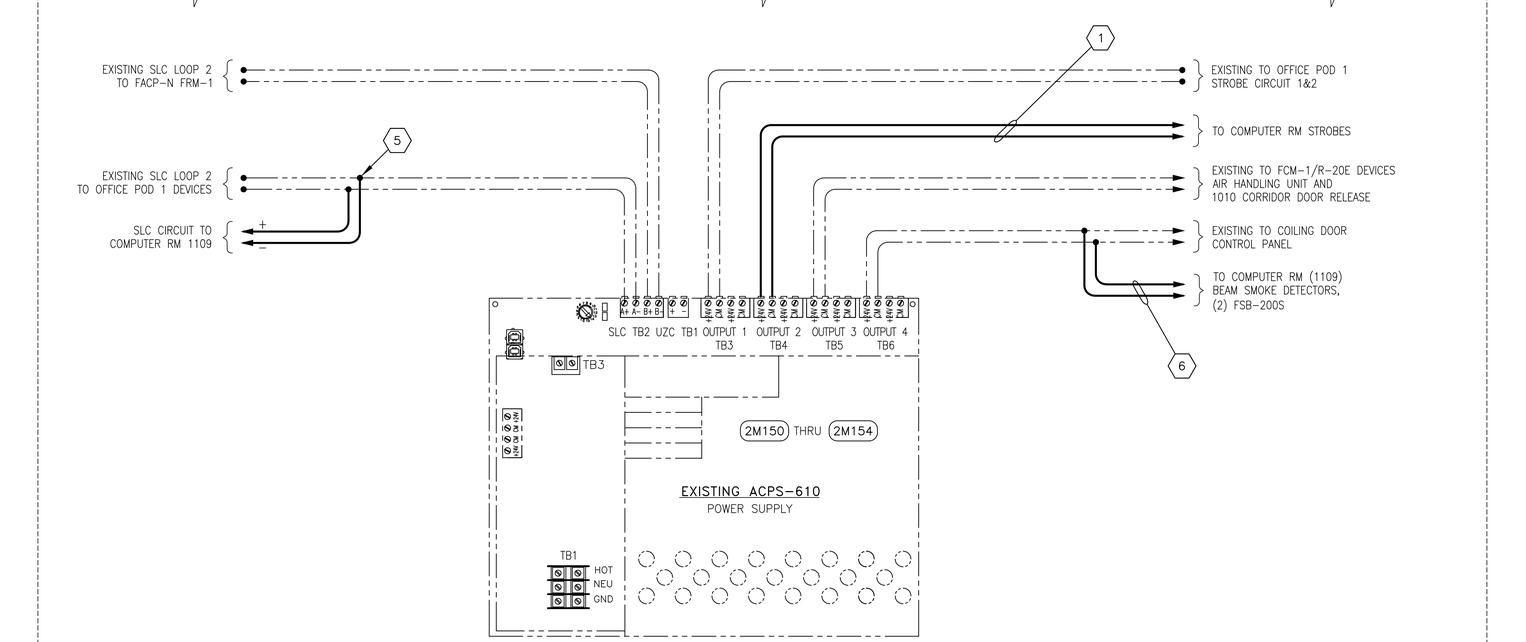
WIRING DIAGRAM, BEAM SMOKE DETECTOR



WIRING DIAGRAM, NOTIFICATION DEVICE



LASER SMOKE DETECTOR WIRING DIAGRAM



WIRING DIAGRAM, FACP-OP RM 1151

DRAWING NO	DRAWING TITLE
REFERENCE DRAWINGS	
NEXT USED ON	

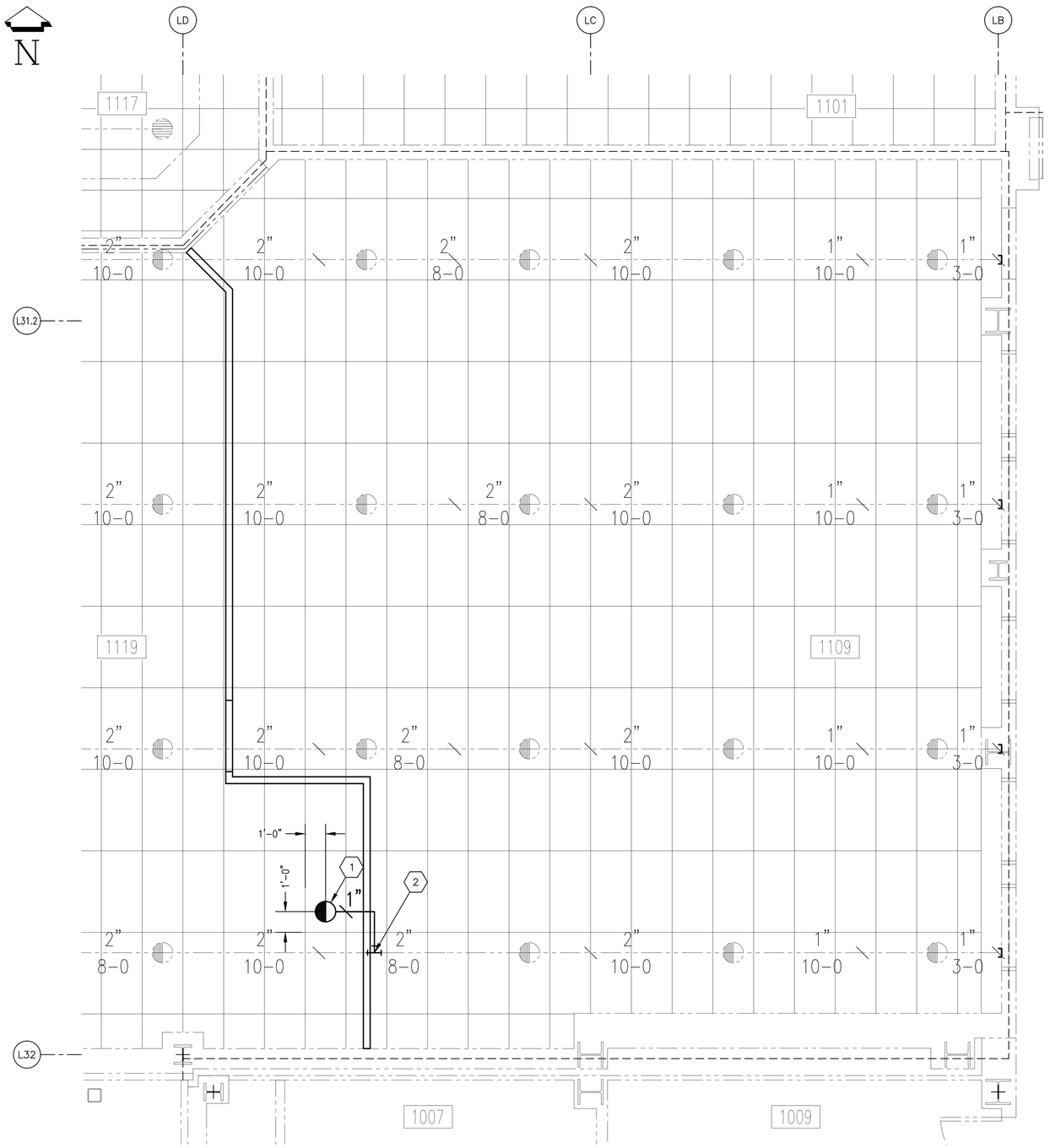
RR	QA BY / DATE	ENGR BY / DATE	CHK BY / DATE	REV BY / DATE	DESCRIPTION	REV NO
REVISIONS						

DRAWN DS BOYLE	DATE 11/15/11	U. S. DEPARTMENT OF ENERGY PACIFIC NORTHWEST SITE OFFICE
CHECKED		Pacific Northwest Division — Battelle — Richland, Washington 99352
ENGR AL MINTON	1/18/13	ELECTRICAL FIRE ALARM MODS WIRING DIAGRAMS
APVD		PROJ TITLE: HPCS-4 POWER & COOLING
OTHER		SIZE F; INDEX NO 7702; BLDG NO EMSL; DWG NO WS9635; REV NO 0
OTHER		SCALE NONE; SHEET 2 OF 2
APVD FOR IMPLEMENTATION BY NA ON WORKSHEET		

RELEASE 01-18-13 DATE JMK

EDP # S593062-EDP03

Z0000513-R10-S/07



COMPUTER RM PARTIAL PLAN – MOD @ FIRE SPRINKLER

3/8" = 1'-0" 0' 2' 4' 8' SCALE FEET

NOTE: SATC GRID SHOWN FOR REFERENCE.

GENERAL NOTES

(UNLESS OTHERWISE SPECIFIED)

1. DIMENSIONS ARE IN FEET AND INCHES UNLESS OTHERWISE SPECIFIED.
2. FIELD VERIFY DIMENSIONS AND REPORT DISCREPANCIES WITH FIELD CONDITIONS TO BATTELLE CONSTRUCTION MANAGER PRIOR TO ANY CONSTRUCTION.
3. WORK SHALL BE COORDINATED WITH THE BATTELLE CONSTRUCTION MANAGER.
4. SURFACES DAMAGED DURING CONSTRUCTION SHALL BE REPAIRED TO MATCH CONDITION OF EXISTING.
5. NOT ALL SYMBOLS SHOWN IN LEGEND OR ABBREVIATIONS IN LIST ARE USED ON PROJECT DRAWINGS. ADDITIONAL ABBREVIATIONS (NOT SHOWN) ARE IN ACCORDANCE WITH ASME Y14.38–1999. SEE WORKSHEET WS9611.
6. THE PIPING SHOWN ON THE DRAWINGS IS DIAGRAMMATIC IN NATURE AND DOES NOT NECESSARILY SHOW ALL REQUIRED FITTINGS AND/OR ACTUAL ROUTING. ALL OBSTRUCTIONS MAY NOT BE SHOWN ON DRAWINGS. PROVIDE ALL MATERIAL FOR A COMPLETE INSTALLATION.

SPECIFICATIONS

(UNLESS OTHERWISE STATED)

DIVISION 21 – FIRE SUPPRESSION

211101 FIRE PROTECTION – ABOVE GRADE

A. CODE APPLICABILITY: NFPA 13, 2010 EDITION.

B. SPRINKLER SYSTEM PIPING SHALL BE SCHEDULE 40 UL LISTED/FM APPROVED FOR AUTOMATIC SPRINKLER SYSTEM USE.

C. RUBBER GASKETED FITTINGS FOR USE WITH PLAIN END PIPE SHALL NOT BE USED.

D. ALL COMPONENTS USED IN SYSTEM SHALL BE UL/FM APPROVED (HANGERS, HEADS, PIPE, FITTINGS, VALVES, ALARM VALVES, ETC.). ALL PRESSURIZED COMPONENTS SHALL BE RATED FOR 150 PSIG MINIMUM.

E. FITTINGS SHALL BE MALLEABLE IRON, 150 OR 300 LB. CLASS, SCREWED, ASME B16.3.

F. COUPLING, GROOVED TYPE, LISTED AND APPROVED FOR USE IN SPRINKLER SYSTEM, (VICTAULIC STYLE 77) (GRUVLOC FIG 7001).

G. PAINT, LABEL AND CLEAN, PRIME AND APPLY RED FINISH COAT TO EXPOSED PIPING PER ANSI A13.1.

H. SPRINKLER HEAD SHALL BE UL LISTED/FM APPROVED, FLUSH MOUNT (PENDENT TYPE), POLISHED CHROME FINISH, HAVE A 5.6 K FACTOR, 165F TEMPERATUR RATING.

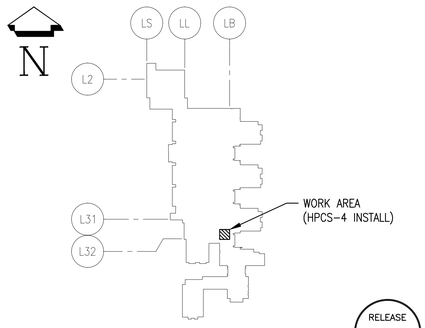
I. LEAK TEST – IN SERVICE TEST.

J. SUPPORT HANGERS – SEE 200529. HANGERS OR CONCRETE FASTENERS (CATALOG NO. S-38) SHALL COMPLY WITH NFPA 13 6-2.3.3 AND 6-2.3.4 INCLUDING EXCEPTIONS.

K. PIPE PENETRATIONS – WHERE PIPE PENETRATES CEILING TILE , THE OPENING SHALL BE SEALED WITH AN ESCUTCHEON.

SHEET NOTES

1. RELOCATED FIRE SPRINKLER LOCATION.
2. REUSE EXISTING TEE FROM ORIGINAL LOCATION AND EXTEND SPRINKLER LINE AS SHOWN.



KEY PLAN

SCALE: NONE

RELEASE 01-18-13 DATE JMK

EDP # S593062-EDP03

DRAWN	DATE
KS KOSCHIK	11/15/11
CHECKED	
ENGR STEVE GOURLEY	
SE GOURLEY	1/18/13
APVD	
OTHER	
OTHER	
APVD FOR IMPLEMENTATION BY	
NA ON WORKSHEET	

U. S. DEPARTMENT OF ENERGY
PACIFIC NORTHWEST SITE OFFICE

Pacific Northwest Division **Battelle** Richland, Washington 99352

FIRE PROTECTION SPRINKLER MOD RM 1109 PLAN

PROJ TITLE: HPCS-4 POWER & COOLING

SIZE	INDEX NO	BLDG NO	DWG NO	REV NO
F	8508	EMSL	WS9637	0

SCALE SHOWN SHEET 1 OF 1

DRAWING NO	DRAWING TITLE
WS9611	PROJECT LEGEND/ABBREV
WS9600	PROJECT TITLE/DWG LIST
S593062-SPCC03	CONSTRUCTION SPEC

REFERENCE DRAWINGS

NEXT USED ON

RR	QA BY / DATE	ENGR BY / DATE	CHK BY / DATE	REV BY / DATE	DESCRIPTION	REV NO

REVISIONS

Job Planning Package Click the ? for online help

Service Request # S593062L	Facility: EMSL	Location: 1119	Funding WP: P91974

Request Subject:	Distribute Power and Cooling Construction
Description:	A new computer room will be created within EMSL's existing computer room 1119. The new room is 1109 and it will house a new High Performance Computing System (HPCS-4). The scope of this project is to provide new infrastructure to support the operation of the HPCS by providing electrical power from the new 4000 amp switchboard located in room 1145 to room 1109, and installing a new chilled water piping system in room 1109 above and below the raised floor. The new infrastructure will tie into existing building systems for electrical power, chilled water, HVAC controls and fire detection/alarms. Also, modificatons will be made to existing systems within room 1119/1109 for HVAC, lighting, fire sprinklers and fire detection/alarm.
Justification:	The scope of this work will be accomplished via fixed price construction contract under an authorized GPP.
Equipment Category:	2
Systems Affected:	System listed on Service Request form: 3020ELEC/3020N Additional system(s) identified for checklist: Architectural, Electrical Power, Hvac, Mechanical, Piping, Electrical Power-Fire Alarm, Electrical Power-Normal Lighting, Hvac-Hv Controls, Piping-Chilled Water

JPP Type, Hold Points and Comments

UseCategory	Mandatory
Contingency Emergency Plan Hold Point:	**Emergency Response** Emergency response actions would be initiated by 1) the activation of an alarm signal such as a fire gong, 2) the loss of building electrical power or, 3) from an unforeseen accident during the work activity. Should any of these emergency response situations occur, stabilize the work area (if time permits) and then immediately exit the building and go to the Staging Area. **Emergency Information Posting (EIP)** Review the EIP (included in this JPP) for emergency signals, meanings and actions, equipment locations, evacuations routes and staging areas. **Emergency Point of Contact (POC)**. The single POC for all emergencies is PNNL Dispatch at **375-2400.** All injuries and accidents (e.g., personal, property, or equipment) shall be reported to employees

	supervisor, primary owner, and PNNL Construction Manager (CM) immediately. **PNNL Person in Charge (PIC)**. The PIC and contact for this project is PNNL Construction Manager (CM) Bill Steward. **Stop Work Authority**. Employees have the right and responsibility to stop work immediately, without fear of reprisal, when convinced a situation exists that places themselves, coworkers, or the environment in danger. Should this occur and if time permits, put work in a safe-condition; notify your supervisor and PNNL CM immediately. **Changing Conditions**. If work conditions are different or change throughout the course of the work, stop work, put work in a safe-condition and notify your supervisor and PNNL CM immediately.
Additional Comments:	**PNNL CONTACTS** **Construction Manager (CM):** Bill Steward 371-7038 or 554-9252 cell,e-mail address: george.steward@pnnl.gov **Construction Coordinator:** Michelle Duncan 371-7371, e-mail address: michelle.duncan@pnnl.gov **Construction Safety (CS):** Mark Deichman 371-7962, 531-9441 cell **Building Engineer (BE):** Dave Brawn 371-6022, 392-1591 cell **Building Manager (BM):** Ken McMullin 371-6020, 531-7807 cell **Project Manager (PM):** Ed Koellermeier 371-6780 **Fire Protection Engineer (FPE):** David Wyatt 371-7887 **Environmental Compliance Rep (ECR):** Dan Edwards 371-7860, or 528-5522 **EMSL Power Operator:** 531-1020 **PNNL NEC Inspector:** Bill Bresina 539-7473 **DAILY WORK RELEASE** Construction work must be released daily through the Facility Plan-of-the-Day (POD) and listed on the *Facilities Core Team Work Control Schedule*. The PNNL CM will inform the POD of planned activities. **SAFETY DOCUMENTATION** **PNNL Job Planning Package (JPP) and Workplace Exposure Assessment (WEA)**. This JPP and (attached) WEA are used by PNNL to

identify and communicate to all affected workers the work scope and the associated construction hazards and controls.

Contractor Job Safety Analysis (JSA). Contractor retains responsibility for identifying/mitigating work-related hazards and preparing and maintaining an approved comprehensive JSA.

Initial Pre-Job Briefing. Employees shall receive an initial pre-job briefing prior to starting work. Employees shall review, understand and comply with PNNL's Job Planning Package (JPP), Workplace Exposure Assessment (WEA), and the Contractorâ€™s Job Safety Analysis (JSA). A thorough briefing adequately describing the remaining work shall be performed for additional employees joining the team.

Subsequent Pre-Job Briefings. May be performed (daily, weekly, etc.) depending on the activity being performed, or if work conditions and/or building configuration changes as the work progresses. Subsequent briefings should include, but are not limited to 1) scope of work for that period, 2) hazards, 3) mitigations, or 4) change in conditions.

Changing Conditions. If at any time a worker encounters materials which are suspect to present a beryllium, asbestos, or other unmitigated exposure hazard, the worker should stop the activity and immediately contact their supervisor. New hazards/controls shall be added and addressed in the Contractor's JSA. Alternate methods of construction not identified in the safety documentation are subject to a JSA revision **BEFORE** Contractor can proceed with the proposed change(s).

Material Safety Data Sheet (MSDS)
Contractor must submit MSDS to the PNNL CM prior to bringing product/chemicals onto the job site or into the facility.

Flammable Material
Flammable products/materials used on this Project shall be removed from the Facility at the end of each shift unless otherwise approved by PNNL.

Waste Disposal
Contractor retains responsibility for disposal of Non-Regulated waste including excess construction materials and debris. Regulated waste will be managed and disposed as defined in the Contract General Provisions and Specification General Requirements.

FACILITY - SYSTEM OUTAGES

System outages shall be requested 5 days in advance of planned outage and coordinated through the PNNL CM and BE.

FACILITY SECURITY

For identification and access authorization, all staff, non-staff, and visitors

	are required to wear a security badge while in/on PNNL and DOE facilities. To gain unescorted facility access, employees must complete facility orientation training. Facility doors shall not be left unlocked while unattended, nor blocked open.

Basis for Planning

Work

Operating Requirements to communicate to Contractor	Yes	Specify Requirements

Statement of Work:	Yes
Other Design Basis Documents:	Yes
Specific Design Information:	Contractor shall carefully review Contract documents for the scope of Work, and perform a pre-bid walkthru. **Contract Documents:** *General Provisions Fixed Price Construction Contracts (July 2012)* *Construction Environment, Safety & Health Manual (CESH) PNNL-18290 Rev. 3* *Job Planning Package S593062L(JPP) & Workplace Exposure Assessment 8441-IH(WEA)* *Construction Specification, S593062-SPCC03, HPCS-4 Power & Cooling* *Categorical Exclusion to Install EMSL HPCS Infrastructure 11-PNSO-0431* **Project Drawings:** PROJECT WS9610/1 CIVIL, SOUTH POWER & COOLING PROJECT TITLE/DRAWING LIST WS9611/1 CIVIL, SOUTH POWER & COOLING PROJECT LEGEND/ABBREVIATION DEMOLITION WS9612/1 ARCHITECTURAL, DEMO @ RAISED FLOOR RM 1109 PLAN WS9613/1 ARCHITECTURAL, DEMO @ REFLECTED CEILING RM 1109 PLAN

WS9614/1 MECHANICAL/ELECTRICAL, DEMO @ LIEBERT UNIT RM 1109 PLAN
WS9614/2 MECHANICAL/ELECTRICAL, DEMO @ LIEBERT UNIT RM 1109 PLAN
WS9614/3 MECHANICAL/ELECTRICAL, DEMO @ LIEBERT UNIT RM 1109 PLAN
WS9615/1 MECHANICAL, DEMO ABOVE CEILING RM 1109 PLAN
WS9616/1 ELECTRICAL, DEMO @ LIGHTING RM 1109 PLAN
WS9617/1 ELECTRICAL, DEMO @ FIRE ALARM RM 1109 PLAN
WS9617/2 ELECTRICAL, DEMO @ FIRE ALARM PANEL M WIRING DIAGRAM
WS9618/1 ELECTRICAL, DEMO @ COMPUTER SHUTDOWN RM 1109 PLAN
WS9618/2 ELECTRICAL, DEMO @ COMPUTER SHUTDOWN WIRING DIAGRAMS
CIVIL
WS9620/1 CIVIL, SOUTH POWER FEED PARTIAL SITE PLAN
WS9620/2 CIVIL, SOUTH POWER FEED PROFILE/TRENCH SECTIONS
WS9620/3 CIVIL, SOUTH POWER FEED ENLARGED DETAILS
ARCHITECTURAL
WS9623/1 ARCHITECTURAL, RAISED FLOORING & PARTITION RM 1109 PLAN
WS9623/2 ARCHITECTURAL, RAISED FLOORING & PARTITION RM 1109 DETAILS
WS9624/1 ARCHITECTURAL, EQUIPMENT ARRANGEMENT RM 1109 PLAN
WS9625/1 ARCHITECTURAL, REFLECTED CEILING RM 1109 PLAN
MECHANICAL
WS9627/1 MECHANICAL, CHWS/CHWR RM 1109 PLAN
WS9627/2 MECHANICAL, CHWS/CHWR SECTIONS AND DETAILS
WS9627/3 MECHANICAL, CHWS/CHWR SECTIONS AND DETAILS
WS9628/1 MECHANICAL, CHWS/CHWR SUPPORTS & DETAILS
WS9628/2 MECHANICAL, CHWS/CHWR SUPPORTS & DETAILS
WS9629/1 MECHANICAL, ABOVE CEILING RM 1109 PLAN
WS9630/1 MECHANICAL, CHWS/CHWR TIE-IN RM 1743 PARTIAL PLAN
ELECTRICAL
WS9631/1 ELECTRICAL, DISTRIBUTION BOARD 026 & 027 ONE-LINE DIAGRAM
WS9632/1 ELECTRICAL, POWER RM 1109 OVERALL PLAN
WS9632/2 ELECTRICAL, POWER RM 1109 PLAN
WS9632/3 ELECTRICAL, POWER RM 1109 SECTIONS
WS9632/4 ELECTRICAL, POWER RM 1109 SECTIONS
WS9633/1 ELECTRICAL, LIGHTING RM 1109 PLAN
WS9634/1 ELECTRICAL, CONTROL PLAN
WS9634/2 ELECTRICAL, CONTROL BUS DIAGRAM
WS9634/3 ELECTRICAL, CONTROL EXPANSION MODULE WIRING DIAGRAM
WS9634/4 ELECTRICAL, CONTROL EXPANSION MODULE WIRING DIAGRAM

	WS9634/5 ELECTRICAL, CONTROL WIRING DIAGRAM WS9635/1 ELECTRICAL, FIRE ALARM MOD RM 1109 PLAN WS9635/2 ELECTRICAL, FIRE ALARM MOD WIRING DIAGRAM FIRE PROTECTION WS9637/1 FIRE PROTECTION, SPRINKLER MOD RM 1109 PLAN

Work to be Performed By:	Off-site Contractor		

Lock and Tag Requirements

Personal, Controlling Organization, Written Instructions	Instructions: **Training** Employees that install or participate in Lockout/Tagout (LOTO) shall be trained as PNWD authorized workers, or approved equivalent. **Written Instructions & Lockbox** When applicable, lock and tag written instructions shall be formalized and approved using the Lockout/Tagout Written Instructions Form. A lockbox may be utilized in situations where other methods are cumbersome, unsafe or infeasible. In this situation key(s) for the Controlling Organization (CO) locking device(s) are secured in the lockbox by the authorized worker – using his/her Authorized Worker (AW) lockout. Items placed in a lockbox are not limited to keys; other items may be utilized (i.e., valve handles, fuses, etc.) to control isolating devices. **Controlling Organization (CO) Lockout/Tagout (LOTO) Protocol** The CO applies their Danger - Do Not Operate LOTO(s) being the first-on, performing safe-condition checks, as applicable. When notified by the PNNL CM that the LOTO evolution or work activities are complete, the CO will remove their LOTO(s) being the last-off. The CO shall approve all temporary removal (lifts) of lockout/tagouts. **Contractor's LOTO Protocol** Authorized Workers (AW) shall over-lock/tag the CO using individual assigned LOTO. Perform safe-to-work checks, as applicable, and then proceed with the work activities. When the LOTO evolution or work activities are complete remove LOTO; notify your supervisor and PNNL CM. **Remove personal locks from PNNL equipment at end of shift each day unless approved otherwise by PNNL BE.**

Permits and Plans

Blind Penetration Permit - Class II (link), Electrical Code Compliance Review, Energized Electrical Work Permit (link), Fall Protection Work Plan (link), Functional Test, Hot Work Permit, Job Safety Analysis, Leak Pressure Test Report, Lockout Tagout Written Instruction Form, Outage Required, Work

Place Exposure Assessment

Other permits:	

Job Site Prep

Documented Pre-job Meeting	Yes	
Barriers	Yes	Demarcate construction work areas with barriers, safety cones or posts, ribbon or rope, and label with appropriate warning signs. Verify barrier and sign placements with PNNL Construction Safety.
Communication Eqpt	Yes	Workers may use cell phones or facility phones.
Postings	Yes	Standard construction warning signs.
Procedures	Yes	This JPP & associated work documents shall be available at the work site.

Personnel Requirements

Special Training Requirements	Yes	EMSL Orientation, GERT (Course 817), Hot Work Fire Watch Training (Course 679), Hot Work Permit Training (Course 988), Journeyman Electrician, Lock & Tag - Authorized Worker (Course 692)
Special Medical Exams	No	
Security Clearance Requirements	Yes	1 (no clearance)

Part Procurement

Special Material Used:	N/A
Material Provided By Customer:	No
Materials Needed:	Contractor shall provivde materials noted in plans and specifications.

Work Activity

Step #	Potential Hazards/Control Methods
	Define Work Activity
	None Specified
	GENERAL REQUIREMENTS A. Perform work in accordance with the General Provisions (GP), Contractor Environmental Safety & Health (CESH) Manual, Division I Specifications, Job Planning Package (JPP) and Workplace Exposure Assessment (WEA), and approved Contractor JSA.

	B. Work is limited to that which is outlined in this JPP. Any changes (e.g., means, methods or scope) shall be coordinated through the PNNL CM, and approved by Battelle. C. Contractor shall maintain control of, and access to their work areas. Contractor also retains responsibility for planning, supervising, and controlling the work. D. Observe and comply with all building signs and postings. Employees must read the Integrated Operations System (IOPS) Hazard Awareness Summaries for the associated workspaces. **PREREQUISITES** A. CM & Contractor shall conduct a pre-job meeting. B. Work shall be scheduled daily on the Core Team Plan of the Day. C. The CM will schedule system isolation/outage with Building Management as needed. **SEQUENCE OF WORK ACTIVITY STEPS** A. Work steps in this JPP can be worked out of sequence unless noted otherwise in the work step.
1	Open floor tiles / Post openings with safety cones or barricades Work from Ladder / Ladder Safety Training Exposed electrical energy >50v / Energized Electrical Work Permit Exposed electrical energy >50v / Lock and tag
2	**INSTALL PARTITION WALL** A. Install partition wall above and below floor in room 1119 to create new computer room 1109 per drawing WS9623. Coordinate relocation/demolition of sprinkler head, light fixture and air diffusers with installation of new partition wall. **NOTE: Wall must be constructed before demolition work begins in room 1109.** **Sprinkler head and light fixture relocation require Isolation Request and LO/TO. Perform safe to work check per the EEWP.** **Coordinate relocation of existing under floor data cables with PNNL CM.**
	Open floor tiles / Post openings with safety cones or barricades Exposed raised floor stanchions / Protect exposed ends on any remaining stanchions Work from Ladder / Ladder Safety Training Exposed electrical energy >50v / Lock and tag Exposed electrical energy >50v / Energized Electrical Work Permit Personnel traffice in corridor / Place safety cones in corridor use spotters when necessary
	DEMOLITION ACTIVITIES Architectural

3	A. Remove existing raised floor system including grounding grid as required for installation of new chilled water piping per drawing WS9612. B. Removed suspended ceiling as required for installation of new piping/electrical systems as shown on drawing WS9613. **NOTE: Install access ramp at east access door. Post safety cones outside access door in east corridor.** Mechanical A. Computer Room 1109; Make tie-in to chilled water system and or install isolation valves as shown on demolition drawing WS9614. Drain system as required, capture glycol for reuse at Central Plant. B. Remove and salvage existing Liebert CAH units 2, 3, 11, 16, 17 & 18, and associated piping as shown on drawing WS9614. Stage the 4 units outside of EMSL wrap with plastic. Deliver 2 units to CSF building room 1811. **NOTE: LO/TO Chilled water isolation valves.** Electrical A. Computer Room 1119; Disconnect power to Liebert CAH units as shown on drawing WS9614. **NOTE: Outage request required on Chinook Computer to remove conduit and wire at MCC2B and MCC2BA. Isolate panels MCCB2 and MCCB2A - LO/TO. Perform safe to work check per EEWP.** C. Remove light fixtures as shown on drawing WS9616. **NOTE: Isolation Request and LO/TO required. Perform safe to work check per EEWP.** HVAC A. Remove existing HVAC duct and diffusers as shown on drawing WS9615. Fire Protection A. Computer room 1109; Remove smoke detectors and re-connect data loop wiring for remaining smoke detectors as shown on drawing WS9617. **NOTE: Requires outage of smoke detectors in computer room 1119.** B. Remove heat detectors as shown on drawing WS9618. Remove Conduit and wire at the fire protection control panel in room 1141. **NOTE: Isolate fire alarm control panel in room 1141. Perform safe to work check per EEWP.**

	Blind Penetration-Class 2 / Blind Penetration Permit - Class 2 Blind Penetration-Class 2 / "White Box" GFI Protection
4	**EARTHWORK and CIVIL** A. Install electrical rigid metalic conduit as shown on drawing WS9620 sheet 3 of 3. **NOTE: A Class II Penetration Permit is required where conduit penetrate the building exterior wall and for support anchors.**
	Open floor tiles / Post openings with safety cones or barricades
5	**ARCHITECTURAL** A. Re-install raised floor including grounding grid per drawing WS9623. B. Install suspended ceiling per reflected ceiling plan as shown on drawing WS9625.
	Welding cutting grinding / Hot work permit Falls from elevations > 6 ft. / Fall Protection Work Plan
6	**MECHANICAL / PIPING** A. Install chilled water piping system per drawing WS9627. **NOTE: Class II Penetration Permit required for installing support anchors in floor and penetrating east fire wall above ceiling.** **Hot work permit required for installing weldolets on pipe header located above ceiling in east corridor.** **Fall protection work plan required for performing welding and installing wet tap on chilled water header. Perform work on off-shift hours or weekend as determined by the Building Manager.** **Provide barricades in hallway and protect walls, ceiling and floor from welding. Immediately cleanup any spilled glycol.**
	Open floor tiles / Post openings with safety cones or barricades Falls from elevations > 6 ft. / Fall Protection Work Plan Dropping conduit on electrical equipment below / Provide protection for equipment below Exposed electrical energy >50v / Lock and tag
7	**ELECTRICAL** A. Install electrical conduit/supports above suspended ceiling from room 1129 to 1109 as shown on drawing WS9632. **NOTE: Take precautions to protect existing room equipment below from damage.** B. Install switchboards in locations shown on drawing WS9632. C. Install conduit from pull box to PDUs as shown on drawing WS9632. D. Pull wire from switchboard in room 1145 to switchboards located in room 1109.

	NOTE: LO/TO requried at switchboard in room 1145. Perform safe to work check per EEWP.
8	Work from Ladder / Ladder Safety Training **HVAC DUCTWORK** A. Install HVAC ductwork and diffusers as shown on drawing WS9629.
9	Exposed electrical energy >50v / Lock and tag **CONTROL SYSTEM** A. Install chilled water control system and connect to building network as shown on drawing WS9634. **NOTE: Isolate Panel BCE5 - LO/TO and perform safe to work check per EEWP.**
10	Work from Ladder / Ladder Safety Training **FIRE PROTECTION** A. Relocate sprinkler head as shown on drawing WS9637. **NOTE: Outage request required.** B. Install fire alarm system per drawing WS9635. Connect in room 1151. **NOTE: Requires outage of fire alarm system.**
11	None Specified **ENERGIZE SYSTEM / FUNCTIONAL TESTING** A. Energize electrical/mechanical equipment to verify operation. **NOTE: If troubleshooting or re-work is needed, contact CM or CS for LO/TO and EEWP requirements.** **Prerequisites noted below:** A. Install equipment labels including are flash labels. B. Ensure inspection reports are received from AHJ for electrical installations. C. Ensure pressure test reports are submitted for chilled water piping system.

Approvals

Building Engineer _____ Date: _____

Building Engineer #2 _____ Date: _____

Building Manager _____ Date: _____

Construction Manager _____ Date: _____

Environmental Compliance Rep _____ Date: _____

Safety: Occupational _____ Date: _____

Battelle The Business of Innovation	**Workplace Exposure Assessment**	Industrial Hygiene Case #: 8295-IH	
		Date:11/06/12	
		X Initial Survey Re-Survey ☐ Other	

Area: RCHN North	Project Title: HPCS-4 Power & Cooling	Organization: F/O	IH: Mark Deichman
Bldg.: EMSL 3020	Project #: N/A	SR #: S593062L	Phone: 371-7962/531-9441
Floor: 1St	Room: 1119 & 1129	Work Package# P91974	Email: Mark.Deichman@pnnl.gov

Facility/Project and Operation: Describe the facility, work area, and process/operation being evaluated.

A new computer room will be created within EMSL's existing computer room 1119. The new room is 1109 and it will house a new High Performance Computing System (HPCS-4). The scope of this project is to provide new infrastructure to support the operation of the HPCS by providing electrical power from the new 4000 amp switchboard located in room 1145 to room 1109, and installing a new chilled water piping system in room 1109 above and below the raised floor.

The new infrastructure will tie into existing building systems for electrical power, chilled water, HVAC controls and fire detection/alarms. Also, modifications will be made to existing systems within room 1119/1109 for HVAC, lighting, fire sprinklers and fire detection/alarm.

Construction work must be released daily through the EMSL Facility Plan-of-the-Day (POD) and listed on the ~Facilities Core Team Work Control Schedule~. The PNNL CM will inform the POD of planned activities.

The contractor will be responsible for creating a job safety analysis (JSA) defining those hazards to workers expected to be encountered during the course of this work. Also, there is a potential that unexpected hazards may be encountered or the nature of the known hazards might change as work activities precede. Should this occur the JSA shall be amended to incorporate the new conditions.

Preliminary Hazard Assessment: Inventory chemical, physical, biological, and ergonomic stressors or attach PHA form.

Employees will be exposed to eye injury, hand injury, ladders, material handling, pinch points, power tools, falls, sharp objects, spark producing operations, mechanized equipment, rigging, manual lifting, noise, strains/sprains, electrical, awkward positions (kneeling & bending), and blind penetrations.

Potentially Exposed Work Force: Define the potentially exposed workforce

Sub-contractor employees.

Risk Assessment: Perform risk assessment. Attach sampling plan if quantitative monitoring is required.

N/A

Preliminary Hazard Assessment: Inventory chemical, physical, biological, and ergonomic stressors or attach PHA form.

Training – The contractor shall be fully responsible for orienting employees to potential workplace hazards and providing each employee with the necessary training to safely complete their work assignment. All training shall be documented.

Blind Penetrations – Potential for unknown utilities within hollow wall cavities, concrete floors, and masonry walls. Follow PNNL blind penetration guidance. Class I penetrations are solid materials ≤ 2 inches, requires white box and class 0 voltage rated gloves. Class II penetrations solid materials ≥ 2 inches, controlled by a blind penetration permit, requires scanning, PPE as identified on permit, and white box.

Ladders - INSPECT ALL LADDERS PRIOR TO USE. USE ONLY LADDERS APPROPRIATE FOR WORK BEING PERFORMED. ALL LADDERS FOUND TO HAVE DEFECTS SHALL BE TAGGED OUT OF SERVICE. LADDERS SHALL BE USED AND MAINTAINED IN A SAFETY MANNER. EMPLOYEES SHALL BE TRAINED BY A COMPETENT PERSON IN THE FOLLOWING AREAS:
(i) The nature of fall hazards in the work area;
(ii) The correct procedures for erecting, maintaining, and disassembling the fall protection systems to be used;
(iii) The proper construction, use, placement, and care in handling of all stairways and ladders;
(iv) The maximum intended load-carrying capacities of ladders used. TRAINING SHALL BE DOCUMENTED ON THE TRAINING ATTENDANCE RECORD

Demolition - All building materials could not be assessed – those hidden behind walls, underneath coils, gasket materials, multiple flooring layers, etc. – and PNNL needs (expects) the contractor to stop work and be mindful of changing conditions.

Electrical – Follow PNNL's lockout and tagout program. Safe to work checks shall be performed under an EEWP as released by PNNL CM. Employees shall be required to wear PPE as identified within the EEWP when disconnecting/breaking neutral conductors (i.e. receptacles, lights, panel board, & switchgear neutrals). A minimum of category 2* PPE must be provided by the electrical contractor.

Hand, power tools and cords: Verify that the tools are in a safe operating condition and are equipped with guards, are either double-insulated-approved or grounded, and use the tool according to the manufacturer's recommendations. All damaged or defective tools, cords, equipment shall be tagged and removed from the job site. Power tools will be de-energized (unplugged/battery pulled/etc.) prior to changing blades, bits, etc. Arrange workspace to allow for adequate clearance to protect against potential injury such, as pinch points or kickback. All electrical tools and cords shall be GFCI protected.

Unexpected release of an energy source - Follow PNNL lockout and tagout program. All workers must be trained to PNNL's lockout and tagout program. Hazardous energy sources are considered electrical, mechanical, pneumatic, thermal, hydraulic, & hazardous materials.

Equipment/Material Staging: Contractors will be mindful of equipment clearances and ensure equipment/material is not staged in a manner that blocks or impedes access to emergency exits, fire pulls, safety showers, and/or electrical equipment. Material and Equipment staging will be coordinated through the CM and staged in a manner that does not allow for displacement.

Permits: Contractor will be mindful and observant to special permitting required while in PNNL managed facilities. Work dealing with electrical, spark producing activities and blind penetration require prior approval from Battelle CM.

Forklifts/Hoisting and Rigging: There may be instances where larger piece of equipment will require the use of forklifts and/or crane and rigging activities. Operators must be qualified for the equipment operated, posses credentials (qual card, NCCCO, journeyman status) as well as medical physical, proof of drug test, and on the job evaluation – pertaining to the piece of equipment. Larger and uncommon lifts may need further planning and review. Contractor to be knowledgeable with the requirements of the PNNL Hoisting and Rigging Manual.

Chemical products (i.e. paints, solvents, epoxies, cement, caulking, etc): In order to ensure chemical safety in the workplace, information must be available about the identities and hazards of the chemicals. All products must have labels and MSDS to convey the hazard information. The Contractors' JSA shall identify the safe method and PPE required when handle these products. Contractor shall notify the CM prior to chemicals brought onsite or used within PNNL facilities.

Sharp objects, pinch points: Construction activities, especially demolition and removal work have the potential of creating sharp edges and pinch points. Disassembly will be done in a controlled and coordinated manner to safely reduce these potential hazards. Never stick hands beneath or in-front of a heavy moving load.

Dust, debris, housekeeping: Maintain good housekeeping and lighting to reduce hazards. General housekeeping should be performed at least daily to prevent additional workplace hazards. Equipment and supplies shall be staged to prevent hazard to worker and building staff. Floors, walls, working surface, and passageway shall be kept free of materials, hardware, disassembled items, or similar hazards. Hoses and electrical cords across aisles or passageways shall be covered or suspended overhead so that there is no tripping hazard. Be prepared to wipe-up, clean-up (pads. litter, etc.) any spilled materials during this task.

Signs & Barricades - Contractor is required to maintain control of their work zone by the use of signs and barricades. Signs shall be used with barricades to identify the hazard within the barricaded area. Work in hallways shall be identified by cones to alert staff and non-staff to congested area and work area. Orange construction fencing when required, shall be utilized to control the construction boundary to prevent unauthorized entry.

General Electrical Safety: Contractors will be mindful of the hazards associated with electrical equipment. Inspect all equipment and cords for damage prior to use. Ensure clearances around electrical equipment; never manipulate breakers without coordinating through CM and Controlling Organization. Contact CM if an off normal condition occurs (breaker trips, power fluctuation, etc…).

Cutting, Welding, Grinding: SEE CESH MANUAL SECTION 23.1 FOR COMPLETE REQUIREMENTS. Contractor shall perform Hot Work in accordance with a Working with Open Flame, Welding, Cutting or Grinding Permit approved by PNNL Building Manager and Fire Protection Engineer. Permit requirements shall be communicated to all applicable contractor personnel via the pre-job briefing. Contractor personnel performing as Fire Watch must have PNNL's fire watch training course and must have hands-on fire extinguisher training. Contractor shall provide their own extinguishers. Alternatives to performing hot work (e.g., saw cutting instead of grinding wheel or torch cutting; crimp style fittings instead of soldered fittings) should be used where practical. To the extent practical, Hot Work should be performed in contractor shops, or designated areas on site approved by PNNL. Inspect welding equipment to be sure it is in good condition. Compressed gas cylinders shall be secured and protected from overhead movement of materials and moving vehicles. Remove or protect combustible materials within 35 feet of welding, grinding, or cutting areas.

Excavation – No excavation activities are anticipated for this scope of work. However, if excavations become necessary an excavation permit will be required. Obtain permit form the CM. Review the excavation permit, drawings, and scanning report prior to excavating. Brief excavation crew daily regarding underground obstructions they may encounter during their workday. Mark underground utilities in accordance with APWA color code system. All markings must be conspicuous and maintained. Hand dig within 5 feet of any underground obstruction. Open excavations shall be barricaded and posted to keep unauthorized persons out of work area. Evaluate excavations at depth 4 feet and greater for the potential of being a confined space. Evaluations shall be documented using the confined space hazard identification form. In work areas where electrical lines are present, employees shall wear voltage rated gloves. When possible these systems shall be locked out. Driving of fence posts, grade stakes, ground rods, screed stakes, etc greater than 12 inches is considered excavation and must be approved by PNNL CM.

Reevaluation Frequency: Mark the appropriate reevaluation frequency N/A		
☐ **Reevaluate annually (High Hazard)**	☐ **Reevaluate every two years (Moderate Hazard)**	☐ **Reevaluate every four years (Low Hazard)**

Survey Performed by (Last Name, First Name, MI)	Signature	Date
Deichman, Mark, L		

General Decision Number: WA120030 06/01/2012 WA30

Superseded General Decision Number: WA20100045

State: Washington

Construction Type: Building

County: Benton County in Washington.

BUILDING CONSTRUCTION PROJECTS (does not include single family homes or apartments up to and including 4 stories).

Modification Number	Publication Date
0	01/06/2012
1	01/27/2012
2	04/06/2012
3	04/13/2012
4	06/01/2012

ASBE0082-001 08/02/2011

	Rates	Fringes
ASBESTOS WORKER/HEAT & FROST INSULATOR	$ 31.42	15.65

BRWA0001-002 06/01/2009

	Rates	Fringes
BRICKLAYER	$ 26.81	12.31

CARP9003-003 09/01/2009

	Rates	Fringes
CARPENTER (Including Cabinet Installation, Drywall Hanging and Form Work)	$ 27.73	10.56

ZONE PAY:

ZONE 1	0-45 MILES	FREE
ZONE 2	46-65 MILES	$2.00/PER HOUR
ZONE 3	66-100 MILES	$3.00/PER HOUR
ZONE 4	OVER 100 MILES	$4.50/PER HOUR

DISPATCH POINTS:
PASCO (515 N. Neel Street) or Main Post Office of established residence of employee (Whichever is closest to the worksite).

SPOKANE (127 E. AUGUSTA AVE.) or Main Post Office of established residence of employee (Whichever is closest to the worksite).

WENATCHEE (27 N. CHELAN) or Main Post Office of established residence of employee (Whichever is closest to the worksite).

COEUR D' ALENE (1839 N. GOVERNMENT WAY) or Main Post Office of established residence of employee (Whichever is closest to the worksite).

MOSCOW (302 N. JACKSON) or Main Post Office of established residence of employee (Whichever is closest to the worksite).

ELEC0112-014 06/01/2011

	Rates	Fringes
ELECTRICIAN	$ 35.90	3%+14.63

ELEC0112-015 06/01/2010

	Rates	Fringes
ELECTRICIAN (Low Voltage Wiring Only)	$ 24.67	8.48

ENGI0370-017 06/01/2011

	Rates	Fringes
Power equipment operators:		
GROUP 1	$ 24.76	12.05
GROUP 2	$ 25.08	12.05
GROUP 3	$ 25.69	12.05
GROUP 4	$ 25.85	12.05
GROUP 5	$ 26.01	12.05
GROUP 6	$ 26.29	12.05
GROUP 7	$ 26.56	12.05
GROUP 8	$ 27.66	12.05

ZONE DIFFERENTIAL (Add to Zone 1 rate): Zone 2 - $2.00

Zone 1: Within 45 mile radius of Spokane, Pasco, Washington; Lewiston, Idaho

Zone 2: Outside 45 mile radius of Spokane, Pasco, Washington; Lewiston, Idaho

POWER EQUIPMENT OPERATORS CLASSIFICATIONS

GROUP 1: Compactor; Drill Oiler; Rollers, all types on

subgrade, including seal and chip coatings

GROUP 2: Fork Lift

GROUP 3: Bulldozer (up to D-6 or equivalent)

GROUP 4: Drills (churn, core, calyx or diamond); Oiler; Loaders (overhead & front-end, under 4 yds. R/T); Vacuum Drill (reverse circulation drill under 8 inch bit)

GROUP 5: Backhoe (Under 45,000 gw); Trackhoe/Excavator (hoe Ram) (under 3/4 yd.); Cranes (25 tons & under), Drilling Equipment(8 inch bit & over) (Robbins, reverse circulation & similar)

GROUP 6: Asphalt Roller; Backhoe (45,000 gw and over to 110,000 gw); Trackhoe/Excavator (Hoe Ram) (3/4 yd. to 3 yd.); Compactor (self-propelled with blade); Cranes (over 25 tons, to and including 45 tons), Bulldozer, 834 R/T & similar; Loader Operator (front-end & overhead, 4 yds. incl. 8 yds.); Scrapers, all, rubber-tired; Screed Operator

GROUP 7: Backhoe (Over 110,000); Trackhoe/Excavator (Hoe Ram) (3 yds & over); Cranes (over 45 tons to but not including 85 tons); Loaders (overhead & front-end, over 8 yds. to 10 yds.); Rubber-tired Scrapers (multiple engine with three or more scrapers); Blade

GROUP 8: Cranes (85 tons and over, and all climbing, overhead,rail and tower); Loaders (overhead and front-end, 10 yards and over)

BOOM PAY: (All Cranes, Including Tower)
180 ft to 250 ft $ .50 over scale
Over 250 ft $ .80 over scale

NOTE:
In computing the length of the boom on Tower Cranes, they shall be measured from the base of the Tower to the point of the boom.

HAZMAT:
Anyone working on HAZMAT jobs, working with supplied air shall receive $1.00 an hour above classification.

IRON0014-012 01/01/2012

	Rates	Fringes
IRONWORKER (Ornamental, Reinforcing and Structural).....	$ 31.35	20.10

LABO0238-014 06/01/2011

Rates Fringes

LABORER: Mason Tender - Brick...$ 23.95 9.95

LABO0238-021 06/01/2011

Rates Fringes

LABORER
GROUP 1.....$ 21.31 10.00
GROUP 2.....$ 23.41 10.00
GROUP 3.....$ 23.68 10.00
GROUP 4.....$ 23.95 10.00

Zone Differential (Add to Zone 1 rates): Zone 2 - $2.00

BASE POINTS: Pasco
Zone 1: 0-45 radius miles from the main post office.
Zone 2: 45 radius miles and over from the main post office

LABORERS CLASSIFICATIONS

GROUP 1: Flagman

GROUP 2: Common or General Laborer; Form-Stripping

GROUP 3: Chipping Guns; Concrete Saw; Pipelayer

GROUP 4: Grade Checker; Gunite; Vibrating Plate

PAIN0054-004 06/01/2008

Rates Fringes

DRYWALL FINISHER/TAPER.....$ 22.78 8.88

PLAS0072-008 06/01/2011

Rates Fringes

CEMENT MASON/CONCRETE FINISHER...$ 25.01 11.32

Zone Differential (Add to Zone 1 rates): Zone 2 - $2.00

BASE POINTS: Spokane, Pasco, Lewiston, Wenatchee

Zone 1: 0 - 45 radius miles from the main post office

Zone 2: 45 radius miles from the main post office

PLUM0598-013 06/01/2011

Rates Fringes

PLUMBER.....$ 45.85 22.39

PLUM0598-015 06/01/2011

Rates Fringes

PIPEFITTER.....$ 45.85 22.39

---

* ROOF0189-011 07/01/2011

Rates Fringes

ROOFER (Includes Roof Tear Off, Waterproofing, and Installation of Metal Roofs).....$ 23.69 10.02

SFWA0699-005 04/01/2012

Rates Fringes

SPRINKLER FITTER (Fire Sprinklers).....$ 28.93 19.60

SHEE0066-019 08/01/2011

Rates Fringes

Sheet Metal Worker (Including HVAC Duct).....$ 27.51 16.90

SUWA2009-018 05/22/2009

Rates Fringes

FLOOR LAYER: Carpet and Vinyl....$ 19.90 4.83

INSULATOR - BATT.....$ 13.58 0.21

LABORER: Handheld Drill.....$ 17.17 5.36

LABORER: Irrigation.....$ 11.58 0.00

LABORER: Landscape.....$ 11.48 0.00

LABORER: Mason Tender - Cement/Concrete.....$ 9.00 0.00

METAL BUILDING ERECTOR.....$ 12.23 3.86

OPERATOR: Bobcat/Skid Steer/Skid Loader.....$ 16.86 0.00

OPERATOR: Concrete Pumper.....$ 22.30 5.27

OPERATOR: Mechanic.....$ 24.33 4.33

PAINTER: Brush Only.....$ 14.50 0.50

PAINTER: Roller.....$ 22.62 0.25

PAINTER: Spray.....$ 22.47 0.00

TILE SETTER.....$ 13.50 0.00

TRUCK DRIVER: Semi-Trailer
Truck.....$ 20.59 5.56

TEAM0760-006 06/01/2009

	Rates	Fringes
Truck drivers: (ANYONE WORKING ON HAZMAT JOBS SEE FOOTNOTE A BELOW)		
ZONE 1:		
GROUP 3	$ 24.37	10.86
GROUP 4	$ 24.70	10.86
GROUP 5	$ 24.81	10.86
GROUP 6	$ 24.97	10.86
GROUP 7	$ 25.51	10.86
GROUP 8	$ 25.83	10.86

Zone Differential (Add to Zone 1 rate: Zone 1 - $2.00)

BASE POINTS: Spokane, Moses Lake, Pasco, Lewiston

Zone 1: 0-45 radius miles from the main post office
Zone 2: Outside a 45 mile radius from the main post office

TRUCK DRIVERS CLASSIFICATIONS

GROUP 3: Trucks, side, end, bottom and articulated end dump (3 yards to and including 6 yds.)

GROUP 4: Trucks, side, end, bottom and articulated end dump (over 6 yds. to & including 12 yds.)

GROUP 5: Trucks, side, end, bottom and articulated end dump (over 12 yds. to & including 20 yds.)

GROUP 6: Trucks, side, end, bottom and articulated end dump (over 20 yds. to & including 40 yds.)

GROUP 7: Truck, side, end, bottom and articulated end dump (over 40 yds. to & including 100 yds.)

GROUP 8: Trucks, side, end, bottom and articulated end dump (over 100 yds.)

FOOTNOTE A - Anyone working on a HAZMAT job, where HAZMAT cerfification is required, shall be compensated as a premium, in addition to the classification working in as follows:

LEVEL C-D: - $.50 PER HOUR - This level may use an air purifying respirator or additional protective clothing.

LEVEL A-B: - $1.00 PER HOUR - Uses supplied air in conjunction with a chemical splash suit or fully encapsulated suit with a self-contained breathing apparatus.

Employees shall be paid Hazmat pay in increments of four(4) and eight(8) hours.

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

==========

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of "identifiers" that indicate whether the particular rate is union or non-union.

Union Identifiers

An identifier enclosed in dotted lines beginning with characters other than "SU" denotes that the union classification and rate have found to be prevailing for that classification. Example: PLUM0198-005 07/01/2011. The first four letters , PLUM, indicate the international union and the four-digit number, 0198, that follows indicates the local union number or district council number where applicable , i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. The date, 07/01/2011, following these characters is the effective date of the most current negotiated rate/collective bargaining agreement which would be July 1, 2011 in the above example.

Union prevailing wage rates will be updated to reflect any changes in the collective bargaining agreements governing the rate.

Non-Union Identifiers

Classifications listed under an "SU" identifier were derived from survey data by computing average rates and are not union rates; however, the data used in computing these rates may include both union and non-union data. Example: SULA2004-007 5/13/2010. SU indicates the rates are not union rates, LA indicates the State of Louisiana; 2004 is the year of the survey; and 007 is an internal number used in producing the wage determination. A 1993 or later date, 5/13/2010, indicates the classifications and rates under that identifier were issued as a General Wage Determination on that date.

Survey wage rates will remain in effect and will not change until a new survey is conducted.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

* an existing published wage determination
* a survey underlying a wage determination
* a Wage and Hour Division letter setting forth a position on a wage determination matter
* a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an

interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

==========

END OF GENERAL DECISION