



Oregon State University

INVITATION TO BID (ITB) #2020-002828

OSU SOFTBALL HITTING FACILITY AND LORENZ SOCCER BLEACHERS

ISSUE DATE: March 11, 2020

MANDATORY PRE-BID CONFERENCE: March 20, 2020 at
1:30 PM Pacific Time (PT) at the Softball Complex (2200
SW Western Blvd. Corvallis, OR 97330).

**** Parking is available on-site**

BID DUE DATE/TIME: April 2, 2020 at 2:00 PM PT
at Construction Contracts Administration (Front Office)
644 SW 13th St., Corvallis, OR 97333

****Front Office is closed daily from noon to 1:00 PM.**

QUESTION DEADLINE: MARCH 26, 2020

PROJECT NUMBER: 2197-19 & 2228-20

CONTRACT ADMINISTRATOR:

Matt Hausman, Construction Contracts Officer
Construction Contracts Administration
Oregon State University
644 SW 13th St.
Corvallis, OR 97333
Phone: 541-737-3401

Email: ConstructionContracts@oregonstate.edu

AWARD DECISION APPEALS:

Hanna Emerson, Construction Contracts Manager
Construction Contracts Administration
Oregon State University
644 SW 13th St.
Corvallis, OR 97333
Phone: (541) 737-7694

Email: hanna.emerson@oregonstate.edu

It is the Bidder's responsibility to continue to monitor the [OSU Business and Bid Opportunities](#) website for Addenda. Failure to acknowledge any Addenda on the Bid Form may cause your Bid to be considered non-responsive.

OSU standards and policies govern this solicitation ([Procurement Thresholds and Methods](#), [Procurement Solicitations and Contracts](#)) unless otherwise referenced or stated.

1.0 INTRODUCTION

1.1 Oregon State University (“OSU” and/or “Owner”) is conducting a competitive Invitation to Bid (ITB) process to retain ONE (1) General Contractor for the **OSU SOFTBALL HITTING FACILITY AND LORENZ SOCCER BLEACHERS** project.

OSU will be accepting sealed Bids at Construction Contracts Administration, Oregon State University, 644 SW 13th Street, Corvallis, Oregon, until 2:00 PM Pacific Time, April 2, 2020 for the project located on the campus of Oregon State University, Corvallis, Oregon. Solicitation documents are available at the [OSU Business and Bid Opportunities](#) website.

A MANDATORY PRE-BID CONFERENCE will be held on March 20, 2020 at 1:30 PM Pacific Time at the Softball Complex (2200 SW Western Blvd. Corvallis, OR 97330). **** Parking is available on-site**

Bids will not be accepted from those firms who have not had a representative attend the Mandatory Pre-Bid Conference. Attendance will be documented through a sign-in sheet prepared by OSU. Representatives who arrive more than five (5) minutes after the start time of the meeting (as stated in the ITB and by OSU’s clock) or after the discussion portion of the meeting (whichever comes first) shall not be permitted to sign in and will not be permitted to submit a response to this ITB.

1.2 Background. Founded in 1868 as Oregon’s land grant institution, Oregon State University (OSU) serves the state, the nation and the world as a premier 21st-century research university. OSU is committed to exceptional research, discovery, innovation and engagement — and to integrating its research and engagement mission with the delivery of a high-quality, globally relevant and affordable education for the people of Oregon and beyond. OSU is one of only two land, sea, space and sun grant universities in the U.S. and is the only university in Oregon to have earned both Carnegie Classifications for Very High Research Activity and Community Engagement.

The university’s 570-acre main campus is located in the city of Corvallis, a vibrant college town of nearly 58,000 in the heart of Western Oregon’s Willamette Valley. Corvallis consistently ranks among the safest, most highly educated and greenest small cities in the nation.

1.3 Location.

Softball Complex. The \$1.5 million Oregon State Softball Complex opened in April 2001 on the heels of the program's first back-to-back 40-win seasons and NCAA Regional appearances in 1999 and 2000. Since knocking off No. 1 UCLA on April 20, 2001 to open the facility, the Beavers have won over 60 percent of their games at home, including amassing nearly 50 wins over nationally ranked opponents. The complex features 750 bleacher seats, a concession and restroom facility, as well as one of the top playing surfaces in the nation. It was built on the site of the old Patrick Wayne Valley track and field.

Lorenz Soccer Field. The Oregon State men's and women's soccer teams play on one of the finest pitches on the West Coast - Paul Lorenz Field at Patrick Wayne Valley Stadium.

Opened in the fall of 1996 a block southeast of Reser Stadium, the field received a makeover during the summer of 2012, as the original sand-based surface was replaced with a new variety of spreading rye grass, the same turf that was used at the 2010 FIFA World Cup in South Africa.

Patrick Wayne Valley Stadium seats 1,500 fans and has an enclosed press box on the west sideline and covered team benches on the east sideline. Lights were installed prior to the 2006 season adding to the programs' allure and giving fans the opportunity to enjoy night games.

The facility has hosted NCAA Tournament matches, exhibitions against the Portland Timbers of Major League Soccer and has been the home of a number of All-Americans and future professionals, including 2010 MLS SuperDraft No. 1 pick Danny Mwanga and US national team forward Robbie Findley.

The stadium is named for the late Patrick Wayne Valley, who was an Oregon State football letterman and 1964 Rose Bowl team member. The field is named for Paul Lorenz, who is the former owner of L&H Grading in Salem and provided equipment for the construction of the original surface.

1.4 Summary of Work. The Work consists of construction of a 3,200 square foot structure for softball use, bleacher replacement at the Lorenz Soccer Facility, and related site circulation and accessibility improvements on the Oregon State University Campus, Corvallis, Oregon.

The project consists of two separate schedules of work. Schedule "A" requires work to construct a new indoor softball practice facility, including relocation of exterior walkways, minor private utility work, and installation of selected furnishings, specialty infield soils, and approved synthetic turf surfacing. Schedule "B" requires work to demolish and remove existing bleacher and press box systems, coordinate and construct a new design-build bleacher system and press box along with site and accessibility improvements.

Two alternates associated with Schedule B are also included to provide cover over the center bleacher section (Alternate #B1) and to provide seat backs for seating in the center bleacher section (Alternate #B2).

Selection will be made as described in the Supplemental Instructions to Bidders.

2.0 SCHEDULE

Solicitation Issue Date	3/11/2020
Mandatory Pre-Bid Meeting/Site Visit	3/20/2020 2020 at 1:30 PM Pacific Time (PT) at the Softball Complex (2200 SW Western Blvd. Corvallis, OR 97330).
Question Deadline	3/26/2020 at 5:00 PM PT
Solicitation Revision Request Deadline	3/26/2020 at 5:00 PM PT
Final Addendum Deadline (if necessary)	3/30/2020
Bid Due Date/Time	4/2/2020 at 2:00 PM PT

The following dates are tentative and subject to change without notice:

Notice of Intent to Award	4/3/2020
Estimated Contract Execution	4/20/2020
Estimated Notice to Proceed	4/20/2020
Estimated Substantial Completion	Softball Hitting Facility – 10/31/2020 Lorenz Soccer Bleachers – 8/7/2020
Estimated Final Completion	Softball Hitting Facility – 11/30/2020 Lorenz Soccer Bleachers – 9/7/2020

3.0 QUESTIONS, SOLICITATION REVISION REQUESTS, CHANGE OR MODIFICATION

3.1 Questions

3.1.1 If a Bidder is unclear about any information contained in this document or its exhibits (Project, scope, agreement terms, etc.), they may submit those questions for formal clarification to the **Contract Administrator** at any time prior to the Question Deadline listed in Section 2.0 of this ITB.

3.1.2 All questions and contacts with Owner regarding any information in this ITB must be addressed either in writing or email to the **Contract Administrator**, unless otherwise stated in this ITB document at the address or email listed in this document no later than the Question Deadline listed in Section 2.0 of this ITB.

3.1.3 Any clarification provided by the Owner for this ITB or the documents included as exhibits to this ITB shall be made by a duly issued Addendum. The Owner will not be responsible for any other explanation or interpretation of this ITB or the documents included as exhibits to this ITB nor for any other approval of a particular manufacturer's process or item.

3.2 Solicitation Revision Requests

3.2.1 Bidders may submit a written request for change of particular solicitation provisions and/or contract terms and conditions to Hanna Emerson, Construction Contracts Manager at the address or email listed in this document. Such requests for change shall be received no later than the Solicitation Revision Deadline listed above.

3.2.2 Such requests for change shall include the reasons for the request and any proposed changes to the solicitation provisions, specifications and/or contract terms and conditions.

3.2.3 Requests for contract terms and conditions revisions may not be considered if request(s) are not received by the Solicitation Revision Deadline.

3.3 Change or Modification

3.3.1 Any change or modification to the specifications or particular solicitation provisions will be in the form of an addendum to the ITB and will be made available to all firms. It is the responsibility of each firm to visit the website and download any addenda to this ITB. No information received in any manner different than as described herein shall serve to change the ITB in any way, regardless of the source of the information.

4.0 PUBLIC RECORD

Owner will retain this ITB and one copy of each bid received, together with copies of all documents pertaining to the award of a contract. These documents will be made a part of a file or record, which shall be open to public inspection after Owner has announced its intent to award a contract. If a bid contains any information that is considered a trade secret under ORS 192.345(2), you must mark each trade secret with the following legend: **“This data constitutes a trade secret under ORS 192.345(2), and shall not be disclosed except in accordance with the Oregon Public Records Law, ORS Chapter**

192.”

The Oregon Public Records Law exempts from disclosure only bona fide trade secrets, and the exemption from disclosure applies only “unless the public interest requires disclosure in the particular instance.”

Therefore, non-disclosure of documents or any portion of a document submitted as part of a proposal may depend upon official or judicial determination made pursuant to the Public Records Law.

In order to facilitate public inspection of the non-confidential portion of the proposal, material designated as confidential shall accompany the proposal, but shall be readily separable from it. Prices, makes, model or catalog numbers of items offered, scheduled delivery dates, and terms of payment shall be publicly available regardless of any designation to the contrary. Any proposal marked as a trade secret in its entirety shall be considered non-responsive and shall be rejected.

5.0 FORM OF AGREEMENT

A sample copy of the standard Public Improvement Contract is included as an exhibit. The sample contract may contain certain notes or alternative provisions. Those alternative provisions will be included at the sole discretion of the Owner.

6.0 BUREAU OF LABOR AND INDUSTRIES (BOLI) PREVAILING WAGES

In compliance with Oregon Prevailing Wage Law, the following is incorporated into this ITB:

The Contractor and all subcontractors shall comply with the provisions of ORS 279C.800 through 279C.870, relative to Prevailing Wage Rates (PWR) as outlined in Sections C.1 and C.2 of the General Conditions. The resulting Contract is subject to the following BOLI wage rate requirements, which are incorporated herein by reference:

- 6.1** January 2, 2020 PWR Apprenticeship Rates
- 6.2** February 1, 2020 PWR Amendments
- 6.3** January 1, 2020 Prevailing Wage Rates for Public Works Contracts in Oregon
- 6.4** July 1, 2018 Definitions of Covered Occupations for Public Works Contracts in Oregon

These BOLI wage rates are available here: https://www.oregon.gov/boli/WHD/PWR/Pages/pwr_state.aspx.

7.0 INSTRUCTIONS TO BIDDERS

7.1 Summary of Work. The Work contemplated in this document shall be for the Owner in connection with the Project described in the Summary of Work in Section 1.0 of this document.

7.2 Pre Bid Conference and Examination of Site Conditions

7.2.1 Before submitting a Bid, if required by this ITB, the Bidder shall attend the mandatory Pre-Bid Conference, which may include a site examination. Attendance will be documented through a sign-in sheet prepared by the Owner. Prime bidders who arrive more than five (5) minutes after start time of the meeting (as stated in the ITB and by the Owner’s clock) or after the discussion portion of the meeting, (whichever comes first) shall not be permitted to sign in and will not be permitted to submit a Bid.

7.2.2 In any event, the Bidder shall examine the Work site to ascertain its physical condition. Failure to comply with this section will not release Contractor from entering into the Contract nor excuse Contractor from performing the Work in strict accordance with the terms and conditions of the Contract Documents.

7.2.3 The Bidder shall be responsible for being fully informed as to the quality, quantity and sources of supply of the materials listed within the documents included as exhibits to this ITB.

7.2.4 The Owner will not be responsible for any loss or unanticipated costs which may arise as a result of Contractor's failure to be fully informed in advance with regard to all conditions pertaining to the Work and the character of the Work required.

7.2.5 No statement made by any officer, agent, or employee of the Owner in relation to the physical conditions pertaining to the Work site or quality, quantity, and supply of materials will be binding on the Owner, unless included in writing in the documents included as exhibits to this ITB or an Addendum.

7.3 **Brand-Name Specification.** To establish a basis of quality, certain processes, types of machinery and equipment or kinds of materials may be specified in the documents included as exhibits to this ITB either by description of process or by designating a manufacturer by name and referring to a brand or product designation or by specifying a kind of material. Whenever a process is designated or a manufacturer name, brand or item designation is given, or whenever a process or material covered by patent is designated or described, it shall be understood that the words "or approved equal" follow such name, designation or description, whether they do so or not.

7.4 **Substitution Approval Process**

7.4.1 Prior to submitting a Bid that contains a Substitution, the Bidder must first seek approval of the Substitution from the Owner by submitting a written request to the **Contract Administrator** for approval prior to the deadline for questions as stated in this Solicitation.

7.4.2 Substitution requests shall be submitted in accordance with Division 01 requirements.

7.4.3 Only approved Substitution requests will be acknowledged via Addendum(a) to this ITB and shall become a part of the documents included as exhibits to this ITB. When approved, it is with the understanding that the substituted article or material is of equal or better value and utility than the one specified.

7.5 **Execution of the Bid Form**

7.5.1 The Bid Form is hereby defined as the OSU form furnished by Owner to be completed by Bidder.

7.5.2 The Bid Form relates to Bids on this ITB. Only the amounts and information asked for on the Bid Form will be considered as the Bid. Each Bidder shall Bid upon the Work exactly as set forth in the Bid Form. The Bidder shall include in the Bid a sum to cover the cost of all items contemplated by the documents included as exhibits to this ITB. Bids that fail to address

alternates set forth on the Bid Form may be considered non-responsive.

7.5.3 Each Bid Form must: 1) Be completed in accordance with these instructions; 2) Include the appropriate signatures as noted on the Bid Form; and 3) Include numbers pertaining to the Base Bid(s) stated both in writing and in figures.

7.5.4 When Bidding on an alternate for which there is no charge, the Bidder shall write the words "No Charge" in the space provided on the Bid Form. If one or more alternates is shown on the Bid Form, the Bidder shall indicate whether each is "add" or "deduct."

7.5.5 When Bidding on unit prices, quantities stated on the Bid Form are estimates and are included for the purpose of award of a Contract. In the event of a discrepancy between unit prices and extensions, the unit price shall govern.

7.5.6 Incomplete Bids may be rejected.

7.5.7 Bids that contain conditions not provided for on the Bid Form may be rejected.

7.5.8 Bids that contain ambiguities may be rejected.

7.5.9 With the exception of filling in the required fields on the Bid Form, no other alterations to the Bid Form shall be made.

7.6 **Submission of Bid.** Each Bid shall be sealed in an envelope, properly addressed to the **Contract Administrator**, showing on the outside of the envelope the name of the Bidder and the name of the project. Bids must be received at the time and place stated in this ITB.

7.7 **Bid Closing and Opening of Bids**

7.7.1 All Bids must be received by the Owner before the Closing Date and Time. The Owner's official clock shall prevail in any time conflict. Any Bid received after the Closing Date and Time will be rejected, and will be retained and part of the Owner's archive records in accordance with OSU Standards.

7.7.2 At the time of opening and reading of Bids, each Bid received, irrespective of any irregularities or informalities, may be publicly opened and read aloud.

7.8 **Acceptance or Rejection of Bids by Owner**

7.8.1 The procedures for Contract awards shall be in compliance with the provisions of OSU standards and policies adopted by the Owner.

7.8.2 The Owner reserves the right to reject any or all Bids and to waive minor informalities.

7.8.3 Unless all Bids are rejected, the Owner will award the Contract(s) based on the lowest responsive Bid from a responsible Bidder. If that Bidder does not execute the Contract(s), the Contract(s) will be awarded to the next lowest responsive Bid from a responsible Bidder or Bidders

in succession, provided this ITB is not cancelled under the provisions of OSU standards and policies adopted by the Owner.

7.8.4 The Owner reserves the right to hold the Bid of the three lowest Bidders for a period of sixty (60) Days from the time of Bid opening pending Award of the Contract.

7.8.5 In determining the lowest Bidder, the Owner reserves the right to take into consideration any or all Base Bids as well as alternates or combinations indicated in the Bid Form.

7.8.5.1 When alternates are included on the Bid Form, they may be exercised at the sole discretion of the Owner within sixty (60) Days of the Effective Date of the Contract, unless extended by written mutual agreement of the Parties.

7.8.5.2 The Owner has the right to accept alternates without regard to order or sequence; but, such acceptance must not deliberately impair the selection of a low, responsible and responsive Bidder to whom the Contract would be awarded under an equitable bid procedure.

7.8.6 If Owner has not accepted a Bid within sixty (60) Days after the opening of the Bids, each of the three lowest Bidders may withdraw the Bid submitted.

7.9 Withdrawal of Bid

7.9.1 At any time prior to the Closing Date and Time a Bidder may withdraw its Bid in accordance with OSU Standards. This will not preclude the submission of another Bid by such Bidder prior to the Closing Date and Time.

7.9.2 After the Closing Date and Time, Bidders are prohibited from withdrawing their Bid, except as provided by OSU Standards.

7.10 Execution of Contract, Agreement, Performance Bond and Payment Bond

7.10.1 The Bidder shall be required to execute the Contract as provided, and, if applicable, deliver a Performance Bond and a Payment Bond from a surety company licensed to do surety business in the State of Oregon within time period contained in the Award letter. The Contract Documents shall be delivered to the Owner in the manner stated in the Award letter.

7.11 Public Works Bond. At the time of submission of its Bid, each Bidder shall have on file with the Construction Contractors Board a public works bond required by ORS 279C.836, unless otherwise exempt under that statute. Failure to have on file a public works bond at the time of submission of the Bid may result in rejection of the Bid as non-responsive.

7.12 Equity Contracting. Owner will require the successful Contractor to comply with OSU Standards, policies, rules and procedures requiring good faith efforts in subcontracting with minority, women, emerging small business or service-disabled veteran owned business enterprises.

8.0 SUPPLEMENTAL INSTRUCTIONS TO BIDDERS

8.1 Multi-Bids.

Three (3) separate bids are being called for in the Bid Form.

Schedule A is the total cost of the Work to construct a new indoor softball practice facility, including relocation of exterior walkways, minor private utility work, and installation of selected furnishings, specialty infield soils, and approved synthetic turf surfacing.

Schedule B is the total cost of the Work to demolish and remove existing bleacher and press box systems, coordinate and construct a new design-build bleacher system and press box along with site and accessibility improvements.

Schedule C is the total cost of the Work to construct both Schedule A & B and can be less than the total of Schedules A & B combined.

It is OSU's intent to award Schedule C to the lowest responsive and responsible bidder with or without any alternates if within available funding in the best interest of the University. Should bid prices exceed available funding it is OSU's intent to award Schedule A or B with or without any alternates whichever is in the best interest of the University.

8.0 EXHIBITS

Exhibit A – Bid Form

Exhibit B – Sample Public Improvement Contract

Exhibit C – General Conditions for Public Improvement Contracts

Exhibit D – Supplemental General Conditions to the Public Improvement General Conditions

Exhibit E – Performance Bond, Payment Bond

Exhibit F – MWESB Project Contract Report Instructions and Report

Exhibit G – Specifications, by Mackenzie, dated 3/12/2020

Exhibit H – Drawings, by Mackenzie, dated 3/12/2020

Exhibit I – Geotech Reports

Foundation Engineering Inc., “OSU Softball Complex – Field Lighting” dated February 21, 2018

Foundation Engineering Inc., “OSU Lorenz Soccer Field Bleacher Improvements” dated February 12, 2020

Exhibit J – Addenda (if and when applicable)

End of ITB

EXHIBIT A



Oregon State University

BID FORM

ITB NUMBER & NAME: ITB 2020-002828 – OSU SOFTBALL HITTING FACILITY AND LORENZ SOCCER BELACHERS

BID DUE DATE AND TIME: _____
(fill in)

FROM: _____
(Name of Contractor)

TO: Oregon State University (“Owner”)
Construction Contracts Administration
644 SW 13th St.
Corvallis, Oregon 97333

1. The Undersigned hereby proposes to furnish all material and labor and perform all work hereinafter indicated for the above project in strict accordance with the Contract Documents as follows:

Schedule “A” _____ Dollars (\$ _____)

Schedule “B” _____ Dollars (\$ _____)

“Schedule C” _____ Dollars (\$ _____)

and the Undersigned agrees to be bound by the documents either contained in or incorporated by reference in the Invitation to Bid and ADDENDA numbered ____ through ____, inclusive. (fill in blanks)

2. The Undersigned proposes to add to or deduct from the Base Bid indicated above the items of work relating to the following Alternate(s) as designated in the Specifications:

ALTERNATE B1: ADD/DEDUCT: \$ _____

ALTERNATE B2: ADD/DEDUCT: \$ _____

3. The work shall be completed within the time stipulated and specified in Division 1, Section 01 11 00, of the Specifications.

4. The Undersigned certifies that: (1) This Bid has been arrived at independently and is being submitted

without collusion with and without any agreement, understanding, or planned common course of action with any other vendor of materials, supplies, equipment or services described in the invitation to bid designed to limit independent bidding or competition; and (2) The contents of the Bid have not been communicated by the Undersigned or its employees or agents to any person not an employee or agent of the Undersigned or its surety on any Bid security furnished with the Bid and will not be communicated to such person prior to the official opening of the Bid.

5. The Undersigned agrees, if awarded a contract, to comply with the provisions of ORS 279C.800 through 279C.870 pertaining to the payment of the prevailing wages.

6. Contractor's CCB license number is _____. As a condition to submitting a Bid, Contractor must be licensed with the Oregon Construction Contractors Board in accordance with ORS 701.021 to 701.128, and disclose the license number. Failure to be licensed and disclose the number will render the Bid unresponsive and it will be rejected, unless contrary to federal law.

7. The Bidder hereby certifies that all subcontractors who perform construction work as described in ORS 701.005(5) are licensed with the Construction Contractors Board in accordance with ORS 701.021 to 701.128 at the time the Bid is submitted.

8. Contractor's Project Manager for this project is: _____,

Email: _____ Cell Phone: _____.

9. The Undersigned agrees, if awarded the Contract, to deliver to Owner, a satisfactory Performance Bond and Payment Bond, each in an amount equal to one hundred (100) percent of the Contract sum, using forms provided by the Owner. The surety requested to issue the Performance Bond and Payment Bond will be:

(name of surety company - not insurance agency)

The Undersigned hereby authorizes said surety company to disclose any information to the Owner concerning the Undersigned's ability to supply a Performance Bond and Payment Bond each in the amount of the Contract.

By signature below, Contractor agrees to be bound by this Bid.

NAME OF FIRM: _____

ADDRESS: _____

FEDERAL TAX ID: _____

TELEPHONE NO: _____

SIGNATURE: _____

Authorized Signature

Printed Name

******* END OF BID *******

EXHIBIT B

OREGON STATE UNIVERSITY PUBLIC IMPROVEMENT CONTRACT

This Public Improvement Contract for the **(Insert Project Name)** (the "Contract"), made by and between Oregon State University, hereinafter called OWNER, and **(Insert Contractor's Name)** hereinafter called the CONTRACTOR (collectively the "Parties"), shall become effective on **(Insert contract award date)**, or the date this Contract has been signed by all the Parties, whichever is later.

1. Contract Price, Contract Documents and Work

The CONTRACTOR, in consideration of the sum of _____ (the "Contract Price"), to be paid to the CONTRACTOR by OWNER in the manner and at the time hereinafter provided, and subject to the terms and conditions provided for in the Instructions to Bidders and other Contract Documents (as defined in the Oregon State University General Conditions referenced within the Instructions to Bidders), all of which are incorporated herein by reference, hereby agrees to perform all Work described and reasonably inferred from the Contract Documents. The Contract Price is the amount contemplated by the Base Bid adjusted for Alternates ____, as indicated in the accepted Bid.

Also, the following documents are incorporated by reference in this Contract and made a part hereof if checked for inclusion [X]:

[] (RESERVED)

2. Representatives

CONTRACTOR has named **(Insert Name)** its' Authorized Representative to act on its behalf. OWNER designates, or shall designate, its Authorized Representative as indicted below (check one):

A. [] Unless otherwise specified in the Contract Documents, the OWNER designates **(Insert Name)** as its Authorized Representative in the administration of this Contract. The above-named individual shall be the initial point of contact for matters related to Contract performance, payment authorization, and to carry out the responsibilities of the OWNER.

B. [X] Name of OWNER'S Authorized Representative shall be submitted by OWNER in a separate writing.

3. Contract Dates.

COMMENCEMENT DATE: Within **(Insert # of Days)** days of the execution of the Contract ("Execution").

SUBSTANTIAL COMPLETION DATE: **(Insert # of Days)** from Contract Execution **(or a date certain)**.

FINAL COMPLETION DATE: **(Insert # of Days)** from Contract Execution **(or a date certain)**.

4. Minimum Wage Rates

Prevailing Wage Rates requirements apply to this Project. Contractor and all subcontractors shall comply with the provisions of ORS 279C.800 through 279C.870, relative to Prevailing Wage Rates and the required public works bond, as outlined in Sections C.1, C.2 and G.2.3 of the General Conditions. The Bureau of

Labor and Industries (BOLI) wage rates and requirements set forth in the following BOLI booklet (and any listed amendments to that booklet), which are incorporated herein by reference, apply to the Work authorized under this Supplement:

PREVAILING WAGE RATES for Public Works Contracts in Oregon, July 1, 2019, which can be downloaded at the following web address:

[\[http://www.boli.state.or.us/BOLI/WHD/PWR/pwr_book.shtml\]](http://www.boli.state.or.us/BOLI/WHD/PWR/pwr_book.shtml)

The Work will take place in Benton County, Oregon.

5. Integration

The Contract documents constitute the entire agreement between the parties. There are no other understandings, agreements or representations, oral or written, not specified herein regarding this Contract. CONTRACTOR, by the signature below of its authorized representative, hereby acknowledges that it has read this Contract, understands it, and agrees to be bound by its terms and conditions.

In witness whereof, Oregon State University executes this Contract and the CONTRACTOR does execute the same as of the day and year indicated below.

CONTRACTOR DATA:

(Insert Contractor Name & Address)

CONTRACTOR NAME:

CONTRACTOR FEDERAL ID #

CONTRACTOR CCB #

[Payment information will be reported to the IRS under the name and taxpayer ID # provided above. Information must be provided prior to contract approval. Information not matching IRS records could subject Contractor to 31 percent backup withholding.]

CONTRACTOR SIGNATURE

By _____
Name/Title Date

Oregon State University

By _____

Michael J. Green Date
Vice President for Finance and Administration

EXHIBIT C

OREGON STATE UNIVERSITY GENERAL CONDITIONS FOR PUBLIC IMPROVEMENT CONTRACTS

June 30, 2017

INSTRUCTIONS: The attached **Oregon State University General Conditions for Public Improvement Contracts ("Public Improvement General Conditions")** apply to all designated Public Improvement contracts. Changes to the Public Improvement General Conditions (including any additions, deletions or substitutions) should only be made by attaching Public Improvement Supplemental General Conditions. The text of these Public Improvement General Conditions should not otherwise be altered.

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**SECTION A
GENERAL PROVISIONS**

A.1 DEFINITION OF TERMS

In the Contract Documents the following terms shall be as defined below:

AMENDMENT, means a writing which, when fully executed by the Parties to this Contract, constitutes a change to a Contract Document. Amendments shall be issued in accordance with the changes provisions of Section D and, if applicable, establish a Contract Price or Contract Time adjustment.

APPLICABLE LAWS, means federal, state and local laws, codes, rules, regulations and ordinances applicable to the Work and to the Contract.

ARCHITECT/ENGINEER, means the Person appointed by the Owner to make drawings and specifications and, to provide contract administration of the Work contemplated by the Contract to the extent provided herein or by supplemental instruction of Owner (under which Owner may delegate responsibilities to the Architect/Engineer), in accordance with ORS Chapter 671 (Architects) or ORS Chapter 672 (Engineers) and administrative rules adopted thereunder.

CHANGE ORDER, means a written order issued by the Owner to be later included as an Amendment. A Change Order shall not be effective until codified as an Amendment.

CLAIM, means a demand by Contractor pursuant to Section D.3 for review of the denial of Contractor's initial request for an adjustment of Contract terms, payment of money, extension of Contract Time or other relief, submitted in accordance with the requirements and within the time limits established for review of Claims in these Public Improvement General Conditions.

CONSTRUCTION CHANGE DIRECTIVE, means a written order by the Owner to the Contractor requiring a change in the Work within the general scope of the Contract Documents, issued under the changes provisions of Section D.

CONSTRUCTION SCHEDULE, means the schedule prepared by the Contractor in CPM format and approved by the Owner, and all adjustments thereto approved by the Owner, that describes sequence and timing of the Work.

CONTRACT, means the written agreement between the Owner and the Contractor comprised of the Contract Documents which describe the Work to be done and the obligations between the parties.

CONTRACT DOCUMENTS, means the Public Improvement Contract, Public Improvement General Conditions, Supplemental General Conditions if any, the accepted Offer, Plans, Specifications, Construction Change Directives, Solicitation Document and addenda thereto, Instructions to Offerors, and Supplemental Instructions to Offerors, the CM/GC's RFQ proposal, the GMP Amendment, and any other Amendment, the Construction Schedule prepared and approved in accordance with the Construction Documents, and all other required Submittals.

CONTRACT PERIOD, as set forth in the Contract Documents, means the total period of time beginning with the full execution of a Contract and, if applicable, the issuance of a Notice to Proceed and concluding upon Final Completion.

CONTRACT PRICE, means the total of the awarded Offer amount, as increased or decreased by the price of approved alternates, as indicated in the Contract Documents.

CONTRACT TIME, means any incremental period of time allowed under the Contract to complete any portion of the Work as reflected in the project schedule.

CONTRACTOR, means the Person awarded the Contract for the Work contemplated.

CPM, means a critical path method format to be used for the Construction Schedule.

DAYS, are calendar days, including weekdays, weekends and holidays, unless otherwise specified.

DIRECT COSTS, means, unless otherwise provided in the Contract Documents, the cost of materials, including sales tax, cost of delivery; cost of labor, including social security, Medicare and unemployment insurance, and fringe benefits required by agreement or custom; worker's compensation insurance; project specific insurance (including, without limitation, Builder's Risk Insurance and Builder's Risk Installation Floater); bond premiums, rental cost of equipment, and machinery required for execution of the Work; and the additional costs of field personnel directly attributable to the Work.

FINAL COMPLETION, means the final completion of all requirements under the Contract, including Contract Closeout as described in Section K but excluding Warranty Work as described in Section I.2, and the final payment and release of all retainage, if any, released.

FINAL PAYMENT, means the last payment to the Contractor, including retainage, in connection with the Work.

FORCE MAJEURE, means an act, event or occurrence caused by fire, riot, war, acts of God, nature, sovereign, or public enemy, strikes, freight embargoes or any other act, event or occurrence that is beyond the control of the party to this Contract who is asserting Force Majeure.

MWESB REPORT, means an accurate report by the Contractor to the Owner identifying all Minority, Women and Emerging Small Business (MWESB) enterprises, as those terms are defined in ORS 200.005, receiving contracts throughout the course of the Work. An initial MWESB report is required (see Section E.2.9) and MWESB Reports are required annually (see Section E.2.9) and as a condition of final payment (see Section K.1). The initial report shall include the total number of contracts and subcontracts awarded to MWESB enterprises and the dollar value of their respective contracts and subcontracts. The annual reports shall include the total number of contracts and subcontracts awarded to MWESB enterprises, the dollar value of each, and the expenditure toward each contract and subcontract during the previous twelve (12) months. The final report shall include the total number of contracts and subcontracts awarded to MWESB enterprises and the dollar value of their respective contracts and subcontracts including all Contracts and Amendments incorporated during the course of the project. The reports shall only include enterprises certified with the State of Oregon as MWESB enterprises and shall include individual identification of each enterprise as a Minority business enterprise, a Women business enterprise, and/or an Emerging Small Business Enterprise, as applicable.

NOTICE TO PROCEED, means the official written notice from the Owner stating that the Contractor is to proceed with the Work defined in the Contract Documents. Notwithstanding the Notice to Proceed, Contractor shall not be authorized to proceed with the Work until all initial Contract requirements, including the Contract, performance bond and payment bond, and certificates of insurance, have been fully executed and submitted to Owner in a suitable form.

OFFER, means a bid in connection with Instructions to Bidders or a proposal in connection with a Request for Proposals.

OFFEROR, means a bidder in connection with Instructions to Bidders or a proposer in connection with a Request for Proposals.

OVERHEAD, means those items which may be included in the Contractor's markup (general and administrative expense and profit) and that shall not be charged as Direct Cost of the Work, including without limitation such Overhead expenses as wages or salary of personnel above the level of foreman (i.e., superintendents and project managers), expenses of Contractor's offices and supplies at the job site (e.g. job trailer) and at Contractor's principal place of business and including expenses of personnel staffing the job site office and Contractor's principal place of business, and Commercial General Liability Insurance and Automobile Liability Insurance.

OWNER, means Oregon State University(OSU). Owner may elect, by written notice to Contractor, to delegate certain duties to more than one party, including without limitation, to an Architect/Engineer. However, nothing in these Public Improvement General Conditions is intended to abrogate the separate design professional responsibilities of Architects under ORS Chapter 671 or of Engineers under ORS Chapter 672.

PERSON, means a natural person or entity doing business as a sole proprietorship, a partnership, a joint venture, a corporation, a limited liability company or partnership, or any other entity possessing the legal capacity to contract.

PLANS, means the drawings which show the location, type, dimensions, and details of the Work to be done under the Contract.

PROJECT, means the development, design, construction

PUNCH LIST, means the list of Work yet to be completed or deficiencies which need to be corrected in order to achieve Final Completion of the Contract.

RECORD DOCUMENT, means the as-built Plans, Specifications, testing and inspection records, product data, samples, manufacturer and distributor/supplier warranties evidencing transfer of ownership to Owner, operational and maintenance manuals, shop drawings, Construction Change Directives, MWESB Reports, correspondence, certificate(s) of occupancy, and other documents listed in Subsection B.9.1 of these Public Improvement General Conditions, recording all Services performed.

SOLICITATION DOCUMENT, means Instructions to Bidders or Offerors or a Request for Proposal or a Request for Quotes.

SPECIFICATION, means any description of the physical or functional characteristics of the Work, or of the nature of a

supply, service or construction item. Specifications may include a description of any requirement for inspecting, testing or preparing a supply, service or construction item for delivery and the quantities or qualities of materials to be furnished under the Contract. Specifications generally will state the results or products to be obtained and may, on occasion, describe the method and manner of doing the Work to be performed. Specifications may be incorporated by reference and/or may be attached to the Contract.

SUBCONTRACT, means a contract between the Contractor and a subcontractor for the performance of a portion of the Work.

SUBCONTRACTOR, means a Person having a direct contract with the Contractor, or another Subcontractor, to perform one or more items of the Work.

SUBMITTAL, means a shop drawing, product data, sample, catalog cut, or similar item for specific portions of the Work as required by the Construction Documents.

SUBSTANTIAL COMPLETION, means the date when the Owner accepts in writing the construction, alteration or repair of the improvement to real property constituting the Work or any designated portion thereof as having reached that state of completion when it may be used or occupied for its intended purpose. Substantial Completion of facilities with operating systems occurs only after thirty (30) continuous Days of successful, trouble-free operation of the operating systems as provided in Section K.3.2.

SUBSTITUTIONS, means items that in function, performance, reliability, quality, and general configuration are the same or better than the product(s) specified. Approval of any substitute item shall be solely determined by the Owner. The decision of the Owner is final.

PUBLIC IMPROVEMENT SUPPLEMENTAL GENERAL CONDITIONS, means those conditions that remove from, add to, or modify these Public Improvement General Conditions. Public Improvement Supplemental General Conditions may be included in the Solicitation Document or may be a separate attachment to the Contract.

WORK, means the furnishing of all materials, equipment, labor, transportation, services and incidentals necessary to successfully complete any individual item or the entire Contract and the carrying out of duties and obligations imposed by the Contract Documents.

A.2 SCOPE OF WORK

The Work contemplated under this Contract includes all labor, materials, transportation, equipment and services for, and incidental to, the completion of all construction work in connection with the project described in the Contract Documents. The Contractor shall perform all Work necessary so that the project can be legally occupied and fully used for the intended use as set forth in the Contract Documents. Execution of the Contract by the Contractor is an express representation (1) that the Contractor understands the intent stated herein with respect to the Preconstruction Phase Services, and (2) the Contractor's execution of an Amendment, including the GMP Amendment, shall be an express and unqualified representation that the Contractor understands the intent stated herein and therein.

A.3 INTERPRETATION OF CONTRACT DOCUMENTS

A.3.1 Unless otherwise specifically defined in the Contract

Documents, words which have well-known technical meanings or construction industry meanings are used in the Contract Documents in accordance with such recognized meanings. Contract Documents are intended to be complementary. Whatever is called for in one, is interpreted to be called for in all. However, in the event of conflicts or discrepancies among the Contract Documents, interpretations will be based on the following descending order of precedence:

- (a) Amendments and Construction Change Directives, with those of later date having precedence over those of an earlier date;
 - (b) The Supplemental General Conditions;
 - (c) Public Improvement General Conditions;
 - (d) The Public Improvement Contract;
 - (e) Construction Change Directive;
 - (f) Division One (General Requirements) of the Specifications;
 - (g) Detailed Schedules of finishes, equipment and other items included in the Specifications;
 - (h) Plans and Specifications (other than Division One and the Detailed Schedules to the Specifications);
 - (i) Large-scale drawings on Plans;
 - (j) Small-scale drawings on Plans;
 - (k) Dimension numbers written on Plans which shall prevail and take precedence over dimensions scaled from Plans;
 - (l) The Solicitation Document, and any addenda thereto.
 - (m) The Contractor's RFQ proposal.
- A.3.2 In the case of an inconsistency between Plans and Specifications or within either document not clarified by addendum, the better quality or greater quantity of Work shall be provided in accordance with the Owner's interpretation in writing.
- A.3.3 If the Contractor finds discrepancies in, or omissions from the Contract Documents, or if the Contractor is in doubt as to their meaning, the Contractor shall at once notify the Owner in writing. Matters concerning and interpretation of requirements of the Contract Documents will be decided by the Owner, who may delegate that duty in some instances to the Architect/Engineer. Responses to Contractor's requests for interpretation of Contract Documents will be made in writing by Owner (or the Architect/Engineer) within any time limits agreed upon or otherwise with reasonable promptness. Interpretations and decisions of the Owner (or Architect/Engineer) will be consistent with the intent of and reasonably inferable from the Contract Documents. Contractor shall not proceed without direction in writing from the Owner (or Architect/Engineer).
- A.3.4 References to standard specifications, manuals, codes of any technical society, organization or association, to the laws or regulations of any governmental authority, whether such reference be specific or by implication,

shall mean the latest standard specification, manual, code, laws or regulations in effect in the jurisdiction where the project is occurring on the first published date of the Solicitation Document, except as may be otherwise specifically stated.

A.4 EXAMINATION OF PLANS, SPECIFICATIONS, AND SITE

- A.4.1 It is understood that the Contractor, before submitting an Offer, has made a careful examination of the Contract Documents; has become fully informed as to the quality and quantity of materials and the character of the Work required; and has made a careful examination of the location and conditions of the Work and the sources of supply for materials. The Owner will in no case be responsible for any loss or for any unanticipated costs that may be suffered by the Contractor as a result of the Contractor's failure to acquire full information in advance in regard to all conditions pertaining to the Work. No oral agreement or conversation with any officer, agent, or personnel of the Owner, or with the Architect/Engineer either before or after the execution of this Contract, shall affect or modify any of the terms or obligations herein contained.
- A.4.2 Should the Plans or Specifications fail to particularly describe the materials, kind of goods, or details of construction of any aspect of the Work, Contractor shall have the duty to make inquiry of the Owner and Architect/Engineer as to what is required prior to performance of the Work. Absent Specifications to the contrary, the materials or processes that would normally be used to produce first quality finished Work shall be considered a part of the Contract requirements.
- A.4.3 Any design errors or omissions noted by the Contractor shall be reported promptly to the Owner and confirmed in writing, including without limitation, any nonconformity with Applicable Laws.
- A.4.4 If the Contractor believes that adjustments to cost or Contract Time is involved because of clarifications or instructions issued by the Owner (or Architect/Engineer) in response to the Contractor's notices or requests for information, the Contractor must submit a written request to the Owner, setting forth the nature and specific extent of the request, including all time and cost impacts against the Contract as soon as possible, but no later than thirty (30) Days after receipt by Contractor of the clarifications or instructions issued. If the Owner denies Contractor's request for additional compensation, additional Contract Time, or other relief that Contractor believes results from the clarifications or instructions, the Contractor may proceed to file a Claim under Section D.3, Claims Review Process. If the Contractor fails to perform the obligations of Sections A.4.1 to A.4.3, the Contractor shall pay such costs and damages to the Owner as would have been avoided if the Contractor had performed such obligations.

A.5 INDEPENDENT CONTRACTOR STATUS

The service or services to be performed under this Contract are those of an independent contractor as defined in ORS 670.600.

Contractor represents and warrants that it is not an officer, employee or agent of the Owner as those terms are used in ORS 30.265.

A.6 RETIREMENT SYSTEM STATUS AND TAXES

Contractor represents and warrants that it is not a contributing member of the Public Employees' Retirement System and will be responsible for any federal or state taxes applicable to payment received under this Contract. Contractor will not be eligible for any benefits from these Contract payments of federal Social Security, employment insurance, workers' compensation or the Public Employees' Retirement System, except as a self-employed individual. Unless the Contractor is subject to backup withholding, Owner will not withhold from such payments any amount(s) to cover Contractor's federal or state tax obligations.

A.7 GOVERNMENT EMPLOYMENT STATUS

- A.7.1 If this payment is to be charged against federal funds, Contractor represents and warrants that it is not currently employed by the Federal Government. This does not preclude the Contractor from holding another contract with the Federal Government.
- A.7.2 Contractor represents and warrants that Contractor is not an employee of the State of Oregon for purposes of performing Work under this Contract

SECTION B ADMINISTRATION OF THE CONTRACT

B.1 OWNER'S ADMINISTRATION OF THE CONTRACT

- B.1.1 The Owner shall administer the Contract as described in the Contract Documents (1) during construction (2) until Final Payment is due and (3) during the one-year period for correction of Work. The Owner will act as provided in the Contract Documents, unless modified in writing in accordance with other provisions of the Contract. In performing these tasks, the Owner may rely on the Architect/Engineer or other consultants to perform some or all of these tasks.
- B.1.2 The Owner will visit the site at intervals appropriate to the stage of the Contractor's operations (1) to become generally familiar with and to keep the Owner informed about the progress and quality of the portion of the Work completed, (2) to endeavor to guard the Owner against defects and deficiencies in the Work, and (3) to determine in general if Work is being performed in a manner indicating that the Work, when fully completed, will be in accordance with the Contract Documents. The Owner will not make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. The Owner will neither have control over or charge of, nor be responsible for the construction means, methods, techniques, sequences or procedures, or for the safety precautions and programs in connection with the Work. Inspection of the progress, quantity, or quality of the Work done by the Owner, any Owner representative, and public agency, the Architect/Engineer, or any inspector, shall not relieve the Contractor of any responsibility for the compliance of all Work with the Contract Documents.
- B.1.3 Except as otherwise provided in the Contract Documents or when direct communications have been specifically authorized, the Owner and Contractor shall communicate with each other about matters arising out of or relating to the Contract. Communications by and with the Architect/Engineer's consultants shall be through the Architect/Engineer. Communications by

and with Subcontractors and material suppliers shall be through the Contractor. Communications by and with separate contractors shall be through the Owner.

B.2 Based upon the Architect/Engineer's evaluations of the Contractor's Application for Payment, or unless otherwise stipulated by the Owner, the Architect/Engineer will review and certify the amounts due the Contractor and will issue Certificates for Payment in such amounts. CONTRACTOR'S MEANS AND METHODS; MITIGATION OF IMPACTS

- B.2.1 The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for and have control over construction means, methods, techniques, sequences and procedures and for coordinating all portions of the Work under the Contract, unless the Contract Documents give other specific instructions concerning these matters. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences or procedures, the Contractor shall evaluate the jobsite safety thereof and, except as stated below, shall be fully and solely responsible for the jobsite safety of such means, methods, techniques, sequences or procedures.
- B.2.2 The Contractor is responsible to protect and maintain the Work during the course of construction and to mitigate any adverse impacts to the project, including those caused by authorized changes, which may affect cost, schedule, or quality.
- B.2.3 The Contractor is responsible for the actions of all its personnel, laborers, suppliers, and Subcontractors on the project. The Contractor shall enforce strict discipline and good order among Contractor's employees and other persons carrying out the Work. The Contractor shall not permit employment of persons who are unfit or unskilled for the tasks assigned to them.

B.3 MATERIALS AND WORKMANSHIP

- B.3.1 The intent of the Contract Documents is to provide for the construction and completion in every detail of the Work described. All Work shall be performed in a professional manner and unless the means or methods of performing a task are specified elsewhere in the Contract Documents, Contractor shall employ methods that are generally accepted and used by the industry, in accordance with industry standards.
- B.3.2 The Contractor is responsible to perform the Work as required by the Contract Documents. Defective Work shall be corrected at the Contractor's expense.
- B.3.3 Work done and materials furnished shall be subject to inspection and/or observation and testing by the Owner to determine if they conform to the Contract Documents. Inspection of the Work by the Owner does not relieve the Contractor of responsibility for the Work in accordance with the Contract Documents.
- B.3.4 Contractor shall furnish adequate facilities, as required, for the Owner to have safe access to the Work including without limitation walkways, railings, ladders, tunnels, and platforms. Producers, suppliers, and fabricators shall also provide proper facilities and access to their

facilities.

ORS 671.560.

- B.3.5 The Contractor shall furnish Samples of materials for testing by the Owner and include the cost of the Samples in the Contract Price.

- B.5.5 The following notice is applicable to Contractors who perform excavation Work. ATTENTION: Oregon law requires you to follow rules adopted by the Oregon Utility Notification Center. Those rules are set forth in OAR 952-001-0010 through OAR 952-001-00100. You may obtain copies of the rules by calling the center at (503)232-1987.

B.4 PERMITS

Contractor shall obtain and pay for all necessary permits, licenses and fees, except for those specifically excluded in the Supplemental General Conditions, for the construction of the Work, for temporary obstructions, enclosures, opening of streets for pipes, walls, utilities, environmental Work, etc., as required for the project.

Contractor shall be responsible for all violations of the law, in connection with the construction or caused by obstructing streets, sidewalks or otherwise. Contractor shall give all requisite notices to public authorities.

- B.5.6 Failure to comply with any or all of the requirements of B.5.1 through B.5.5 shall be a breach of Contract and constitute grounds for Contract termination. Damages or costs resulting from such noncompliance shall be the responsibility of Contractor.

B.5 COMPLIANCE WITH GOVERNMENT REGULATIONS

B.6 SUPERINTENDENCE

Contractor shall keep on the site, during the progress of the Work, a competent superintendent and any necessary assistants who shall be satisfactory to the Owner and who shall represent the Contractor on the site. Directions given to the superintendent by the Owner shall be confirmed in writing to the Contractor.

- B.5.1 Contractor shall comply with Applicable Laws pertaining to the Work and the Contract. Failure to comply with such requirements shall constitute a breach of Contract and shall be grounds for Contract termination. Without limiting the generality of the foregoing, Contractor expressly agrees to comply with the following, as applicable: (i) Title VI and VII of Civil Rights Act of 1964, as amended; (ii) Section 503 and 504 of the Rehabilitation Act of 1973, as amended; (iii) the Health Insurance Portability and Accountability Act of 1996; (iv) the Americans with Disabilities Act of 1990, as amended; (v) ORS Chapter 659; as amended; (vi) ORS Chapter 659A; as amended; (vii) all regulations and administrative rules established pursuant to the foregoing laws; and (viii) all other applicable requirements of federal and state civil rights and rehabilitation statutes, rules and regulations.

B.7 INSPECTION

- B.5.2 Contractor shall comply with all applicable requirements of federal and state civil rights and rehabilitation statutes, rules and regulations, and

- B.7.1 Owner shall have access to the Work at all times.

- (a) Contractor shall not discriminate against Disadvantaged, Minority, Women or Emerging Small Business enterprises, as those terms are defined in ORS 200.005, or a business enterprise that is owned or controlled by or that employs a disabled veteran, as that term is defined in ORS 408.225, in the awarding of subcontracts.

- B.7.2 Inspection of the Work will be made by the Owner at its discretion. The Owner will have authority to reject Work that does not conform to the Contract Documents. Any Work found to be not in conformance with the Contract Documents, in the discretion of the Owner, shall be removed and replaced at the Contractor's expense.

- (b) Contractor shall maintain, in current and valid form, all licenses and certificates required by Applicable Laws or this Contract when performing the Work.

- B.7.3 Contractor shall make or obtain at the appropriate time all tests, inspections and approvals of portions of the Work required by the Contract Documents or by Applicable Laws or orders of public authorities having jurisdiction. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections and approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections and approvals. Tests or inspections conducted pursuant to the Contract Documents shall be made promptly to avoid unreasonable delay in the Work. The Contractor shall give the Owner timely notice of when and where tests and inspections are to be made so that the Owner may be present for such procedures. Required certificates of testing, inspection or approval shall, unless otherwise required by the Contract Documents, be secured by the Contractor and promptly delivered to the Owner.

- B.5.3 Unless contrary to federal law, Contractor shall certify that it shall not accept a bid from Subcontractors to perform Work as described in ORS 701.005 under this Contract unless such Subcontractors are registered with the Construction Contractors Board in accordance with ORS 701.021 to 701.068 at the time they submit their bids to the Contractor.

- B.7.4 As required by the Contract Documents, Work done or material used without required inspection or testing and/or without providing timely notice to the Owner may be ordered removed at the Contractor's expense.

- B.5.4 Unless contrary to federal law, Contractor shall certify that each landscape contractor, as defined in ORS 671.520(2), performing Work under this Contract holds a valid landscape contractor's license issued pursuant to

- B.7.5 If directed to do so any time before the Work is accepted, the Contractor shall uncover portions of the completed Work for inspection. After inspection, the Contractor shall restore such portions of Work to the standard required by the Contract. If the Work uncovered is unacceptable or was done without required testing or inspection or sufficient notice to the Owner, the uncovering and restoration shall be done at the Contractor's expense. If the Work uncovered is acceptable and was done with sufficient notice to the

Owner, the uncovering and restoration will be paid for pursuant to an Amendment.

- B.7.6 If any testing or inspection reveals failure of the portions of the Work to comply with requirements established by the Contract Documents, all costs made necessary by such failure, including those of repeated procedures and compensation for the Owner's and Architect/Engineer's services and expenses, shall be at the Contractor's expense.
- B.7.7 When the United States government participates in the cost of the Work, or the Owner has an agreement with other public or private organizations, or if any portion of the Work is being performed for a third party or in close proximity to third party facilities, representatives of these organizations shall have the right to inspect the Work affecting their interests or property. Their right to inspect shall not make them a party to the Contract and shall not interfere with the rights of the parties of the Contract. Instructions or orders of such parties shall be transmitted to the Contractor, through the Owner.

B.8 SEVERABILITY

If any provision of this Contract is declared by a court to be illegal or in conflict with any law, the validity of the remaining terms and provisions shall not be affected and the rights and obligations of the parties shall be construed and enforced as if the Contract did not contain the particular provision held to be invalid.

B.9 ACCESS TO RECORDS

- B.9.1 Contractor shall keep, at all times on the Work site, one record copy of the complete Contract Documents, including the Plans, Specifications, Construction Change Directives and addenda, in good order and marked currently to record field changes and selections made during construction, and one record copy of Shop Drawings, Product Data, Samples and similar Submittals, and shall at all times give the Owner access thereto.
- B.9.2 Contractor shall retain and the Owner and its duly authorized representatives shall have access, for a period not less than ten (10) years, to all Record Documents, financial and accounting records, and other books, documents, papers and records of Contractor which are pertinent to the Contract, including records pertaining to Overhead and indirect costs, for the purpose of making audit, examination, excerpts and transcripts. If for any reason, any part of the Work or this Contract shall be subject to litigation, Contractor shall retain all such records until all litigation is resolved and Contractor shall continue to provide Owner and/or its agents with full access to such records until such time as all litigation is complete and all periods for appeal have expired and full and final satisfaction of any judgment, order or decree is recorded and Owner receives a record copy of documentation from Contractor.

B.10 WAIVER

Failure of the Owner to enforce any provision of this Contract shall not constitute a waiver or relinquishment by the Owner of the right to such performance in the future nor of the right to enforce any other provision of this Contract.

B.11 SUBCONTRACTS AND ASSIGNMENT

- B.11.1 Contractor shall require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound by the terms and conditions of these Public Improvement General Conditions, and to assume toward the Contractor all of the obligations and responsibilities which the Contractor assumes toward the Owner thereunder, unless (1) the same are clearly inapplicable to the subcontract at issue because of legal requirements or industry practices, or (2) specific exceptions are requested by Contractor and approved in writing by Owner. Where appropriate, Contractor shall require each Subcontractor to enter into similar agreements with sub-subcontractors at any level.
- B.11.2 At Owner's request, Contractor shall submit to Owner prior to their execution either Contractor's form of subcontract, or the subcontract to be executed with any particular Subcontractor. If Owner disapproves such form, Contractor shall not execute the form until the matters disapproved are resolved to Owner's satisfaction. Owner's review, comment upon or approval of any such form shall not relieve Contractor of its obligations under this Agreement or be deemed a waiver of such obligations of Contractor.

- B.11.3 Contractor shall not assign, sell, or transfer its rights, or delegate its responsibilities under this Contract, in whole or in part, without the prior written approval of the Owner. No such written approval shall relieve Contractor of any obligations of this Contract, and any transferee shall be considered the agent of the Contractor and bound to perform in accordance with the Contract Documents. Contractor shall remain liable as between the original parties to the Contract as if no assignment had occurred.

B.12 SUCCESSORS IN INTEREST

The provisions of this Contract shall be binding upon and shall accrue to the benefit of the parties to the Contract and their respective permitted successors and assigns.

B.13 OWNER'S RIGHT TO DO WORK

Owner reserves the right to perform other or additional work at or near the project site with other forces than those of the Contractor. If such work takes place within or next to the project site, Contractor shall coordinate work with the other contractors or forces, cooperate with all other contractors or forces, carry out the Work in a way that will minimize interference and delay for all forces involved, place and dispose of materials being used so as not to interfere with the operations of another, and join the Work with the work of the others in an acceptable manner and perform it in proper sequence to that of the others. The Owner will resolve any disagreements that may arise between or among Contractor and the other contractors over the method or order of doing all work (including the Work). In case of unavoidable interference, the Owner will establish work priority (including the Work) which generally will be in the sequence that the contracts were awarded.

B.14 OTHER CONTRACTS

In all cases and at any time, the Owner has the right to execute other contracts related to or unrelated to the Work of this

Contract. The Contractor of this Contract shall fully cooperate with any and all other contractors without additional cost to the Owner in the manner described in section B.13.

B.15 GOVERNING LAW

This Contract shall be governed by and construed in accordance with the laws of the State of Oregon without regard to principles of conflict of laws.

B.16 LITIGATION

Any Claim between Owner and Contractor that arises from or relates to this Contract and that is not resolved through the Claims Review Process in Section D.3 shall be brought and conducted solely and exclusively within the Circuit Court of Benton County for the State of Oregon; provided, however, if a Claim must be brought in a federal forum, then it shall be brought and conducted solely and exclusively within the United States District Court for the District of Oregon. In no event shall this section be construed as a waiver by the State of Oregon on any form of defense or immunity, whether sovereign immunity, governmental immunity, immunity based on the Eleventh Amendment to the Constitution of the United States or otherwise, from any claim or from the jurisdiction of any court. CONTRACTOR, BY EXECUTION OF THIS CONTRACT, HEREBY CONSENTS TO THE IN PERSONAM JURISDICTION OF THE COURTS REFERENCED IN THIS SECTION B.16.

B.17 ALLOWANCES

B.17.1 The Contractor shall include in the Contract Price all allowances stated in the Contract Documents. Items covered by allowances shall be supplied for such amounts and by such persons or entities as the Owner may direct.

B.17.2 Unless otherwise provided in the Contract Documents:

- (a) when finally reconciled, allowances shall cover the cost to the Contractor of materials and equipment delivered at the site and all required taxes, less applicable trade discounts;
- (b) Contractor's costs for unloading and handling at the site, labor, installation costs, Overhead, profit and other expenses contemplated for stated allowance amounts shall be included in the Contract Price but not in the allowances;
- (c) whenever costs are more than or less than allowances, the Contract Price shall be adjusted accordingly by Amendment. The amount of the Amendment shall reflect
 - (i) the difference between actual costs and the allowances under Section B.17.2(a) and (2)
 - (ii) changes in Contractor's costs under Section B.17.2(b).
- (d) Unless Owner requests otherwise, Contractor shall provide to Owner a proposed fixed price for any allowance work prior to its performance.

B.18 SUBMITTALS, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

B.18.1 The Contractor shall prepare and keep current, for the Architect's/Engineer's approval (or for the approval of Owner if approval authority has not been delegated to the Architect/Engineer), a schedule and list of

Submittals which is coordinated with the Contractor's construction schedule and allows the Architect/Engineer reasonable time to review Submittals. Owner reserves the right to finally approve the schedule and list of Submittals. Submittals include, without limitation, Shop Drawings, product data, and samples which are described below:

- (a) Shop Drawings are drawings, diagrams, schedules and other data specially prepared for the Work by the Contractor or a Subcontractor (including any sub-subcontractor), manufacturer, supplier or distributor to illustrate some portion of the Work.
- (b) Product Data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams and other information furnished by the Contractor to illustrate materials or equipment for some portion of the Work.
- (c) Samples are physical examples which illustrate materials, equipment or workmanship and establish standards by which the Work will be judged.

B.18.2 Shop Drawings, Product Data, Samples and similar Submittals are not Contract Documents. The purpose of their Submittal is to demonstrate for those portions of the Work for which Submittals are required by the Contract Documents the way by which the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents. Review of Submittals by the Architect/Engineer is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, or for approval of safety precautions or, unless otherwise specifically stated by the Architect/Engineer, of any construction means, methods, techniques, sequences or procedures, all of which remain the responsibility of the Contractor as required by the Contract Documents. The Architect/Engineer's review of the Contractor's Submittals shall not relieve the Contractor of its obligations under the Contract Documents. The Architect/Engineer's approval of a specific item shall not indicate approval of an assembly of which the item is a component. Informational Submittals upon which the Architect/Engineer is not expected to take responsive action may be so identified in the Contract Documents. Submittals which are not required by the Contract Documents may be returned by the Architect/Engineer without action.

B.18.3 The Contractor shall review for compliance with the Contract Documents, approve and submit to the Architect/Engineer Shop Drawings, Product Data, Samples and similar Submittals required by the Contract Documents with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of the Owner or of separate contractors. Submittals which are not marked as reviewed for compliance with the Contract Documents and approved by the Contractor may be returned by the Architect/Engineer without action.

B.18.4 Approving and submitting shop drawings, product data, samples and similar Submittals, the Contractor represents that the Contractor has determined and verified materials, field measurements and field construction criteria related thereto, or will do so, and has checked and coordinated the information contained within such Submittals with the requirements of the Work and of the Contract Documents.

B.18.5 The Contractor shall perform no portion of the Work for which the Contract Documents require submittal and review of Shop Drawings, Product Data, Samples or similar Submittals until the respective Submittal has been approved by the Architect/Engineer.

B.18.6 The Work shall be in accordance with approved Submittals except that the Contractor shall not be relieved of responsibility for deviations from requirements of the Contract Documents by the Architect/Engineer's review or approval of Shop Drawings, Product Data, Samples or similar Submittals unless the Contractor has specifically informed the Architect/Engineer in writing of such deviation at the time of submittal and (i) the Architect/Engineer has given written approval to the specific deviation as a minor change in the Work, or (ii) an Amendment or Construction Change Directive has been executed by Owner authorizing the deviation. The Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples or similar Submittals by the Architect/Engineer's review or approval thereof.

B.18.7 In the event that Owner elects not to have the obligations and duties described under this Section B.18 performed by the Architect/Engineer, or in the event no Architect/Engineer is employed by Owner on the project, all obligations and duties assigned to the Architect/Engineer hereunder shall be performed by the Owner.

B.19 SUBSTITUTIONS

The Contractor may make Substitutions only with the written consent of the Owner, after evaluation by the Owner and only in accordance with an Amendment or Construction Change Directive. Substitutions shall be subject to the requirements of the bid documents. By making requests for Substitutions, the Contractor represents that the Contractor has personally investigated the proposed substitute product; represents that the Contractor will provide the same warranty for the Substitution that the Contractor would for the product originally specified unless approved otherwise; certifies that the cost data presented is complete and includes all related costs under this Contract including redesign costs, and waives all claims for additional costs related to the Substitution which subsequently become apparent; and will coordinate the installation of the accepted Substitution, making such changes as may be required for the Work to be completed in all respects.

B.20 USE OF PLANS AND SPECIFICATIONS

Plans, Specifications and related Contract Documents furnished to Contractor by Owner or Owner's Architect/Engineer shall be used solely for the performance of the Work under this Contract. Contractor and its Subcontractors and suppliers are authorized to use and reproduce applicable portions of such documents appropriate to the execution of the Work, but shall not claim any ownership or other interest in them beyond the scope of

this Contract, and no such interest shall attach. Unless otherwise indicated, all common law, statutory and terminate the Contract.

B.21 FUNDS AVAILABLE AND AUTHORIZED

If Owner fails to receive funding, appropriations, allocations or other expenditure authority as contemplated by Owner's budget and Owner determines, in its assessment and ranking of the policy objectives explicit or implicit in Owner's budget, Owner may other reserved rights, in addition to copyrights, are retained by Owner.

B.22 NO THIRD PARTY BENEFICIARIES

Owner and Contractor are the only parties to this Contract and are the only parties entitled to enforce its terms. Nothing in this Contract gives, is intended to give, or shall be construed to give or provide any benefit or right, whether directly, indirectly, or otherwise, to third persons unless such third persons are individually identified by name herein and expressly described as intended beneficiaries of the terms of this Contract.

SECTION C WAGES AND LABOR

C.1 MINIMUM WAGE RATES ON PUBLIC WORKS

Contractor shall comply fully with the provisions of ORS 279C.800 through 279C.870. Documents establishing those conditions, as determined by the Commissioner of the Bureau of Labor and Industries (BOLI), are included as attachments to or are incorporated by reference in the Contract Documents. Pursuant to ORS 279C.830(1)(c), Contractor shall pay workers at not less than the specified minimum hourly rate of wage, and shall include that requirement in all subcontracts. If the Work is subject to both the state prevailing wage rate law and the federal Davis-Bacon Act, Contractor shall pay the higher of the applicable state or federal prevailing rate of wage. Contractor shall provide written notice to all workers of the number of hours per day and days per week such workers may be required to work.

C.2 PAYROLL CERTIFICATION AND FEE REQUIREMENTS

C.2.1 In accordance with ORS 279C.845, the Contractor and every Subcontractor shall submit written certified statements to the Owner, on the form prescribed by the Commissioner of the Bureau of Labor and Industries, certifying the hourly rate of wage paid each worker which the Contractor or the Subcontractor has employed on the project and further certifying that no worker employed on the project has been paid less than the prevailing rate of wage or less than the minimum hourly rate of wage specified in the Contract, which certificate and statement shall be verified by the oath of the Contractor or the Subcontractor that the Contractor or Subcontractor has read the certified statement, that the Contractor or Subcontractor knows the contents of the certified statement, and, that to the Contractor's or Subcontractor's best knowledge and belief, the certified statement is true. The certified statements shall set out accurately and completely the payroll records for the prior week, including the name and address of each worker, the worker's correct classification, rate of pay, daily and weekly number of

hours worked, deductions made, and actual wages paid. Certified statements for each week during which the Contractor or Subcontractor has employed a worker on the project shall be submitted once a month, by the fifth business day of the following month. The Contractor and Subcontractors shall preserve the certified statements for a period of ten (10) years from the date of completion of the Contract.

C.2.2 Pursuant to ORS 279C.845(7), the Owner shall retain 25 percent of any amount earned by the Contractor on this public works project until the Contractor has filed the certified statements required by section C.2.1. The Owner shall pay to the Contractor the amount retained under this subsection within 14 days after the Contractor files the required certified statements, regardless of whether a Subcontractor has failed to file certified statements. Pursuant to ORS 279C.845(8), the Contractor shall retain 25 percent of any amount earned by a first-tier Subcontractor on this public works project until the first-tier Subcontractor has filed with the Owner the certified statements required by C.2.1. Before paying any amount retained under this subsection, the Contractor shall verify that the first-tier Subcontractor has filed the certified statement. Within 14 days after the first-tier Subcontractor files the required certified statement the Contractor shall pay the first-tier Subcontractor any amount retained under this subsection.

C.2.3 In accordance with statutory requirements and administrative rules promulgated by the Commissioner of the Bureau of Labor and Industries, the fee required by ORS 279C.825(1) will be paid by Owner to the Commissioner.

C.3 PROMPT PAYMENT AND CONTRACT CONDITIONS

C.3.1 As a condition to Owner's performance hereunder, the Contractor shall:

C.3.1.1 Make payment promptly, as due, to all persons supplying to Contractor labor or materials for the prosecution of the Work provided for in this Contract.

C.3.1.2 Pay all contributions or amounts due the State Industrial Accident Fund from such Contractor or Subcontractor incurred in the performance of the Contract.

C.3.1.3 Not permit any lien or claim to be filed or prosecuted against the Owner on account of any labor or material furnished. Contractor will not assign any claims that Contractor has against Owner, or assign any sums due by Owner, to Subcontractors, suppliers, or manufacturers, and will not make any agreement or act in any way to give Subcontractors a claim or standing to make a claim against the Owner.

C.3.1.4 Pay to the Department of Revenue all sums withheld from employees pursuant to ORS 316.167.

C.3.2 As a condition to Owner's performance hereunder, if Contractor fails, neglects or refuses to make prompt payment of any claim for labor or services furnished to the Contractor of a Subcontractor by any person in connection with the project as such claim becomes due, the proper officer(s) representing the Owner may pay the claim and charge the amount of the payment against funds due or to become due Contractor under this Contract.

Payment of claims in this manner shall not relieve the Contractor or the Contractor's surety from obligation with respect to any unpaid claims.

C.3.3 Contractor shall include in each subcontract for property or services entered into by the Contractor and a first-tier subcontractor, including a material supplier, for the purpose of performing a construction contract, a payment clause that obligates the Contractor to pay the first-tier Subcontractor for satisfactory performance under its subcontract within ten (10) Days out of such amounts as are paid to the Contractor by the public contracting agency under such contract.

C.3.4 All employers, including Contractor, that employ subject workers who work under this contract in the State of Oregon shall comply with ORS 656.017 and provide the required Workers' Compensation coverage, unless such employers are exempt under ORS 656.126. Contractor shall ensure that each of its Subcontractors complies with these requirements.

C.4 PAYMENT FOR MEDICAL CARE

As a condition to Owner's performance hereunder, Contractor shall promptly, as due, make payment to any person, partnership, association or corporation furnishing medical, surgical, and hospital care or other needed care and attention, incident to sickness or injury, to the employees of such Contractor, all sums of which the Contractor agrees to pay for such services and all moneys and sums which the Contractor has collected or deducted from the wages of personnel pursuant to any law, contract or agreement for the purpose of providing or paying for such services.

C.5 HOURS OF LABOR

As a condition to Owner's performance hereunder, no person shall be employed to perform Work under this Contract for more than ten (10) hours in any one day or forty (40) hours in any one week, except in cases of necessity, emergency or where public policy absolutely requires it. In such instances, Contractor shall pay the employee at least time and a half pay:

(a) For all overtime in excess of eight (8) hours a day or forty (40) hours in any one week when the work week is five consecutive Days, Monday through Friday; or

(b) For all overtime in excess of ten (10) hours a day or forty (40) hours in any one week when the work week is four consecutive Days, Monday through Friday; and

(c) For all Work performed on Saturday and on any legal holiday specified in ORS 279C.540.

This section C.5 will not apply to Contractor's Work under this Contract to the extent Contractor is currently a party to a collective bargaining agreement with any labor organization.

This Section C.5 shall not excuse Contractor from completion of the Work within the time required under this Contract.

**SECTION D
CHANGES IN THE
WORK**

D.1 CHANGES IN WORK

D.1.1 The terms of this Contract shall not be waived, altered, modified, supplemented or amended in any manner whatsoever, without prior written agreement and then only after any necessary approvals have been obtained. An Amendment or Change Order is required, which shall not be effective until its execution by the parties to this Contract and all approvals required by public contracting laws have been obtained.

D.1.2 It is mutually agreed that changes in Plans, quantities, or details of construction are inherent in the nature of construction and may be necessary or desirable during the course of construction. Within the general scope of this Contract, the Owner may at any time, without notice to the sureties and without impairing the Contract, require changes consistent with this Section D.1. All changes to the Work shall be documented and Amendments shall be executed under the conditions of the Contract Documents. Such changes may include, but are not limited to:

- (a) Modification of specifications and design.
- (b) Increases or decreases in quantities.
- (c) Increases or decreases to the amount of Work.
- (d) Addition or elimination of any Work item.
- (e) Change in the duration of the project.
- (f) Acceleration or delay in performance of Work.
- (g) Deductive changes,
- (h) Changed conditions.

Deductive changes are those that reduce the scope of the Work, and shall be made by mutual agreement whenever feasible. In cases of suspension or partial termination under Section J, Owner reserves the right to unilaterally impose a deductive change and to self-perform such Work, for which the provisions of B.13 (Owner's Right to Do Work) shall then apply. Adjustments in compensation shall be made under the provisions of D.1.3, in which costs for deductive changes shall be based upon a Direct Costs adjustment together with the related percentage markup specified for profit, Overhead and other indirect costs, unless otherwise agreed to by Owner.

D.1.3 The Owner and Contractor agree that adjustments to or deletions from the Work shall be administered and compensated according to the following:

- (a) Unit pricing may be utilized at the Owner's option when unit prices or solicitation alternates were provided that established the cost for adjustments to Work, and a binding obligation exists under the Contract on the parties covering the terms and conditions of the adjustment to Work.
- (b) If the Owner elects not to utilize unit pricing, or in the event that unit pricing is not available or appropriate, fixed pricing may be used for adjustments to or deletions from the Work. In fixed pricing, the basis of payments or total price shall be agreed upon in writing between the parties to the Contract, and shall be established before the Work is done whenever feasible. Notwithstanding the foregoing, the mark-ups set forth in D.1.3(c) shall

be utilized in establishing fixed pricing, and such mark-ups shall not be exceeded. Cost and price data relating to adjustments to or deletions from the Work shall be supplied by Contractor to Owner upon request, but Owner shall be under no obligation to make such requests.

- (c) In the event that unit pricing and fixed pricing are not utilized, then adjustments to or deletions from the Work shall be performed on a cost reimbursement basis for Direct Costs. Such Work shall be compensated on the basis of the actual, reasonable and allowable cost of labor, equipment, and material furnished on the Work performed. In addition, the following markups shall be added to the Contractor's or Subcontractor's Direct Costs as full compensation for profit, Overhead and other indirect costs for Work directly performed with the Contractor's or Subcontractor's own forces:

On Labor.....	15%
On Equipment.....	10%
On Materials.....	10%

- (d) When adjustments to or deletions from the Work under D.1.3(c) are invoiced by an authorized Subcontractor at any level, each ascending tier Subcontractor or Contractor will be allowed a supplemental mark-up on each piece of subcontract Work covered by an Amendment as follows:

\$0.00 - \$5,000.00	10%,
and then Over \$5,000.00	5%

Notwithstanding the foregoing, the maximum aggregate markup to be billed shall not exceed 10% regardless of the number of Subcontract tiers.

Payments made to the Contractor shall be complete compensation for Overhead, profit, and all costs that were incurred by the Contractor or by other forces furnished by the Contractor, including Subcontractors, for adjustments to or deletions from the Work pursuant to an Amendment or Change Order. Owner may establish a maximum cost for additional Work under this Section D.1.3, which shall not be exceeded for reimbursement without additional written authorization from Owner in the form of an Amendment or Change Order. Contractor shall not be required to complete such additional Work without additional authorization.

- D.1.4 Any necessary adjustment of Contract Time that may be required as a result of adjustments to or deletions from the Work must be agreed upon by the parties before the start of the revised Work unless Owner authorizes Contractor to start the revised Work before agreement on Contract Time adjustment. Contractor shall submit any request for additional compensation (and additional Contract Time if Contractor was authorized to start Work before an adjustment of Contract Time was approved) as soon as possible but no later than thirty (30) Days after receipt of Owner's request for additional Work. Contractor agrees that this thirty (30) Day notice period is adequate time for it to request and document the amount of additional compensation or adjustment of Contract Time. If Contractor's request for additional compensation or adjustment of Contract Time is not made within the

thirty (30) Day time limit, Contractor agrees its requests pertaining to that additional Work shall be barred. The thirty (30) Day time limit for making requests shall not be extended for any reason, including without limitation Contractor's claimed inability to determine the amount of additional compensation or adjustment of Contract Time, unless an extension is granted in writing by Owner. If the Owner denies Contractor's timely request for additional compensation or adjustment of Contract Time, Contractor may proceed to file a Claim under Section D.3, Claims Review Process. No other reimbursement, compensation, or payment will be made, except as provided in Section D.1.5 for impact claims.

- D.1.5 If any adjustment to Work under Section D.1.3 causes an increase or decrease in the Contractor's cost of, or the Contract Time required for the performance of any other part of the Work under this Contract, Contractor shall submit a written request to the Owner, setting forth the nature and specific extent of the request, including all time and cost impacts against the Contract as soon as possible, but no later than thirty (30) Days after receipt of Owner's request for adjustments to or deletions from the Work by Contractor.

The thirty (30) Day time limit applies to claims of Subcontractors, suppliers, or manufacturers who may be affected by Owner's request for adjustments to or deletions from the Work and who request additional compensation or an extension of Contract Time to perform; Contractor has responsibility for contacting its Subcontractors, suppliers, or manufacturers within the thirty (30) Day time limit, and including their requests with Contractor's requests. If the request involves Work to be completed by Subcontractors, or materials to be furnished by suppliers or manufacturers, such requests shall be submitted to the Contractor in writing with full analysis and justification for the adjustments to compensation and Contract Time requested. The Contractor shall analyze and evaluate the merits of the requests submitted by Subcontractors, suppliers, and manufacturers to Contractor prior to including those requests and Contractor's analysis and evaluation of those requests with Contractor's requests for adjustments to compensation or Contract Time that Contractor submits to the Owner. Failure of Subcontractors, suppliers, manufacturers or others to submit their requests to Contractor for inclusion with Contractor's requests submitted to Owner within the time period and by the means described in this section shall constitute a waiver of these Subcontractor claims. The Owner will not consider direct requests or claims from Subcontractors, suppliers, manufacturers or others not a party to this Contract. The consideration of such requests and claims under this section does not give any Person, not a party to the Contract the right to bring a claim against Owner, whether in this claims process, in litigation, or in any dispute resolution process.

If the Owner denies the Contractor's request for adjustment to compensation or Contract Time and the request is timely as set forth herein, the Contractor may proceed to file a Claim under Section D.3, Claims Review Process.

- D.1.6 Contractor agrees that no request or Claim for additional costs or an adjustment of Contract Time shall be allowed if made after receipt of Final Payment application under this Contract. Final Payment

application must be made by Contractor within the time required under Section E.6.4.

- D.1.7 It is understood that changes in the Work are inherent in construction of this type. The number of changes, the scope of those changes, and the effect they have on the progress of the original Work cannot be defined at this time. The Contractor is notified that numerous changes may be required and that there will be no compensation made, unless and only to the extent otherwise provided in the Contract Documents, to the Contractor directly related to the number of changes. Each change will be evaluated for extension of Contract Time and increase or decrease in compensation based on its own merit.

D.2 DELAYS

- D.2.1 Delays in construction include "Avoidable Delays", which are defined in Section D.2.1.1, and "Unavoidable Delays", which are defined in Section D.2.1.2. The effect of Avoidable Delays is described in Section D.2.2 and the effect of Unavoidable Delays is described in Section D.2.3.

- D.2.1.1 Avoidable Delays include any delays other than Unavoidable Delays, and include delays that otherwise would be considered Unavoidable Delays but that:

- (a) Could have been avoided by the exercise of care, prudence, foresight, and diligence on the part of the Contractor or its Subcontractors.
- (b) Affect only a portion of the Work and do not necessarily prevent or delay the prosecution of other parts of the Work or the completion of the whole Work within the Contract Time.
- (c) Do not impact activities on the accepted CPM Construction Schedule.
- (d) Are associated with the reasonable interference of other contractors employed by the Owner that do not necessarily prevent the completion of the whole Work within the Contract Time.

- D.2.1.2 Unavoidable Delays include delays other than Avoidable Delays that are:

- (a) To the extent caused by any actions of the Owner, or any other employee or agent of the Owner, or by separate contractor employed by the Owner.
- (b) To the extent caused by any site conditions that differ materially from what was represented in the Contract Documents or from conditions that would normally be expected to exist and be inherent to the construction activities defined in the Contract Documents. The Contractor agrees to notify the Owner immediately of differing site conditions before the area has been disturbed. The Owner will investigate the area and make a determination as to whether the conditions differ materially from either the conditions stated in the Contract Documents or those that could reasonably be expected in execution of this particular Contract. If Contractor and the Owner agree that a differing site condition exists, any adjustment to compensation or Contract Time will be determined based on the process set forth in Section D.1.5 for adjustments to or deletions from Work. If the Owner disagrees that a differing site

condition exists and denies Contractor's request for additional compensation or Contract Time, Contractor may proceed to file a Claim under Section D.3, Claims Review Process.

- (c) To the extent caused by Force Majeure acts, events or occurrences that could not have been avoided by the exercise of care, prudence, foresight, and diligence on the part of the Contractor or its Subcontractors.
- (d) To the extent caused by adverse weather conditions. Any adverse weather conditions must be substantiated by documentary evidence that weather conditions were abnormal for the specific time period claimed, could not have been anticipated by the Contractor, and adversely impacted the Project in a manner that could not be avoided by rescheduling the Work or by implementing measures to protect against the weather so that the Work could proceed. A rain, windstorm, high water, or other natural phenomenon for the specific locality of the Work, which might reasonably have been anticipated from the previous 10-year historical records of the general locality of the Work, shall not be construed as abnormal. The parties agree that rainfall greater than the following levels cannot be reasonably anticipated:

- (i) Daily rainfall equal to, or greater than, 0.50 inch during a month when the monthly rainfall exceeds the normal monthly average by twenty- five percent (25 %) or more.
- (ii) daily rainfall equal to, or greater than, 0.75 inch at any time.

The Office of the Environmental Data Service of the National Oceanic and Atmospheric Administration of the U.S. Department of Commerce nearest the Project site shall be considered the official agency of record for weather information.

D.2.2 Contractor agrees it is not entitled to additional compensation or additional Contract Time for Avoidable Delays.

D.2.3 In the event of Unavoidable Delays, based on principles of equitable adjustment, Contractor may be entitled to the following:

- (a) Contractor may be entitled to additional compensation or additional Contract Time, or both, for Unavoidable Delays described in Section D.2.1.2 (a) and (b).
- (b) Contractor may be entitled to additional Contract Time for Unavoidable Delays described in Section D.2.1.2(c) and (d).

In the event of any requests for additional compensation or additional Contract Time, or both, as applicable, arising under this Section D.2.3 for Unavoidable Delays, other than requests for additional compensation or additional Contract Time for differing site conditions for which a review process is established under Section D.2.1.2 (b), Contractor must submit a written notification of the delay to the Owner within two (2) Days of the occurrence of the cause of the delay. This

written notification shall state the cause of the potential delay, the project components impacted by the delay, and the anticipated additional Contract Time extension or the additional compensation, or both, as applicable, resulting from the delay. Within seven (7) Days after the cause of the delay has been mitigated, or in no case more than thirty (30) Days after the initial written notification, the Contractor agrees to submit to the Owner, a complete and detailed request for additional compensation or additional Contract Time, or both, as applicable, resulting from the delay. If the Owner denies Contractor's request for additional compensation or adjustment of Contract Time, the Contractor may proceed to file a Claim under Section D.3, Claims Review Process, provided Contractor has complied with the requirement in this Section D.2.3. Contractor agrees any Claim it may have is barred if Contractor does not comply with the requirements herein.

If Contractor does not timely submit the notices required under this Section D.2, then unless otherwise prohibited by law, Contractor's Claim shall be barred.

D.3 CLAIMS REVIEW PROCESS

D.3.1 All Contractor Claims shall be referred to the Owner for review. Contractor's Claims, including Claims for adjustments to compensation or Contract Time, shall be submitted in writing by Contractor to the Owner within five (5) Days after a denial of Contractor's initial request for an adjustment of Contract terms, payment of money, extension of Contract Time or other relief, provided that such initial request has been submitted in accordance with the requirements and within the time limits established in these Public Improvement General Conditions. Within thirty (30) Days after the initial Claim, Contractor shall submit to the Owner a complete and detailed description of the Claim (the "Detailed Notice") that includes all information required by Section D.3.2. Contractor agrees that, unless the Claim is made in accordance with these time requirements, Contractor voluntarily waived all rights to prosecute its Claim.

D.3.2 The Detailed Notice of the Claim shall be submitted in writing by Contractor and shall include a detailed, factual statement of the basis of the Claim, pertinent dates, Contract provisions which support or allow the Claim, reference to or copies of any documents which support the Claim, the dollar value of the Claim, and the Contract Time adjustment requested for the Claim. If the Claim involves Work to be completed by Subcontractors, the Contractor will analyze and evaluate the merits of the Subcontractor claim prior to forwarding it and that analysis and evaluation to the Owner. The Owner will not consider direct claims from Subcontractors, suppliers, manufacturers, or others not a party to this Contract. Contractor agrees that it will make no agreement, covenant, or assignment, nor will it commit any other act that will permit or assist any Subcontractor, supplier, manufacturer, or other to directly or indirectly make a claim against Owner.

D.3.3 The Owner will review all Claims and take one or more of the following preliminary actions within ten (10) Days of receipt of the Detailed Notice of a Claim: (1) request additional supporting information from the Contractor; (2) inform the Contractor and Owner in writing of the time required for adequate review and response; (3) reject the Claim in whole or in part and identify the reasons for rejection; (4) based on principles of equitable adjustment,

recommend approval of all or part of the Claim; or
(5) propose an alternate resolution.

D.3.4 The Owner's decision shall be final and binding on the Contractor unless appealed by written notice to the Owner within fifteen (15) Days of receipt of the decision. The Contractor must present written documentation supporting the Claim within fifteen (15) Days of the notice of appeal. After receiving the appeal documentation, the Owner shall review the materials and render a decision within thirty (30) Days after receiving the appeal documents.

D.3.5 The decision of the Owner shall be final and binding unless the Contractor delivers to the Owner its request for mediation, which shall be a non-binding process, within fifteen (15) Days of the date of the Owner's decision. The mediation process will be considered to have commenced as of the date the Contractor delivers the request. Both parties acknowledge and agree that participation in mediation is a prerequisite to commencement of litigation of any disputes relating to the Contract. Both parties further agree to exercise their best efforts in good faith to resolve all disputes within sixty (60) Days of the commencement of the mediation through the mediation process set forth herein.

In the event that a lawsuit must be filed within this sixty (60) Day period in order to preserve a cause of action, the parties agree that, notwithstanding the filing, they shall proceed diligently with the mediation to its conclusion prior to actively prosecuting the lawsuit, and shall seek from the Court in which the lawsuit is pending such stays or extensions, including the filing of an answer, as may be necessary to facilitate the mediation process. Further, in the event settlements are reached on any issues through mediation, the plaintiff shall promptly cause to be entered by the Court a stipulated general judgment of dismissal with prejudice, or other appropriate order limiting the scope of litigation as provided in the settlement.

D.3.6 Should the parties arrive at an impasse regarding any Claims or disputed Claims, it is agreed that the parties shall participate in mediation as specified in Section D.3.5. The mediation process will be considered to have been commenced as of the date one party delivers to the other its request in writing to mediate. The mediator shall be an individual mutually acceptable to both parties, but in the absence of agreement each party shall select a temporary mediator and the temporary mediators shall jointly select the permanent mediator. Each party shall pay its own costs for the time and effort involved in mediation. The cost of the mediator shall be split equally between the two parties. Both parties agree to exercise their best effort in good faith to resolve all disputes in mediation. Participation in mediation is a mandatory requirement of both the Owner and the Contractor. The schedule, time and place for mediation will be mutually acceptable, or, failing mutual agreement, shall be as established by the mediator. The parties agree to comply with Owner's administrative rules governing the confidentiality of mediation, if any, and shall execute all necessary documents to give effect to such confidentiality rules. In any event, the parties shall not subpoena the mediator or otherwise require the mediator to produce records, notes or work product, or to testify in any future proceedings as to information disclosed or representations made in the course of mediation, except to the extent disclosure is required by law.

D.3.7 Unless otherwise directed by Owner, Contractor shall proceed with the Work while any Claim, or mediation or litigation arising from a Claim, is pending. Regardless of the review period or the final decision of the Owner, the Contractor shall continue to diligently pursue the Work as identified in the Contract Documents. In no case is the Contractor justified or allowed to cease or Delay Work, in whole or in part, without a written stop work order from the Owner.

SECTION E PAYMENTS

E.1 SCHEDULE OF VALUES

The Contractor shall submit, at least ten (10) Days prior to submission of its first application for progress payment, a schedule of values ("Schedule of Values") for the contracted Work. This schedule shall provide a breakdown of values for the contracted Work and will be the basis for progress payments. The breakdown shall demonstrate reasonable, identifiable, and measurable components of the Work.

Unless objected to by the Owner, this schedule shall be used as the basis for reviewing Contractor's applications for payment. If objected to by Owner, Contractor shall revise the schedule of values and resubmit the same for approval of Owner.

E.2 APPLICATIONS FOR PAYMENT

E.2.1 Owner shall make progress payments on the Contract monthly as Work progresses, in accordance with the requirements of this Section E.2. Applications for payment shall be based upon estimates of Work completed and the Schedule of Values. As a condition precedent to Owner's obligation to pay, all applications for payment shall be approved by the Owner. A progress payment shall not be considered acceptance or approval of any Work or waiver of any defects therein. Owner shall pay to Contractor interest for overdue invoices at the rate of two-thirds of one percent per month on the progress payment, not including retainage, due the Contractor. Overdue invoices will be those that have not been paid within forty-five (45) days from the latest of:

- (a) The date of the receipt of the accurate invoice;
- (b) The date Owner receives the correct application for payment if no invoice is received;
- (c) The date all goods and services have been received;
or
- (d) The date a Claim is made certain by agreement of the parties or by operation of law.

Notwithstanding the foregoing, in instances when an application for payment is filled out incorrectly, or when there is any defect or impropriety in any submitted application or when there is a good faith dispute, Owner shall so notify the Contractor within fifteen (15) Days stating the reason or reasons the application for payment is defective or improper or the reasons for the dispute. A defective or improper application for payment, if corrected by the Contractor within seven (7) Days of being notified by the Owner, shall not cause a payment to be made later than specified in this section unless interest is also paid. Payment of interest will be postponed when payment on the principal is delayed because of disagreement between the Owner and the Contractor.

Owner reserves the right, instead of requiring the Contractor to correct or resubmit a defective or improper application for payment, to reject the defective or improper portion of the application for payment and pay the remainder of the application for such amounts which are correct and proper.

Owner, upon written notice to the Contractor, may elect to make payments to the Contractor only by means of Electronic Funds Transfers (EFT) through Automated Clearing House (ACH) payments. If Owner makes this election, the Contractor shall arrange for receipt of the EFT/ACH payments.

E.2.2 .2 Contractor shall submit to the Owner an application for each payment and, if required, receipts or other vouchers showing payments for materials and labor including payments to Subcontractors. Contractor shall include in its application for payment a schedule of the percentages of the various parts of the Work completed, based on the Schedule of Values which shall aggregate to the payment application total, and shall include, on the face of each copy thereof, a certificate in substantially the following form:

"I, the undersigned, hereby certify that the above bill is true and correct, and the payment therefore, has not been received.

Signed: _____
Dated: _____"

E.2.3 Generally, applications for payment will be accepted only for materials that have been installed. Under special conditions, applications for payment for stored materials will be accepted at Owner's sole discretion. Such a payment, if made, will be subject to the following conditions:

- (a) The request for stored material shall be submitted at least thirty (30) Days in advance of the application for payment on which it appears. Applications for payment shall be entertained for major equipment, components or expenditures only.
- (b) The Contractor shall submit applications for payment showing the quantity and cost of the material stored.
- (c) The material shall be stored in a bonded warehouse and Owner shall be granted the right to access the material for the purpose of removal or inspection at any time during the Contract Period.
- (d) The Contractor shall name the Owner as co-insured on the insurance policy covering the full value of the property while in the care and custody of the Contractor until it is installed. A certificate noting this coverage shall be issued to the Owner.
- (e) Payments shall be made for materials and equipment only. The submitted amount in the application for payment shall be reduced by the cost of transportation from the storage site to the project site and for the cost of an inspector to verify delivery and condition of the goods at the storage site. The cost of storage and inspection shall be borne solely by the Contractor.
- (f) Within sixty (60) Days of the application for payment, the Contractor shall submit evidence of

payment covering the material and/or equipment stored and of payment for the storage site.

(g) Payment for stored materials and/or equipment shall in no way indicate acceptance of the materials and/or equipment or waive any rights under this Contract for the rejection of the Work or materials and/or equipment not in conformance with the Contract Documents.

(h) All required documentation shall be submitted with the respective application for payment.

E.2.4 The Owner reserves the right to withhold all or part of a payment, or may nullify in whole or part any payment previously made, to such extent as may be necessary in the Owner's opinion to protect the Owner from loss because of:

- (a) Work that is defective and not remedied, or that has been demonstrated or identified as failing to conform with Applicable Laws or the Contract Documents,
- (b) third party claims filed or evidence reasonably indicating that such claims will likely be filed unless security acceptable to the Owner is provided by the Contractor;
- (c) failure of the Contractor to make payments properly to Subcontractors or for labor, materials or equipment (in which case Owner may issue checks made payable jointly to Contractor and such unpaid persons under this provision, or directly to Subcontractors and suppliers at any level under Section C.3.2.);
- (d) reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Price;
- (e)) damage to the Work, Owner or another contractor;
- (f) reasonable evidence that the Work will not be completed within the Contract Time required by the Contract, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay;
- (g) failure to carry out the Work in accordance with the Contract Documents; or
- (h) assessment of liquidated damages, when withholding is made for offset purposes.

E.2.5 Subject to the provisions of the Contract Documents, the amount of each progress payment shall be computed as follows:

- (a) Take that portion of the Contract Price properly allocable to completed Work as determined by multiplying the percentage completion of each portion of the Work by the share of the total Contract Price allocated to that portion of the Work in the Schedule of Values, less retainage as provided in Section E.5. Pending final determination of cost to the Owner of changes in the Work, no amounts for changes in the Work can be included in applications for payment until the Contract Price has been adjusted by an Amendment or Change Order;

- (b) Add that portion of the Contract Price properly allocable to materials and equipment delivered and suitably stored at the site for subsequent incorporation in the completed construction (or, if approved in advance by the Owner pursuant to Section E.2.3, suitably stored off the site at a location agreed upon in writing), less retainage as provided in Section E.5;
- (c) Subtract the aggregate of previous payments made by the Owner; and
- (d) Subtract any amounts for which the Owner has withheld or nullified payment as provided in the Contract Documents.

E.2.6 Contractor's applications for payment shall not include requests for payment for portions of the Work for which the Contractor does not intend to pay to a Subcontractor or material supplier.

E.2.7 The Contractor warrants to Owner that title to all Work covered by an application for payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submittal of an application for payment all Work for which payments are received from the Owner shall be free and clear of liens, claims, security interests or encumbrances in favor of the Contractor, Subcontractors, material suppliers, or other persons or entities making a claim by reason of having provided financing, labor, materials and equipment relating to the Work.

E.2.8 If Contractor disputes any determination by Owner with regard to any application for payment, Contractor nevertheless shall continue to expeditiously perform the Work. No payment made hereunder shall be or be construed to be final acceptance or approval of that portion of the Work to which such partial payment relates or shall relieve Contractor of any of its obligations hereunder.

E.2.9 Contractor shall submit its initial MWESB Report within ten (10) Days of Contractor's execution of the Contract, or if there will be a Guaranteed Maximum Price (GMP) Amendment, then within ten (10) Days of Contractor's execution of the GMP Amendment. Contractor shall submit annual MWESB Reports on June 30 of each year the Contract is active. Contracts (or GMP Amendments) first executed by Contractor within ninety (90) Days before June 30 of the year of execution by Contractor may at the discretion of Owner be exempt from submitting the annual MWESB Report otherwise due on that June 30. The final MWESB Report shall be filed with the application for final payment. Timely receipt of MWESB Reports by Owner shall be a condition precedent to Owner's obligation to pay any progress payments or final payment otherwise due.

E.3 PAYROLL CERTIFICATION REQUIREMENT

Owner's receipt of payroll certification pursuant to Section C.2 of this Contract shall be a condition precedent to Owner's obligation to pay any progress payments or final payment otherwise due.

E.4 DUAL PAYMENT SOURCES

Contractor shall not be compensated for Work performed

under this Contract from any state agency other than the agency that is a party to this Contract.

E.5 RETAINAGE

E.5.1 Retainage shall be withheld and released in accordance with the requirements set forth in OSU Standard 580-063-0045.

E.5.1.1 Owner may reserve as retainage from any progress payment an amount not to exceed five percent of the payment. As Work progresses, Owner may reduce the amount of retainage on or may eliminate retainage on any remaining monthly Contract payments after 50 percent of the Work under the Contract is completed if, in the Owner's discretion, such Work is progressing satisfactorily. Elimination or reduction of retainage shall be allowed at Owner's sole discretion and only upon written application by the Contractor, which application shall include written approval of Contractor's surety; except that when the Work is 97-1/2 percent completed the Owner may, at its discretion and without application by the Contractor, reduce the retained amount to 100 percent of the value of the Work remaining to be done. Upon receipt of written application by the Contractor, Owner shall respond in writing within a reasonable time.

E.5.1.2 Contractor may request in writing:

- (a) to be paid amounts which would otherwise have been retained from progress payments where Contractor has deposited acceptable bonds and securities of equal value with Owner or in a custodial account or other mutually-agreed account satisfactory to Owner, with an approved bank or trust company to be held in lieu of the cash retainage for the benefit of Owner;
- (b) for construction projects over \$1,000,000, that retainage be deposited in an interest bearing account, established through the State Treasurer for state agencies, in a bank, savings bank, trust company or savings association for the benefit of Owner, with earnings from such account accruing to the Contractor; or
- (c) that the Owner allow Contractor to deposit a surety bond for the benefit of Owner, in a form acceptable to Owner, in lieu of all or a portion of funds retained, or to be retained. Such bond and any proceeds therefrom shall be made subject to all claims in the manner and priority as set forth for retainage.

When the Owner has accepted the Contractor's election of option

(a) or (b), Owner may recover from Contractor any additional costs incurred through such election by reducing Contractor's final payment. Where the Owner has agreed to Contractor's request for option (c), Contractor shall accept like bonds from Subcontractors and suppliers on the project from which Contractor has required retainages.

E. 5.1.3 The retainage held by Owner shall be included in and paid to the Contractor as part of the Final Payment of the Contract Price. The Owner shall pay to Contractor interest at the rate of two-thirds of one percent per month on the final payment due Contractor, interest to commence forty-five (45) Days after the date which Owner receives Contractor's final approved application

for payment and Work under the Contract has been completed and accepted and to run until the date when final payment is tendered to Contractor. The Contractor shall notify Owner in writing when the Contractor considers the Work complete and deliver to Owner its final application for payment and Owner shall, within fifteen (15) Days after receiving the written notice and the application for payment, either accept the Work or notify the Contractor of Work yet to be performed on the Contract. If Owner does not within the time allowed notify the Contractor of Work yet to be performed to fulfill contractual obligations, the interest provided by this subsection shall commence to run forty-five (45) Days after the end of the 15- Day period.

E.5.1.4 Owner will reduce the amount of the retainage if the Contractor notifies the controller of the Owner that the Contractor has deposited in an escrow account with a bank or trust company, in a manner authorized by the Owner, bonds and securities of equal value of a kind approved by the Owner and such bonds and securities have in fact been deposited.

E.5.1.5 Contractor agrees that if Contractor elects to reserve a retainage from any progress payment due to any Subcontractor or supplier, such retainage shall not exceed five percent of the payment, and such retainage withheld from Subcontractors and suppliers shall be subject to the same terms and conditions stated in Subsection E.5 as apply to Owner's retainage from any progress payment due to Contractor.

E.6 FINAL PAYMENT

E.6.1 Upon completion of all the Work under this Contract, the Contractor shall notify the Owner, in writing, that Contractor has completed Contractor's obligations under the Contract and shall prepare its application requesting final payment. Upon receipt of such notice and application for payment, the Owner will inspect the Work, and, if acceptable, submit to the Owner a recommendation as to acceptance of the completed Work and the final estimate of the amount due the Contractor. If the Work is not acceptable, Owner will notify Contractor within fifteen (15) Days of Contractor's request for Final Payment. Upon approval of this final application for payment by the Owner and compliance by the Contractor with provisions in Section K, and Contractor's satisfaction of other provisions of the Contract Documents as may be applicable, the Owner shall pay to the Contractor all monies due under the provisions of these Contract Documents.

E.6.2 Neither Final Payment nor any remaining retained percentage shall become due until the Contractor submits to the Owner (1) a certificate evidencing that insurance required by the Contract Documents to remain in force after Final Payment is currently in effect and will not be canceled or allowed to expire until at least thirty (30) Days' prior written notice has been given to the Owner, (2) a written statement that the Contractor knows of no substantial reason that the insurance will not be renewable to cover the period required by the Contract Documents, (3) consent of surety, if any, to Final Payment and (4), if required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts, releases and waivers of liens, claims, security interests or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner. If a Subcontractor refuses to furnish a release or waiver

required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such lien. If such lien remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging such lien, including all costs and reasonable attorneys' fees.

E.6.3 Acceptance of Final Payment by the Contractor, a Subcontractor or material supplier shall constitute a waiver of claims by that payee except those previously made in writing and identified by that payee as unsettled at the time of final application for payment.

E.6.4 Contractor agrees to submit its final payment application within ninety (90) Days after Substantial Completion, unless written extension is granted by Owner. Contractor shall not delay Final Payment application for any reason, including without limitation nonpayment of Subcontractors, suppliers, manufacturers or others not a party to this Contract, or lack of resolution of a dispute with Owner or any other person of matters arising out of or relating to the Contract. If Contractor fails to submit its Final Payment application within ninety (90) Days after Substantial Completion, and Contractor has not obtained written extension by Owner, all requests or Claims for additional costs or an extension of Contract Time shall be waived.

SECTION F JOB SITE CONDITIONS

F.1 USE OF PREMISES

Contractor shall confine equipment, storage of materials and operation of Work to the limits indicated by Contract Documents, Applicable Laws, permits or directions of the Owner. Contractor shall follow the Owner's instructions regarding use of premises, if any.

F.2 PROTECTION OF WORKERS, PROPERTY AND THE PUBLIC

F.2.1 Contractor shall maintain continuous and adequate protection of all of the Work from damage and shall protect the Owner, workers and property from injury or loss arising in connection with this Contract. Contractor shall remedy acceptably to the Owner any damage, injury, or loss, except such as may be directly due to errors in the Contract Documents or caused by authorized representatives or personnel of the Owner. Contractor shall adequately protect adjacent property as provided by law and the Contract Documents.

F.2.2 Contractor shall take all necessary precautions for the safety of all personnel on the job site or otherwise engaged in the undertaking of the Work and shall comply with the Contract Documents, best practices and all applicable provisions of federal, state and municipal safety laws and building codes to prevent accidents or injury to persons on, about or adjacent to the premises where the Work is being performed. Contractor shall erect and properly maintain at all times, as required by the conditions and progress of the Work, all necessary safeguards for protection of workers and the public against any hazards created by construction. Contractor shall designate a responsible employee or associate on the Work site, whose duty shall be the prevention of accidents. The name and position of the person designated shall be reported to the Owner. The Owner has no responsibility for Work site safety. Work site safety shall be the responsibility of the Contractor.

F.2.3 Contractor shall not enter upon private property without first obtaining permission from the property owner or its duly authorized representative. Contractor shall be responsible for the preservation of all public and private property along and adjacent to the Work contemplated under the Contract and shall use every precaution necessary to prevent damage thereto. In the event the Contractor damages any property, the Contractor shall at once notify the property owner and make, or arrange to make, full restitution. Contractor shall, immediately and in writing, report to the Owner, all pertinent facts relating to such property damage and the ultimate disposition of the claim for damage.

F.2.4 Contractor shall be responsible for protection of adjacent work areas including impacts brought about by activities, equipment, labor, utilities, vehicles and materials on the site.

F.2.5 Contractor shall at all times direct its activities in such a manner as to minimize adverse effects on the environment. Handling of all materials shall be conducted so no release will occur that may pollute or become hazardous.

F.2.6 In an emergency affecting the safety of life or limb or of the Work or of adjoining property, the Contractor, without special instruction or authorization from the Owner, shall act reasonably to prevent threatened loss or injury, and shall so act, without appeal, if instructed by the Owner. Any compensation claimed by the Contractor on account of emergency work shall be determined in accordance with section D.

F.3 CUTTING AND PATCHING

F.3.1 Contractor shall be responsible for coordinating all cutting, fitting, or patching of the Work to make its several parts come together properly and fit to receive or be received by work of other contractors or Subcontractors shown upon, or reasonably implied by, the Contract Documents.

F.3.2 Contractor shall be responsible for restoring all cut, fitted, or patched surfaces to an original condition; provided, however, that if a different condition is specified in the Contract Documents, then Contractor shall be responsible for restoring such surfaces to the condition specified in the Contract Documents.

F.4 CLEANING UP

From time to time as may be prudent or ordered by the Owner and, in any event, immediately after completion of the Work, the Contractor shall, at its own expense, clean up and remove all refuse and unused materials of any kind resulting from the Work. If Contractor fails to do so within twenty-four hours after notification by the Owner the work may be done by others and the cost charged to the Contractor and deducted from payment due the Contractor.

F.5 ENVIRONMENTAL CONTAMINATION

F.5.1. Contractor shall be held responsible for and shall indemnify, defend (with counsel of Owner's choice), and hold harmless Owner from and against any costs, expenses, damages, claims, and causes of action, (including attorneys' fees), or any of them, resulting from

all spills, releases, discharges, leaks and disposal of environmental pollution, including storage, transportation, and handling during the performance of the Work or Contractor's obligations under the Contract which occur as a result of, or are contributed by, the negligence or actions of Contractor or its personnel, agents, or Subcontractors or any failure to perform in accordance with the Contract Documents (except to the extent otherwise void under ORS 30.140). Nothing in this section F.5.1 shall limit Contractor's responsibility for obtaining insurance coverages required under Section G.3 of this Contract, and Contractor shall take no action that would void or impair such coverages.

F.5.1.1 Contractor agrees to promptly dispose of such spills, releases, discharge or leaks to the satisfaction of Owner and regulatory agencies having jurisdiction in a manner that complies with Applicable Laws. Cleanup shall be at no cost to the Owner and shall be performed by properly qualified and, if applicable, licensed personnel.

F.5.1.2 Contractor shall obtain the Owner's written consent prior to bringing onto the Work site any (i) environmental pollutants or (ii) hazardous substances or materials, as the same or reasonably similar terms are used in any Applicable Laws. Notwithstanding such written consent from the Owner, the Contractor, at all times, shall:

- (a) properly handle, use and dispose of all environmental pollutants and hazardous substances or materials brought onto the Work site, in accordance with all Applicable Laws;
- (b) be responsible for any and all spills, releases, discharges, or leaks of (or from) environmental pollutants or hazardous substances or materials which Contractor has brought onto the Work site; and
- (c) promptly clean up and remediate, without cost to the Owner, such spills, releases, discharges, or leaks to the Owner's satisfaction and in compliance with all Applicable Laws.

F.5.2 Contractor shall report all reportable quantity releases, as such releases are defined in Applicable Laws, including but not limited to 40 CFR Part 302, Table 302.4 and in OAR 340-142- 0050, to applicable federal, state, and local regulatory and emergency response agencies. Upon discovery, regardless of quantity, Contractor must telephonically report all releases to the Owner. A written follow-up report shall be submitted to Owner within 48 hours of the telephonic report. Such written report shall contain, as a minimum:

- (a) Description of items released (identity, quantity, manifest numbers, and any and all other documentation required by law.)
- (b) Whether amount of items released is EPA/DEQ reportable, and, if so, when reported.
- (c) Exact time and location of release, including a description of the area involved.
- (d) Containment procedures initiated.
- (e) Summary of communications about the release between Contractor and members of the press or Stat, local or federal officials other than

Owner.

- (f) Description of cleanup procedures employed or to be employed at the site, including disposal location of spill residue.
- (g) Personal injuries, if any, resulting from, or aggravated by, the release.

F.6 ENVIRONMENTAL CLEAN-UP

- F.6.1 Unless disposition of environmental pollution is specifically a part of this Contract, or was caused by the Contractor (reference F.5 Environmental Contamination), Contractor shall immediately notify Owner of any hazardous substance(s) which Contractor discovers or encounters during performance of the Work required by this Contract. "Hazardous substance(s)" means any hazardous, toxic and radioactive materials and those substances defined as "hazardous substances," "hazardous materials," "hazardous wastes," "toxic substances," or other similar designations in any federal, state, or local law, regulation, or ordinance, including without limitation asbestos, polychlorinated biphenyl (PCB), or petroleum, and any substances, materials or wastes regulated by 40 CFR, Part 261 and defined as hazardous in 40 CFR S 261.3. In addition to notifying Owner of any hazardous substance(s) discovered or encountered, Contractor shall immediately cease working in any particular area of the project where a hazardous substance(s) has been discovered or encountered if continued work in such area would present a risk or danger to the health or well-being of Contractor's or any Subcontractor's work force, property or the environment.
- F.6.2 Upon being notified by Contractor of the presence of hazardous substance(s) on the project site, Owner shall arrange for the proper disposition of such hazardous substance(s).

F.7 FORCE MAJEURE

A party to this Contract shall not be held responsible for delay or default due to Force Majeure acts, events or occurrences unless they could have been avoided by the exercise of reasonable care, prudence, foresight, and diligence by that party. The Owner may terminate this Contract upon written notice after determining that delay or default caused by Force Majeure acts, events or occurrences will reasonably prevent successful performance of the Contract.

**SECTION G INDEMNITY,
BONDING, AND INSURANCE**

G.1 RESPONSIBILITY FOR DAMAGES / INDEMNITY

- G.1.1 Contractor shall be responsible for all damage to property, injury to persons, and loss, expense, inconvenience, and delay that may be caused by, or result from, the carrying out of the Work to be done under this Contract, or from any act, omission or neglect of the Contractor, its Subcontractors, sub-subcontractors of any tier, suppliers, employees, guests, visitors, invitees and agents.
- G.1.2 To the fullest extent permitted by law, Contractor shall indemnify, defend (with counsel approved by Owner) and hold harmless the Owner, Architect/Engineer, Architect/Engineer's consultants, and their respective

officers, directors, agents, employees, partners, members, stockholders and affiliated companies (collectively "Indemnitees") from and against all liabilities, damages, losses, claims, expenses (including reasonable attorney fees), demands and actions of any nature whatsoever which arise out of, result from or are related to, (a) any damage, injury, loss, expense, inconvenience or delay described in this Section G.1., (b) any accident or occurrence which happens or is alleged to have happened in or about the project site or any place where the Work is being performed, or in the vicinity of either, at any time prior to the time the Work is fully completed in all respects, (c) any failure of the Contractor or its Subcontractors, sub-subcontractors of any tier, suppliers, employees, or consultants to observe or perform any duty or obligation under the Contract Documents which is to be observed or performed by the Contractor, or any breach of any agreement, representation or warranty of the Contractor contained in the Contract Documents or in any subcontract, (d) the negligent acts or omissions of the Contractor, a Subcontractor, sub-subcontractor of any tier, a supplier, a consultant, or anyone directly or indirectly employed by them or any one of them or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss or expense is caused in part by a party indemnified hereunder (except to the extent otherwise void under ORS 30.140), and (e) any lien filed upon the project or bond claim in connection with the Work. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity which would otherwise exist as to a party or person described in this Section G.1.2.

- G.1.3 In claims against any person or entity indemnified under Section G.1.2 by an employee of the Contractor, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, the indemnification obligation under Section G.1.2 shall not be limited by a limitation on amount or type of damages, compensation or benefits payable by or for the Contractor or a Subcontractor under workers' compensation acts, disability benefit acts or other employee benefit acts.

**G.2 PERFORMANCE AND PAYMENT SECURITY;
PUBLIC WORKS BOND**

- G.2.1 When the Contract Price is \$100,000 or more (or \$50,000 or more in the case of Contracts for highways, bridges and other transportation projects), the Contractor shall furnish and maintain in effect at all times during the Contract Period a performance bond in a sum equal to the Contract Price and a separate payment bond also in a sum equal to the Contract Price. Contractor shall furnish such bonds even if the Contract Price is less than the above thresholds if otherwise required by the Contract Documents.
- G.2.2 Bond forms furnished by the Owner and notarized by awarded Contractor's surety company authorized to do business in Oregon are the only acceptable forms of performance and payment security, unless otherwise specified in the Contract Documents.
- G.2.3 Before execution of the Contract the Contractor shall file with the Construction Contractors Board, and maintain in full force and effect, the separate public works bond required by Oregon Laws 2015, Chapter 279C, and OAR 839-025-0015, unless otherwise exempt under those provisions. The Contractor shall also include in every subcontract a provision requiring the Subcontractor to have a public works bond filed with the

Construction Contractors Board before starting Work, unless otherwise exempt, and shall verify that the Subcontractor has filed a public works bond before permitting any Subcontractor to start Work.

G.3 INSURANCE

G.3.1 Primary Coverage: Insurance carried by Contractor and Subcontractors under this Contract shall be the primary coverage. The coverages indicated are minimums unless otherwise specified in the Contract Documents.

G.3.2 Workers' Compensation: All employers, including Contractor, that employ subject workers who work under this Contract in the State of Oregon shall comply with ORS 656.017 and provide the required Workers' Compensation coverage, unless such employers are exempt under ORS 656.126. This shall include Employer's Liability Insurance with coverage limits of not less than the minimum amount required by statute for each accident. Contractors who perform the Work without the assistance or labor of any employee need not obtain such coverage if the Contractor certifies so in writing. Contractor shall ensure that each of its Subcontractors complies with these requirements. The Contractor shall require proof of such Workers' Compensation coverage by receiving and keeping on file a certificate of insurance from each Subcontractor or anyone else directly employed by either the Contractor or its Subcontractors.

G.3.3 Builder's Risk Insurance:

G.3.3.1 Builder's Risk: During the term of this Contract, for new construction the Contractor shall obtain and keep in effect Builder's Risk insurance on an all risk forms, including earthquake and flood, for an amount equal to the full amount of the Contract, plus any changes in values due to modifications, Change Orders and loss of materials added. Such Builder's Risk shall include, in addition to earthquake and flood, theft, vandalism, mischief, collapse, transit, debris removal, and architect's fees "soft costs" associated with delay of project due to insured peril. Any deductible shall not exceed \$50,000 for each loss, except the earthquake and flood deductible which shall not exceed 2 percent of each loss or \$50,000, whichever is greater. The deductible shall be paid by Contractor if Contractor or its Subcontractors are negligent. The policy will include as loss payees Owner, the Contractor and its Subcontractors as their interests may appear.

G.3.3.2 Builder's Risk Installation Floater: For Work other than new construction, Contractor shall obtain and keep in effect during the term of this Contract, a Builder's Risk Installation Floater for coverage of the Contractor's labor, materials and equipment to be used for completion of the Work performed under this Contract. The minimum amount of coverage to be carried shall be equal to the full amount of the Contract. The policy will include as loss payees Owner, the Contractor and its Subcontractors as their interests may appear. Owner may waive this requirement at their sole and absolute discretion.

G.3.3.3 Such insurance shall be maintained until Owner has occupied the facility.

G.3.3.4 Loss insured under the Builder's Risk insurance shall be adjusted by the Owner and made payable to the

Owner as loss payee. The Contractor shall pay Subcontractors their just shares of insurance proceeds received by the Contractor, and

by appropriate agreements, written where legally required for validity, shall require Subcontractors to make payments to their sub-subcontractors of any tier in similar manner. The Owner shall have power to adjust and settle a loss with insurers.

G.3.4 General Liability Insurance:

G.3.4.1 Commercial General Liability: Upon issuance of a Contract, Contractor shall obtain, and keep in effect at Contractor's expense for the term of the Contract, Commercial General Liability Insurance covering bodily injury and property damage in the amount of \$1,000,000 per claim and \$2,000,000 per occurrence in a form satisfactory to Owner. This insurance shall include personal injury liability, products and completed operations, no subcontractors' limitations, and blanket contractual liability coverage for the indemnities provided under this Contract (to the extent contractual liability coverage for the indemnity is available in the marketplace), and shall be issued on an occurrence basis.

G.3.4.2 Automobile Liability: Contractor shall obtain, at Contractor's expense, and keep in effect during the term of this Contract, Automobile Liability Insurance covering owned, and/or hired vehicles, as applicable. The coverage may be written in combination with the Commercial General Liability Insurance. Contractor shall provide proof of insurance of not less than \$1,000,000 per claim and \$2,000,000 per occurrence. Contractor and its Subcontractors shall be responsible for ensuring that all non-owned vehicles maintain adequate Automobile Liability insurance while on site.

G.3.4.3 Owner may adjust the insurance amounts required in Section G.3.4.1 and G.3.4.2 based upon institution specific risk assessments through the issuance of Supplemental General Conditions and a Contract.

G.3.4.4 "Tail" Coverage: If any of the required liability insurance is arranged on a "claims made" basis, "tail" coverage will be required at the completion of this Contract for a duration of 36 months or the maximum time period available in the marketplace if less than 36 months. Contractor shall furnish certification of "tail" coverage as described or continuous "claims made" liability coverage for 36 months following Final Completion. Continuous "claims made" coverage will be acceptable in lieu of "tail" coverage, provided its retroactive date is on or before the effective date of this Contract. Owner's receipt of the policy endorsement evidencing such coverage shall be a condition precedent to Owner's obligation to make final payment and to Owner's final acceptance of Work or services and related warranty (if any).

G.3.4.5: Umbrella Liability: Contractor shall obtain, at Contractor's expense, and keep in effect during the term of this Contract, Umbrella liability Insurance over and above the general liability, automobile liability and workers' compensation coverage if required by Owner in specified limits at time of requirement.

G.3.4.6 Pollution Liability (if required by Owner through issuance of Supplemental General Conditions): Contractor shall obtain, at Contractor's expense, and

keep in effect during the term of this Contract, Pollution liability Insurance in minimum amounts of \$3,000,000 naming Owner as "additional insured," as noted in the "additional insured section below.

- G.3.5 Additional Insured: The general liability insurance coverage, professional liability, umbrella, and pollution liability if required, shall include the Owner as additional insureds but only with respect to the Contractor's activities to be performed under this Contract, and shall include completed operations coverage.

If Contractor cannot obtain an insurer to name the Owner as additional insureds, Contractor shall obtain at Contractor's expense, and keep in effect during the term of this Contract, Owners and Contractors Protective Liability Insurance, naming the Owner as additional insureds with not less than a \$2,000,000 limit per occurrence. This policy must be kept in effect for at least 36 months following Final Completion. As evidence of coverage, Contractor shall furnish the actual policy to Owner prior to execution of the Contract.

- G.3.6 Notice of Cancellation or Change: If the Contractor receives a non-renewal or cancellation notice from an insurance carrier affording coverage required herein, or receives notice that coverage no longer complies with the insurance requirements herein, Contractor agrees to notify Owner by fax within five (5) business days with a copy of the non-renewal or cancellation notice, or written specifics as to which coverage is no longer in compliance. When notified by Owner, the Contractor agrees to stop Work pursuant to this Contract, unless all required insurance remain in effect. Any failure to comply with the reporting provisions of this insurance, except for the potential exhaustion of aggregate limits, shall not affect the coverages provided to the Owner and its institutions, divisions, officers, and employees.

Owner shall have the right, but not the obligation, of prohibiting Contractor from entering the Work site until a new certificate(s) of insurance is provided to Owner evidencing the replacement coverage. The Contractor agrees Owner reserves the right to withhold payment to Contractor until evidence of reinstated or replacement coverage is provided to Owner.

- G.3.7 Certificate(s) of Insurance: As evidence of the insurance coverage required by this Contract, the Contractor shall furnish certificate(s) of insurance to the Owner prior to execution of the Contract. The certificate(s) will specify all of the parties who are additional insureds or loss payees for this contract. Insurance coverage required under this Contract shall be obtained from insurance companies or entities acceptable to the Owner and that are eligible to provide such insurance under Oregon law. Eligible insurers include admitted insurers that have been issued a certificate of authority from the Oregon Department of Consumer and Business Services authorizing them to conduct an insurance business and issue policies of insurance in the state of Oregon, and certain non-admitted surplus lines insurers that satisfy the requirements of applicable Oregon law and which are subject to approval by the Owner. The Contractor shall be financially responsible for all deductibles, self-insured retentions and/or self-insurance included

hereunder. Any deductible, self-insured retention and/or self-insurance in excess of \$50,000 shall be subject to approval by the Owner in writing and shall be a condition precedent to the effectiveness of any Contract. The Owner has the right to require the Contractor at any time during the performance of the Work to furnish to Owner copies of the Contractor's actual policies.

SECTION H SCHEDULE OF WORK

H.1 CONTRACT PERIOD

- H.1.1 Time is of the essence. The Contractor shall at all times carry on the Work diligently, without delay and punctually fulfill all requirements herein. If required by the Contract Documents, Contractor shall commence Work on the site within fifteen (15) Days of Notice to Proceed, unless directed otherwise.
- H.1.2 Unless specifically extended by an Amendment or Change Order, all Work shall be complete by the date contained in the Contract Documents. The Owner shall have the right to accelerate the completion date of the Work, which may require the use of overtime. Such accelerated Work schedule shall be an acceleration in performance of Work under Section D.1.2 (f) and shall be subject to the provisions of Section D.1.
- H.1.3 The Owner shall not waive any rights under the Contract by permitting the Contractor to continue or complete in whole or in part the Work after the date described in Section H.1.2 above.

H.2 SCHEDULE

- H.2.1 Contractor shall provide, by or before the pre-construction conference, the initial as-planned Construction Schedule for review and acceptance by the Owner. The submitted Construction Schedule must illustrate Work by project components, labor trades, and long lead items broken down by building and/or floor where applicable. If Owner shall so elect, Contractor shall provide the Construction Schedule in CPM format showing the graphical network of planned activities, including i) a reasonably detailed list of all activities required to complete the Work; ii) the time and duration that each activity will take to completion; and iii) the dependencies between the activities. Construction Schedules lacking adequate detail, or unreasonably detailed, will be rejected. The Construction Schedule shall include the following: Notice to Proceed or the date the Work commences, if no Notice to Proceed is issued by Owner, Substantial Completion, and Final Completion. Construction Schedules shall be updated monthly, unless otherwise required by the Contract Documents, and submitted with the monthly application for payment. Acceptance of the Construction Schedule by the Owner does not constitute agreement by the Owner as to the Contractor's sequencing, means, methods, or durations. Any positive difference between the Contractor's scheduled completion and the Contract completion date is float owned by the Owner. Owner reserves the right to negotiate the float if it is deemed to be in Owner's best interest to do so. In no case shall the Contractor make a claim for delays if the Work is completed within the Contract Time but after Contractor's scheduled completion.

H.3 PARTIAL OCCUPANCY OR USE

H.3.1 The Owner may occupy or use any completed or partially completed portion of the Work at any stage, provided such occupancy or use is consented to by public authorities having jurisdiction over the Work. Such partial occupancy or use may commence whether or not the portion is substantially complete, provided the Owner and Contractor have reasonably accepted in writing the responsibilities assigned to each of them for payments, retainage, if any, security, insurance or self-insurance, maintenance, heat, utilities, and damage to the Work, and have agreed in writing concerning the period for correction of the Work and commencement of warranties required by the Contract Documents with respect to such portion of the Work. Approval by the Contractor to partial occupancy or use shall not be unreasonably withheld. Immediately prior to such partial occupancy or use, the Owner and Contractor shall jointly inspect the area to be occupied or portion of the Work to be used in order to determine and record the condition of the Work. Partial occupancy or use of a portion or portions of the Work shall not constitute acceptance of Work not complying with the requirements of the Contract Documents.

**SECTION I
CORRECTION OF
WORK**

I.1 CORRECTION OF WORK BEFORE FINAL PAYMENT

The Contractor warrants to the Owner that materials and equipment furnished under the Contract will be of good quality and new unless otherwise required or permitted by the Contract Documents, that the Work will be free from defects, and that the Work will conform to the requirements of the Contract Documents. Work failing to conform to these requirements shall be deemed defective. Contractor shall promptly remove from the premises and replace all defective materials and equipment as determined by the Owner, whether incorporated in the Work or not. Removal and replacement shall be without loss or expense to the Owner, and Contractor shall bear the cost of repairing all Work destroyed or damaged by such removal or replacement. Contractor shall be allowed a period of no longer than thirty (30) Days after Substantial Completion for completion of defective (Punch List) work. At the end of the thirty-day period, or earlier if requested by the Contractor, Owner shall arrange for inspection of the Work by the Architect/Engineer. Should the work not be complete, and all corrections made, the costs for all subsequent re-inspections shall be borne by the Contractor. If Contractor fails to complete the Punch List work within the thirty (30) Day period, Owner may perform such work and Contractor shall reimburse Owner all costs of the same within ten (10) Days after demand without affecting Contractor's obligations.

I.2 WARRANTY WORK

I.2.1 Neither the final certificate of payment nor any provision of the Contract Documents shall relieve the Contractor from responsibility for defective Work and, unless a longer period is specified, Contractor shall correct all defects that appear in the Work within a period of one year from the date of issuance of the written notice of Substantial Completion by the Owner except for latent defects which will be remedied by the Contractor at any time they become apparent. The Owner shall give Contractor notice of defects with reasonable promptness. The Contractor shall perform the warranty Work by correcting defects within twenty-four (24) hours of

notification by Owner, unless otherwise specified in the Contract Documents. Should the Contractor fail to respond within the specified response time, the Owner may, at its option, complete the necessary repairs using another contractor or its own forces. If Owner completes the repairs using Owner's own forces, Contractor shall pay Owner at the rate of one and one-half (1½) times the standard hourly rate of Owner's forces, plus related overhead and any direct non-salary costs. If Owner completes the repairs using another contractor, Contractor shall pay Owner the amount of Owner's direct costs billed by the other contractor for the work, plus the direct salary costs and related overhead and direct non-salary expenses of Owner's forces who are required to monitor that contractor's work. Work performed by Owner using Owner's own forces or those of another contractor shall not affect the Contractor's contractual duties under these provisions, including warranty provisions. In the event of warranty work consisting of emergency repairs, Owner may perform such work and Contractor shall reimburse Owner all costs of the same within ten (10) Days after demand, without affecting Contractor's obligations.

I.2.2 Nothing in this Section I.2 provision shall negate guarantees or warranties for periods longer than one year including without limitation such guarantees or warranties required by other sections of the Contract Documents for specific installations, materials, processes, equipment or fixtures.

I.2.3 In addition to Contractor's warranty, manufacturer's warranties shall pass to the Owner and shall not take effect until such portion of the Work covered by the applicable warranty has been accepted in writing by the Owner.

I.2.4 The one-year period for correction of Work shall be extended with respect to portions of Work performed after Substantial Completion by the period of time between Substantial Completion and the actual performance of the Work, and shall be extended by corrective Work performed by the Contractor pursuant to this Section, as to the Work corrected. The Contractor shall remove from the site portions of the Work which are not in accordance with the requirements of the Contract Documents and are neither corrected by the Contractor nor accepted by the Owner.

I.2.5 Nothing contained in this Section I.2 shall be construed to establish a period of limitation with respect to other obligations which the Contractor might have under the Contract Documents. Establishment of the period for correction of Work as described in this Section I.2 relates only to the specific obligation of the Contractor to correct the Work, and has no relationship to the time within which the obligation to comply with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the Contractor's liability with respect to the Contractor's obligations other than specifically to correct the Work.

I.2.6 If the Owner prefers to accept Work which is not in accordance with the requirements of the Contract Documents, the Owner may do so instead of requiring its removal and correction, in which case the Contract Price will be reduced as appropriate and equitable. Such adjustment shall be effected whether or not final payment has been made.

SECTION J
SUSPENSION AND/OR TERMINATION OF THE
WORK

J.1 OWNER'S RIGHT TO SUSPEND THE WORK

J.1.1 The Owner has the authority to suspend portions or all of the Work due to the following causes:

- (a) Failure of the Contractor to correct unsafe conditions;
- (b) Failure of the Contractor to carry out any provision of the Contract;
- (c) Failure of the Contractor to carry out orders;
- (d) Conditions, in the opinion of the Owner, which are unsuitable for performing the Work;
- (e) Time required to investigate differing site conditions;
- (f) Any reason considered to be in the public interest.

J.1.2 The Owner shall notify Contractor and the Contractor's Surety in writing of the effective date and time of the suspension, and Owner shall notify Contractor and Contractor's surety in writing to resume Work.

J.2 CONTRACTOR'S RESPONSIBILITIES

J.2.1 During the period of the suspension, Contractor is responsible to continue maintenance at the project just as if the Work were in progress. This includes, but is not limited to, protection of completed Work, maintenance of access, protection of stored materials, temporary facilities, and clean-up.

J.2.2 When the Work is recommenced after the suspension, the Contractor shall replace or renew any Work damaged during the suspension, remove any materials or facilities used as part of temporary maintenance, and complete the project in every respect as though its prosecution had been continuous and without suspension.

J.2.3 COMPENSATION FOR SUSPENSION

J.2.4

J.2.1 Depending on the reason for suspension of the Work, the Contractor or the Owner may be due compensation by the other party. If the suspension was required due to acts or omissions of Contractor, the Owner may assess the Contractor actual costs of the suspension in terms of administration, remedial work by the Owner's forces or another contractor to correct the problem associated with the suspension, rent of temporary facilities, and other actual costs related to the suspension. If the suspension was caused by acts or omissions of the Owner, the Contractor may be due compensation which shall be defined using Section D, Changes in Work. If the suspension was required through no fault of the Contractor or the Owner, neither party shall owe the other for the impact.

J.4 OWNER'S RIGHT TO TERMINATE CONTRACT

J.4.1 The Owner may, without prejudice to any other right or

remedy, and after giving Contractor seven (7) Days' written notice and an opportunity to cure, terminate the Contract in whole or in part under the following conditions:

- (a) If Contractor should, voluntarily or involuntarily, seek protection under the United States Bankruptcy Code and Contractor as debtor-in-possession or the Trustee for the estate fails to assume the Contract within a reasonable time;
- (b) If Contractor should make a general assignment for the benefit of Contractor's creditors;
- (c) If a receiver should be appointed on account of Contractor's insolvency;
- (d) If Contractor should repeatedly refuse or fail to supply an adequate number of skilled workers or proper materials to carry on the Work as required by the Contract Documents, or otherwise fail to perform the Work in a timely manner;
- (e) If Contractor should repeatedly fail to make prompt payment to Subcontractors or for material or labor, or should disregard laws, ordinances or the instructions of the Owner; or
- (f) If Contractor is otherwise in breach of any part of the Contract.
- (g) If Contractor is in violation of Applicable Laws, either in the conduct of its business or in its performance of the Work.

J.4.2 At any time that any of the above occurs, Owner may exercise all rights and remedies available to Owner at law or in equity, and, in addition, Owner may take possession of the premises and of all materials and appliances and finish the Work by whatever method it may deem expedient. In such case, the Contractor shall not be entitled to receive further payment until the Work is completed. If the Owner's cost of finishing the Work exceeds the unpaid balance of the Contract Price, Contractor shall pay the difference to the Owner.

J.5 TERMINATION FOR CONVENIENCE

J.5.1 Owner may terminate the Contract in whole or in part whenever Owner determines that termination of the Contract is in the best interest of Owner or the public.

The Owner shall provide the Contractor with seven (7) Days prior written notice of a termination for Owner's or for public convenience. After such notice, the Contractor shall provide the Owner with immediate and peaceful possession of the premises and materials located on and off the premises for which the Contractor received progress payment under Section E. Compensation for Work terminated by the Owner under this provision will be according to Section E. In no circumstance shall Contractor be entitled to lost profits for Work not performed due to termination.

J.6 ACTION UPON TERMINATION

J.6.1 Upon receiving a notice of termination, and except as directed otherwise by the Owner, Contractor shall immediately cease placing further subcontracts or orders for materials, services, or facilities. In addition, Contractor shall terminate all subcontracts or orders to the extent they

relate to the Work terminated and, with the prior written approval of the Owner, settle all outstanding liabilities and termination settlement proposals arising from the termination of subcontracts and orders.

J.6.2 As directed by the Owner, Contractor shall, upon termination, transfer title and deliver to the Owner all Record Documents, information, and other property that, if the Contract had been completed, would have been required to be furnished to the Owner.

J.6.3 Upon Owner's notice of termination pursuant to either Section J.4 or J.5, if Owner shall so elect, Contractor shall assign the Owner such subcontracts and orders as Owner shall specify. In the event Owner elects to take assignment of any such subcontract or order, Contractor shall take such action and shall execute such documents as Owner shall reasonably require for the effectiveness of such assignment and Contractor shall ensure that no contractual arrangement between it and its subcontractors or suppliers of any tier or sub-tier shall prevent such assignment.

SECTION K CONTRACT CLOSE OUT

K.1 RECORD DOCUMENTS

As a condition of final payment (refer also to section E.6), Contractor shall comply with the following: Contractor shall provide Record Documents for the entire project to Owner. Record Documents shall depict the project as constructed and shall reflect each and every change, modification, and deletion made during the construction. Record Documents are part of the Work and shall be provided prior to the Owner's issuance of final payment. Record Documents include all modifications to the Contract Documents unless otherwise directed, and accurate MWESB Reports.

K.2 OPERATION AND MAINTENANCE MANUALS

As part of the Work, Contractor shall submit two completed operation and maintenance manuals ("O & M Manuals") for review by the Owner prior to submission of any pay request for more than 75% of the Work. Owner's receipt of the O & M Manuals shall be a condition precedent to any payment thereafter due. The O & M Manuals shall contain a complete set of all Submittals, all product data as required by the specifications, training information, telephone list and contact information for all consultants, manufacturers, installer and suppliers, manufacturer's printed data, record and shop drawings, schematic diagrams of systems, appropriate equipment indices, warranties and bonds. The Owner shall review and return one O & M Manual for any modifications or adjustments required. Prior to submission of its final pay request, Contractor shall deliver two (2) complete and approved sets of O & M Manuals in paper form and one (1) complete and approved set in electronic form to the Owner and Owner's receipt of the O & M Manuals shall be a condition precedent to Owner's obligation to make final payment.

K.3 COMPLETION NOTICES

K.3.1 Contractor shall provide Owner written notice of both Substantial and Final Completion. The certificate of Substantial Completion shall state the date of Substantial Completion, the responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance, and the time within which the Contractor shall finish all items on the Punch List accompanying the Certificate. Both completion notices

must be signed by the Contractor and the Owner to be valid. The Owner shall provide the final signature on the notices. The notices shall take effect on the date they are signed by the Owner.

K.3.2 Substantial Completion of a facility with operating systems (e.g., mechanical, electrical, HVAC) shall be that degree of completion that has provided a minimum of thirty (30) continuous Days of successful, trouble-free operation, which period shall begin after all performance and acceptance testing has been successfully demonstrated to the Owner. All equipment contained in the Work, plus all other components necessary to enable the Owner to operate the facility in the manner that was intended, shall be complete on the Substantial Completion date. The Contractor may request that a Punch List be prepared by the Owner with submission of the request for the Substantial Completion notice.

K.4 TRAINING

As part of the Work, and prior to submission of the final application for payment, the Contractor shall schedule with the Owner training sessions for all equipment and systems as required by the Contract Documents. Contractor shall schedule training sessions at least two weeks in advance of the date of training to allow Owner to provide its personnel with adequate notice. The O & M Manual shall be used as a basis for training. In addition to any off-site training required by the Contract Documents, training shall include a formal session conducted at the Work site after the equipment and/or system is completely installed and operational in its normal operating environment.

K.5 EXTRA MATERIALS

As part of the Work, Contractor shall provide spare parts, extra maintenance materials, and other materials or products in the quantities specified in the Contract Documents prior to final payment. Delivery point for extra materials shall be designated by the Owner.

K.6 ENVIRONMENTAL CLEAN-UP

As part of the Final Completion notice, or as a separate written notice submitted with or before the notice of Final Completion, the Contractor shall notify the Owner that all environmental and pollution clean-up, remediation and closure have been completed in accordance with all Applicable Laws and pursuant to the authority of all agencies having jurisdiction, and Contractor shall provide Owner with any and all documentation related to the same, including but not limited to directives, orders, letters, certificates and permits related to or arising from such environmental pollution. The notice shall reaffirm the indemnification given under Section F.5.1 above. Contractor's completion of its obligations under this Section K.6 and Owner's receipt of documents evidencing such completion shall be a condition precedent to Owner's obligation to make final payment.

K.7 CERTIFICATE OF OCCUPANCY

Owner's receipt of an unconditioned certificate of occupancy from the appropriate state and/or local building officials shall be a condition precedent to Owner's obligation to make final payment, except to the extent failure to obtain an unconditional certificate of occupancy is due to the sole fault or neglect of Owner.

K.8 OTHER CONTRACTOR RESPONSIBILITIES

The Contractor shall be responsible for returning to the

Owner all property of Owner issued to Contractor during construction such as keys, security passes, site admittance badges, and all other pertinent items. Upon notice from Owner, Contractor shall be responsible for notifying the appropriate utility companies to transfer utility charges from the Contractor to the Owner. The utility transfer date shall not be before Substantial Completion and may not be until Final Completion, if the Owner does not take beneficial use of the facility and the Contractor's forces continue with the Work.

K.9 SURVIVAL

All warranty and indemnification provisions of this Contract, and all of Contractor's other obligations under this Contract that are not fully performed by the time of Final Completion or termination, shall survive Final Completion or any termination of the Contract.

EXHIBIT D

OREGON STATE UNIVERSITY

SUPPLEMENTAL GENERAL CONDITIONS

To The

PUBLIC IMPROVEMENT GENERAL CONDITIONS

Project Name: OSU SOFTBALL HITTING FACILITY AND LORENZ SOCCER BLEACHERS

The following modify the June 30, 2017 Oregon State University General Conditions (“OSU Public Improvement General Conditions”) for this Contract. Where a portion of the OSU General Conditions is modified by these Supplemental General Conditions, the unaltered portions shall remain in effect.

SG-1 Section B.4 is modified as follows: Revise to read:

“Contractor shall obtain and pay for all necessary permits and licenses, except for those specifically excluded in the Supplemental General Conditions, for the construction of the Work, for temporary obstructions, enclosures, opening of streets for pipes, walls, utilities, environmental Work, etc., as required for the project. Owner shall obtain and pay for the general building permit and pay for any specialty permits required for the Work. Contractor shall be responsible for all violations of the law, in connection with the construction or caused by obstructing streets, sidewalks or otherwise. Contractor shall give all requisite notices to public authorities. The Contractor shall pay all royalties and license fees. The Contractor shall defend all suits or claims for infringement of any patent or other proprietary rights and save harmless and blameless from loss, on account thereof, Oregon State University, and its departments, divisions, members and employees.

SG-2 Section F.2.4 is modified as follows: Add the following:

“Contractor shall verify that all mechanical or electrical equipment in the construction areas that may be affected by the Work is in working order and shall notify the Owner, in writing, of any equipment not in working order prior to the start of the Work. Start of Work will be considered as acknowledgement that all equipment is in good working order. Contractor shall be required to restore equipment to its original, or better, condition upon completion of the Project.”

SG-3 Section H.2.1 is replaced with the following:

"Contractor shall provide, by or before the pre-construction conference, a detailed Construction Schedule for review and acceptance by the Owner. The submitted Construction Schedule must illustrate Work by significant project components, significant labor trades, long-lead items, broken down by building and/or floor where applicable. Each Construction Schedule item shall account for no greater than 5% of the monetary value of the Project or 5% of the available time. Schedules with activities of less than one day or valued at less than 1% of the Contract shall be considered too detailed and shall not be accepted. Schedules lacking adequate detail, or unreasonably detailed, shall be rejected. Included within the Construction Schedule are the following: Notice to Proceed, Substantial Completion, and Final Completion. Contractor shall provide an updated, full project schedule with each payment request. In addition, twice monthly, the Contractor shall provide an updated three-week forward-looking Construction Schedule. Acceptance of the Schedule by the Owner does not constitute agreement by the Owner as to the Contractor's sequencing, means, methods, or durations. Any positive difference between the Contractor's scheduled completion and the contract completion date is float owned by the Project. Use of the float shall be negotiated. In no case shall the Contractor make a claim for delays if the Work is completed within the Contract time but after Contractor's scheduled completion."

EXHIBIT E

OREGON STATE UNIVERSITY

PERFORMANCE BOND

Bond No. _____
Solicitation _____
Project Name _____

_____ (Surety #1) Bond Amount No. 1: \$ _____
_____ (Surety #2)* Bond Amount No. 2: * \$ _____
* *If using multiple sureties* Total Penal Sum of Bond: \$ _____

We, _____ as Principal, and the above identified Surety(ies), authorized to transact surety business in Oregon, as Surety, hereby jointly and severally bind ourselves, our respective heirs, executors, administrators, successors and assigns firmly by these presents to pay unto Oregon State University (OSU), the sum of (Total Penal Sum of Bond)

(Provided, that we the Sureties bind ourselves in such sum “jointly and severally” as well as “severally” only for the purpose of allowing a joint action or actions against any or all of us, and for all other purposes each Surety binds itself, jointly and severally with the Principal, for the payment of such sum only as is set forth opposite the name of such Surety), and

WHEREAS, the Principal has entered into contract No. _____ with the OSU, the plans, specifications, terms and conditions of which are contained within the Contract resulting from the above-referenced Solicitation;

WHEREAS, the terms and conditions of the Contract, together with applicable plans, standard specifications, special provisions, schedule of performance, and schedule of Contract prices, are made a part of this Performance Bond by reference, whether or not attached to the contract (all hereafter called “Contract”); and

WHEREAS, the Principal has agreed to perform the Contract in accordance with the terms, conditions, requirements, plans and specifications, and all authorized modifications of the Contract which increase the amount of the work, the amount of the Contract, or constitute an authorized extension of the time for performance, notice of any such modifications hereby being waived by the Surety:

NOW, THEREFORE, THE CONDITION OF THIS BOND IS SUCH that if the Principal herein shall (1) faithfully and truly observe and comply with the terms, conditions and provisions of the Contract, in all respects, (2) shall well and truly and fully do and perform all matters and things undertaken by Contractor to be performed under the Contract, upon the terms set forth therein, and within the time prescribed therein, or as extended as provided in the Contract, with or without notice to the Sureties, (3) shall save, defend, indemnify and hold harmless OSU and its officers, board members, employees, agents and other representatives, against any direct or indirect damages or claim of every kind and description that shall be suffered or claimed to be suffered in connection with or arising out of the performance of the Contract by

the Principal or its subcontractors, and (4) shall in all respects perform said contract according to law, then this obligation is to be void; otherwise, it shall remain in full force and effect.

Nonpayment of the bond premium will not invalidate this bond, nor shall OSU be obligated for the payment of any premiums.

This bond is given and received under authority of ORS Chapters 279C and 352, the provisions of which hereby are incorporated into this bond and made a part hereof.

IN WITNESS WHEREOF, WE HAVE CAUSED THIS INSTRUMENT TO BE EXECUTED AND SEALED BY OUR DULY AUTHORIZED LEGAL REPRESENTATIVES.

Dated this _____ day of _____, 20__.

PRINCIPAL: _____

By _____

Signature

Official Capacity

Attest: _____

Corporation Secretary

SURETY: _____

[Add signatures for each surety if using multiple bonds]

BY ATTORNEY-IN-FACT:

[Power-of-Attorney must accompany each surety bond]

Name

Signature

Address

City

State

Zip

Phone

Fax

OREGON STATE UNIVERSITY

PAYMENT BOND

Bond No. _____
Solicitation _____
Project Name _____

_____ (Surety #1)	Bond Amount No. 1:	\$ _____
_____ (Surety #2)*	Bond Amount No. 2:*	\$ _____
<i>* If using multiple sureties</i>	Total Penal Sum of Bond:	\$ _____

We, _____, as Principal, and the above identified Surety(ies), authorized to transact surety business in Oregon, as Surety, hereby jointly and severally bind ourselves, our respective heirs, executors, administrators, successors and assigns firmly by these presents to pay unto Oregon State University (OSU) the sum of (Total Penal Sum of Bond) _____ (Provided, that we the Sureties bind ourselves in such sum “jointly and severally” as well as “severally” only for the purpose of allowing a joint action or actions against any or all of us, and for all other purposes each Surety binds itself, jointly and severally with the Principal, for the payment of such sum only as is set forth opposite the name of such Surety), and

WHEREAS, the Principal has entered into contract No. _____ with OSU, the plans, specifications, terms and conditions of which are contained within the Contract resulting from the above-referenced Solicitation;

WHEREAS, the terms and conditions of the contract, together with applicable plans, standard specifications, special provisions, schedule of performance, and schedule of contract prices, are made a part of this Payment Bond by reference, whether or not attached to the contract (all hereafter called “Contract”); and

WHEREAS, the Principal has agreed to perform the Contract in accordance with the terms, conditions, requirements, plans and specifications, and schedule of contract prices which are set forth in the Contract and any attachments, and all authorized modifications of the Contract which increase the amount of the work, or the cost of the Contract, or constitute authorized extensions of time for performance of the Contract, notice of any such modifications hereby being waived by the Surety:

NOW, THEREFORE, THE CONDITION OF THIS BOND IS SUCH that if the Principal shall (1) faithfully and truly observe and comply with the terms, conditions and provisions of the Contract, in all respects, (2) shall well and truly and fully do and perform all matters and things by it undertaken to be performed under said Contract and any duly authorized modifications that are made, upon the terms set forth therein, and within the time prescribed therein, or as extended therein as provided in the Contract, with or without notice to the Sureties, (3) shall save, defend, indemnify and hold harmless OSU, and its officers, board members, employees, agents and other representatives, against any claim for direct or indirect damages of every kind and description that shall be suffered or claimed to be suffered in connection with or arising out of the performance of the Contract by the Contractor or its subcontractors, (4) shall promptly pay all persons supplying labor, materials or both to the Principal or its subcontractors for prosecution of the work provided in the Contract; (5) shall promptly pay all contributions due the State Industrial Accident Fund and the State Unemployment Compensation Fund from the Principal or its

subcontractors in connection with the performance of the Contract; (6) shall pay over to the Oregon Department of Revenue all sums required to be deducted and retained from the wages of employees of the Principal and its subcontractors pursuant to ORS 316.167;(7) shall permit no lien nor claim to be filed or prosecuted against the State or OSU on account of any labor or materials furnished; and (8) shall do all things required of the Principal by the laws of this State, then this obligation shall be void; otherwise, it shall remain in full force and effect.

Nonpayment of the bond premium will not invalidate this bond, nor shall OSU be obligated for the payment of any premiums.

This bond is given and received under authority of ORS Chapters 279C and 352, the provisions of which hereby are incorporated into this bond and made a part hereof.

IN WITNESS WHEREOF, WE HAVE CAUSED THIS INSTRUMENT TO BE EXECUTED AND SEALED BY OUR DULY AUTHORIZED LEGAL REPRESENTATIVES:

Dated this _____ day of _____, 20__.

PRINCIPAL: _____

By _____
Signature

Official Capacity

Attest: _____
Corporation Secretary

SURETY: _____

[Add signatures for each if using multiple bonds]

BY ATTORNEY-IN-FACT:

[Power-of-Attorney must accompany each bond]

Name

Signature

Address

City State Zip

Phone Fax

EXHIBIT F

As indicated in the General Conditions of your contract(s) Section E.2.9, OSU requires that we gather MWESB (Minority, Women's Emerging Small Business) Contractor/Subcontractor information. This is an Oregon State University requirement and the information will be gathered annually and at time of final payment.

- **You must do this step first or the report will not let you add any information:** In Row 1 Column B there is a drop down menu. You must select yearend (if the job has not been completed) or final (if the job is completed and you have submitted for retention). Once you choose yearend or final in the drop down menu there will be areas highlighted in light green and red. Those are the areas that you are required to fill out. If you did not use or planning to use any MWESB then the left side of the report (Light Green area) still needs to be filled out and the red area needs to remain blank.
- If your agency is an MWESB or if you are using/used an MWESB subcontractor then you need to fill out the information in the report that is highlighted in light green and red (see instructions in the next bullet). If you are not an MWESB or used a Subcontractor that is an MWESB then you need to fill out the left side of the form (Light Green areas) and leave the red area blank.
- In row 2 Column B there is another drop down menu, click the drop down menu and choose Fiscal Year 2015.
- In Row 4 Column B there is another drop down menu, click there and choose OSU.

EXHIBIT G

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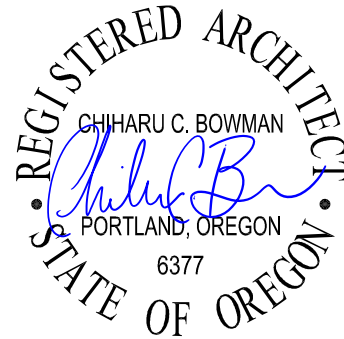
MACKENZIE

1515 SE WATER AVE, SUITE 100

PORTLAND, OR 97214

TELEPHONE: (503) 224-9560

EMAIL: CBOWMAN@MCKNZE.COM



STRUCTURAL ENGINEER

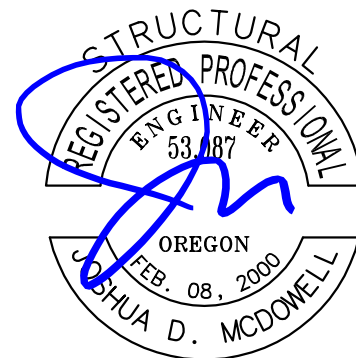
MACKENZIE

1515 SE WATER AVE, SUITE 100

PORTLAND, OR 97214

TELEPHONE: (503) 224-9560

EMAIL: JMCDOWELL@MCKNZE.COM



EXPIRES: 12/31/20

CIVIL ENGINEER

MACKENZIE

1515 SE WATER AVE, SUITE 100

PORTLAND, OR 97214

TELEPHONE: (503) 224-9560

EMAIL: MBUTTS@MCKNZE.COM



EXPIRES 12-31-21

MECHANICAL/ELECTRICAL ENGINEER

SYSTEM DESIGN CONSULTANTS

333 SE SECOND AVE, SUITE 100

PORTLAND, OR 97214

TELEPHONE: (503) 248-0227

EMAIL: JEFF@SDCPDX.COM



EXPIRES: 12/31/21

END OF SECTION



EXPIRES: 12/31/20

SECTION 01 11 00

SUMMARY OF WORK

PART 1 GENERAL

1.01 SUMMARY OF WORK

- A. The Work consists of construction of a 3,200 square foot structure for softball use, bleacher replacement at the Lorenz Soccer Facility, and related site circulation and accessibility improvements on the Oregon State University Campus, Corvallis, Oregon.
- B. GENERAL DESCRIPTION OF WORK – BASE BID
The project consists of two separate schedules of work. Schedule “A” requires work to construct a new indoor softball practice facility, including relocation of exterior walkways, minor private utility work, and installation of selected furnishings, specialty infield soils, and approved synthetic turf surfacing. Schedule “B” requires work to demolish and remove existing bleacher and press box systems, coordinate and construct a new design-build bleacher system and press box along with site and accessibility improvements.
Selection will be made as described in the Supplemental Instructions to Bidders.
- C. ALTERNATE BID ITEM #B1 (Schedule “B”)
Provide Cover over Center Bleacher Section – See Section 13 12 50
- D. ALTERNATE BID ITEM #B2 (Schedule “B”)
Provide Seat Backs for Seating in Center Bleacher Section – See Section 13 12 50
- E. Contractor will be required to coordinate with athletic lighting vendor / contractor engaged independently by University to relocate softball lighting prior to July 1, 2020.
- F. Work shall be started within ten (10) calendar days after signing of Contract on behalf of Oregon State University. The Contract may not be signed prior to approval of the Contractor's Certificate of Insurance by Construction Contract Administration (CCA), Oregon State University.
 - 1. For Schedule “A” The Contractor shall achieve Substantial Completion by October 31, 2020.
 - 2. For Schedule “B” The Contractor shall achieve Substantial Completion by August 7, 2020.
 - 3. Notice to Proceed with ordering of long-lead items and deferred submittal

production is anticipated on or about April 8, 2020. Site occupancy is anticipated to be granted on June 14, 2020.

1.02 CONTRACTORS USE OF PREMISES

- A. Contractor shall limit use of the Premises for work and storage to allow for:
 - 1. Owner occupancy, day and night.
 - 2. Public use, day and night.
 - 3. Security.
 - 4. Safe entry and exit for vehicles and pedestrians.
 - 5. Fire egress.
- B. Coordinate all operations with the Owner's Authorized Representative during the construction period. A 96 hour notification is required prior to scheduled utility shutdowns or street closures, but more lead time is often required to schedule around other critical activities.
- C. Limit Contractor's employee parking to locations designated at the Pre-construction Conference.

1.03 OWNER OCCUPANCY

- A. The Owner will occupy the Premises during the entire period of construction for the conduct of normal operations. Cooperate with Owner's Authorized Representative in construction operations to minimize conflict and to facilitate the Owner's usage especially in the following areas:
 - 1. Restricted access and parking.
 - 2. Use of stairs.
 - 3. Storage space availability.
- B. Conduct operations in such a way to ensure the least inconvenience to the general public, including:
 - 1. Limitations and easements.
 - 2. Emergency vehicle access.
 - 3. Building access to the public, day and night.

1.04 ASBESTOS AND OTHER HAZARDOUS MATERIAL

- A. The Owner has made a reasonable attempt to locate and identify asbestos or other hazardous material that may be encountered during the course of the Work.
- B. If the Contractor observes or suspects the existence of asbestos, polychlorinated biphenyl (PCB) or other hazardous materials in the structure or components of the building, the Contractor shall immediately stop work and notify the Owner's Authorized Representative.
- C. The Owner will arrange for the removal of asbestos, polychlorinated biphenyl (PCB) or

other hazardous materials as required by Facilities Services personnel or by separate contract.

- D. Schedule ten (10) days of slack or "down" time for the removal of hazardous materials without penalty to Owner for the delay of the Contract.

1.05 LEAD BASED PAINT

- A. The Owner may have tested existing paint in the project area and if levels are found the following conditions apply.
- B. Contractor shall remove paint as specified for surface preparation and capture removed material for disposal.
- C. Contractor shall follow OSHA guidelines involving exposure to workers.
- D. Owner will provide containers for Contractor's use at project site.
- E. Contractor shall comply with the requirements of DEQ and EPA and shall submit a lead abatement plan.
- F. Contractor shall separate lead contaminated material from effluent and water.
- G. Owner will dispose of lead paint and effluent resulting from stripping operation.
- H. Soil contaminated by stripping operations shall be replaced with topsoil.

END OF SECTION

SECTION 01 23 00

ALTERNATES

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. The alternates described in this Section may be exercised at the option of the Owner within 20 days of the execution of the Contract.
- B. It is generally the practice of the Owner to exercise alternates in numerical order.
- C. The Owner reserves the right to accept the alternates without regard to order or sequence; but, such acceptance shall not impair the selection of a low, responsible and responsive bidder to whom the Contract may be awarded under an equitable bid procedure.

1.02 QUALITY ASSURANCE

- A. For each alternate which is accepted, coordinate the work of the various trades involved, and modify surrounding work as required to complete the project as intended.
- B. In the change-in-price figure for each alternate, include incidental costs which are attributable to adjustments in the work of other trades which may be required to achieve the contemplated and final conditions.
- C. Questions:
 - 1. If there is a question regarding the extent, scope, nature, or intent of the alternates, contact the Owner's Authorized Representative for clarification.
 - 2. Failure on the part of the Contractor to clarify any unclear items shall not relieve the Contractor of the responsibility for performing the selected alternates in accordance with the intent and requirements of the Project Manual and Drawings.
 - 3. The description of the alternates hereinafter is qualitative and not quantitative; the Contractor shall determine the quantities of labor and materials and the extent of same required to execute the selected alternates in accordance with the intent and requirements of the Project Manual and Drawings.
 - 4. The applicable Sections of the Specifications apply to the work under each alternate.

1.03 LIST OF ALTERNATES

- A. ALTERNATE BID ITEM #B1 (Schedule "B")

Provide Cover over Center Bleacher Section – See Section 13 12 50

B. ALTERNATE BID ITEM #B2 (Schedule "B")

Provide Seat Backs for Seating in Center Bleacher Section – See Section 13 12 50

END OF SECTION

SECTION 01 24 76

APPLICATIONS FOR PAYMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Work of this Section includes forms and procedures for progress payments.
- B. Related work specified elsewhere.
 - 1. For the primary discussion of payments, refer to OSU General Conditions, Section E, as supplemented.
 - 2. In compliance with OSU General Conditions, Section K, no payments beyond 75% will be made by the Owner before draft Operation and Maintenance Manuals have been received for review by the Owner.

1.02 APPLICATION FORMS

- A. For applications for payment, use sample Contract Payment Request (see below), contract payment request on company letterhead, or AIA Document G702, supported by AIA Document G703, Continuation Sheet, or similar document.
- B. Prepare the Schedule of Values in such a manner that each major item of Work and each subcontracted item of Work is shown as a line item broken down in terms of material and labor costs on AIA Document G703, Application Certification of Payment, Continuation Sheet or similar format. The sample continuation sheet shall be the minimum Schedule of Values breakdown.
- C. The Schedule of Values shall be submitted for review by the Owner prior to the first application for payment; and may be used when, and only when, accepted in writing by the Owner.
- D. Payment request is to include the Contractor's Federal Tax Identification number and return address.

1.03 PAYMENTS

- A. The Owner will make progress payments on account of the Contract once monthly for the scheduled duration of the project (i.e. three (3) payments on a three-month project), based on the value of work accomplished or materials on the job site, as stated in the Schedule of Values on the Application and Certificate Payment.
- B. Notwithstanding the foregoing, as this project is scheduled to take seven (7) months to complete, Owner will only make seven (7) payments, plus a final retainage payment, as applicable.
- C. Complete and forward Application to the Owner on or about the 15th day of each month for work performed the previous month and include certified payroll statements as specified in the OSU General Conditions.

- D. Submit one (1) copy of forms requesting payment to the Owner.
- E. Payments will be made on protected materials on hand at the job site properly stored, protected, and insured.
- F. Estimated quantities shall be subject to the Owner's review and judgment.

1.04 EARLY PURCHASE AND PAYMENT OF MATERIALS AND EQUIPMENT

- A. Order materials and equipment requiring a long lead or waiting time early so as not to delay progress of the Work.
- B. The Contractor will be reimbursed for early order materials or equipment upon receipt and verification of quality and quantity against submittals and shipping documents by the Owner's Authorized Representative.
- C. Receipt shall be to the job site or stored at Owner's other premises in an orderly and safe manner, secured from normal weather damage.
- D. Security remains the responsibility of the Contractor.

END OF SECTION

CONTRACT PAYMENT REQUEST

DATE: _____

TO: University Financial Services
Oregon State University
850 SW 35th St.
Corvallis, OR 97333

Payment Request No. _____ Contract No. _____ Period from _____ to _____

Project: _____

Original Contract Amount \$ _____

Change Orders (Net Amount)..... \$ _____

Contract Total to Date \$ _____

=====

Total Completed and Stored to Date \$ _____

Less Retainage (5%), if applicable \$ _____

Total Earned, Less Retainage (if applicable) \$ _____

Less Previous Payments..... \$ _____

Net Amount Due this Request..... \$ _____

The undersigned Contractor certifies that, to the best of his/her knowledge, information, and belief, the Work covered by this request has been completed in accordance with the Contract Documents, that all amounts have been paid for Work for which previous applications for Payment were issued and payments received from the Owner, and that the amount shown herein is now due.

Contractor: _____

By: _____ Date: _____

Federal Tax ID Number: _____

Address: _____

CONTINUATION SHEET

NOTES:

Amounts are stated to the nearest penny.
 Use Column I on Contracts where variable retainage for line items may apply, or if retainage is required.

Change Orders are usually listed as the last items of the basic schedule.

Project Name: _____

Application No.: _____

Date: _____

Period To: _____

WRN No.: _____

A	B	C	D	E	F	G		H	I
Item No.	Description of work	Scheduled Value	Work Completed		Materials Presently Stored (Not in D or E)	TOTAL Completed & Stored (D+E+F)	% Completed (G/C)	Balance to Finish (C-G)	Retainage
			From Previous Applications	This Period					
TOTALS									

SECTION 01 25 00

PRODUCT SUBSTITUTION PROCEDURES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. General requirements for the Work in relation to substitutions and product options.
- B. Submit to the Owner's property insurance carrier shop drawings, samples, and product data (such as manufacturer's standard schematic drawings and other literature) when required by individual Specifications sections.
- C. Related Work Specified Elsewhere
 - 1. Instructions to Bidders.
 - 2. OSU General Conditions.

1.02 REQUESTS FOR SUBSTITUTIONS

- A. Requests for substitution of products in place of those specified shall be in accordance with Instructions to Bidders, and as specified herein.

1.03 CONTRACTOR'S RESPONSIBILITIES

- A. Investigate proposed products and determine that they are equal or superior in all respects to products specified.
- B. Provide same guarantee for accepted substitutions as for products specified.
- C. Coordinate installation of accepted substitutions into the Work, making such changes as may be required for the Work to be complete in all respects.

1.04 SUBSTITUTIONS DURING BIDDING

- A. Submit two (2) copies of the following information with each request to the Owner:
 - 1. CSI substitution request form.
 - 2. Comparison of proposed substitution with product, material or system specified.
 - 3. Complete data, substantiating compliance of proposed substitution with the Contract Documents.
 - 4. Test numbers and supporting reports, indicating compliance with referenced standards.
 - 5. Evidence that warranty requirements are acceptable.
 - 6. Details indicating specific deviations proposed for the substitution.
 - 7. Reference and applicable Specification sections.
 - 8. Applicable product samples.
- B. All substitution requests shall be received in the Owner's office no less than ten (10) calendar days before bid opening. Requests received after this date will not be considered.

1.05 SUBSTITUTIONS DURING CONSTRUCTION

- A. Substitutions will normally not be considered after date of Contract except when required due to unforeseen circumstances.
- B. Within a period of thirty (30) days after date of Contract, the Owner may, at its option, consider formal written requests for substitution of products in place of those specified, when submitted in accordance with the requirements stipulated herein.
- C. One or more of the following conditions must be documented in any such request:
 - 1. Required for compliance with final interpretation of code or insurance requirements.
 - 2. Required due to unavailability of a specified product.
 - 3. Required because of the inability of the specified product to perform properly or to fit in the designated space.
 - 4. Substitution would be substantially in the best interest of the Owner in terms of cost, time, or other considerations.

1.06 SUBSTITUTIONS NOT PERMITTED

- A. If implied on submittals without first requesting approval thereof.
- B. If acceptance will require substantial revision of the Contract Documents.

END OF SECTION

SUBSTITUTION REQUEST FORM

TO: _____

PROJECT: _____

SPECIFIED ITEM:

Section	Page	Paragraph	Description
---------	------	-----------	-------------

The undersigned requests consideration of the following:

PROPOSED SUBSTITUTION: _____

Attached data includes product description, specifications, drawings, photographs, performance and test data adequate for evaluation of the request; applicable portions of the data are clearly identified.

Attached data also includes description of changes to Contract Documents which proposed substitution will require for its proper installation.

The undersigned states that the following paragraphs, unless modified on attachments, are correct:

1. The proposed substitution does not affect dimensions shown on Drawings.
2. The undersigned will pay for changes to the building design, including engineering design, detailing and construction costs caused by the requested substitution.
3. The proposed substitution will have no adverse effect on other trades, the construction schedule, or specified warranty requirements.
4. Maintenance and service parts will be locally available for the proposed substitution.

The undersigned further states that the function, appearance and quality of the Proposed Substitution are equivalent or superior to the Specified Item.

Submitted by:

Signature _____

Firm _____

Address _____

Date _____

Telephone _____

For use by Design Consultant:

Accepted Accepted as noted

Not Accepted Received too late

By _____

Date _____

Remarks _____

Attachments:

SECTION 01 31 19

PROJECT MEETINGS

PART 1 GENERAL

1.01 PRE-CONSTRUCTION MEETING

- A. Architect/Engineer/Designer, Contractor and Owner will meet prior to start of the Work (within seven (7) days after notice to proceed) to discuss at least the following topics and any others of mutual interest.
1. Schedule of Values
 2. Permit Status/tree protection/erosion control
 3. List of sub-contractors
 4. Job inspections.
 5. Early purchase of, and/or lead time requirements for material and equipment/repurchase of equipment
 6. Monthly payment date/SOP for pay requests
 7. Portion of site to be occupied by construction.
 8. Parking/Staging areas
 9. Non-smoking campus requirements
 10. Maintenance of access and safety.
 11. Processing of field decisions and change orders
 12. Labor provisions/labor rates for subs
 13. Material submittals/deferred submittals
 14. Owner access during construction.
 15. Review of Contract Documents/review ADA requirements/cross-slopes
 16. Coordination procedures and separate contracts.
 17. Progress schedules.
 18. Critical Work sequencing.
 19. Safety and emergency procedures/24 hour contact numbers
 20. Security procedures.
 21. Hazardous materials.
 22. Progress meetings.
 23. Contract close-out.
- B. Location of Meeting: Project site

1.02 PROGRESS MEETINGS

- A. The Contractor will schedule and administer progress meetings and will:
1. Prepare agendas.
 2. Schedule progress meetings, frequency, time and day to be determined during pre-construction meeting.
 3. Make physical arrangements for and preside at meetings.
 4. Record minutes and include decisions.

5. Distribute copies of minutes to participants within four (4) days after meetings.
- B. Location of Meetings: Project site.
- C. Attendance:
1. The Owner or Owner's Authorized Representative.
 2. Contractor.
 3. Subcontractors affected by agenda.
 4. Project Architect/Engineer/as necessary.
 5. Owner will attend meeting to ascertain Work is expedited consistent with progress schedule and with Contract Documents.
- D. Minimum Agenda:
1. Review and approve minutes from previous meeting.
 2. Review Work progress since previous meeting.
 3. Discuss field observations, and problems.
 4. Review delivery schedules, construction schedule, and identify problems which impede planned progress.
 5. Review proposed changes.
 6. Material submittals.
 7. Note all new subcontractors performing Work at the job site.

END OF SECTION

SECTION 01 33 23

SHOP DRAWINGS, PRODUCT DATA, SAMPLES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Submit to the Owner shop drawings, samples, and product data (such as manufacturer's standard schematic drawings and other literature) when required by individual Specifications sections.
- B. Related Work Specified Elsewhere
 - 1. Instructions to Bidders.
 - 2. OSU General Conditions.

1.02 SUBMITTAL SCHEDULING

- A. For items requiring review by the Owner only, submittals shall be sent to the Owner at least 15 calendar days before the date each is required for fabrication or installation.
- B. Submittals to be reviewed by Owner's consultants shall be sent to the Owner at least 20 calendar days before the date each is required for fabrication or installation.
- C. Submittals to be reviewed by Owner's property insurance carrier shall be sent to Owner as directed in individual specification sections.
- D. Submittals involving Substitution requests or other modifications requiring review by the Owner and/or the Owner's consultants shall be sent to the Owner at least 20 calendar days before the date each is required for fabrication or installation.

1.03 SUBMITTAL CONTENT AND FORMAT

- A. General Requirements:
 - 1. Shop Drawings: Submit in electronic format and, if requested by Owner's Authorized Representative, submit one reproducible transparency and 1 print of each drawing.
 - 2. Product Data: Submit electronically, and if requested by Owner's Authorized Representative, up to 6 hard copies.
 - 3. Samples: Submit the number and type stated in each Specification Section. Submit a minimum of three sets of color samples where color selection is required.
 - 4. Submittals shall include:
 - a. Date and revision dates return date requested.
 - b. Project title and number.
 - c. The names of the Contractor, subcontractor, supplier, and manufacturer.
 - d. Identification of product or material, with Specification Section number.
 - e. Relation to adjacent critical features of work or materials.
 - f. Field dimensions, clearly identified as such.

- g. Applicable standards, such as ASTM number or Federal Specification.
 - h. Identification of deviations from Contract Documents, and for products accompanied by Substitution request as required by Section 01 25 00.
 - i. Contractor's stamp legibly signed, essentially as follows:
 - 1) The undersigned, acting on behalf of the Contractor, certifies that this submittal has been reviewed and is approved; products have been verified as being as specified, field measurements and field construction criteria have been or will be coordinated, and the submittal is in compliance with Contract Documents.
5. Re-submission Requirements:
- a. Revise initial drawings as required and resubmit as specified for initial submittal.
 - b. Indicate on drawings any changes which have been made other than those requested by the Owner or the owner's consultants.
6. The Owner may return without review any submittal not meeting the requirements listed above.
- B. Shop Drawings:
- 1. Present data in a clear and thorough manner.
 - 2. Details shall be identified by reference to sheet and detail, schedule or room numbers shown on Contract Documents.
 - 3. Structural items shall be identified by location in the completed structure. Identify details by reference to contract sheet and detail numbers.
 - 4. Minimum sheet Size: 8 ½ x 11".
- C. Product Data:
- 1. Manufacturer's catalog sheets, brochures, diagrams, schedules, performance charts, illustrations and other standard descriptive data:
 - a. Clearly mark each copy to identify pertinent product or models.
 - b. Show dimensions, weights, and clearances required.
 - c. Show performance data consisting of capabilities, ROM, KW, pressure drops, design characteristics and consumption; conforming as closely as possible to the test methods referenced in the Plans and Specifications.
 - d. Show wiring or piping diagrams and controls.
 - 2. Manufacturer's standard schematic drawings and diagrams:
 - a. Modify to delete information which is not applicable.
 - b. Supplement standard information to provide information specifically applicable to the Work.
- D. Samples:
- 1. Insure that samples are of sufficient size to indicate the general visual effect or color.
 - 2. Where samples must show a range of color, texture, finish, graining, or other property, submit sets of pairs illustrating the full scope of this range.

3. One (1) sample or one (1) set of approved samples will be retained by the Owner; final work will be measured against approved samples.

1.04 QUALITY ASSURANCE

- A. Process submittals in ample time for review, as applicable, so as to not delay the Work. All submittals shall be received by the Owner within ten (10) days after pre-construction.

1.05 DEFINITIONS

- A. The Owner will mark reviewed materials as follows:
 1. "No Exception Taken," which means fabrication, manufacture and/or installation may proceed.
 2. "Make Revisions Noted," which means fabrication, manufacture and/or installation may proceed with revisions as noted.
 3. "Revise and Resubmit," which means that fabrication, manufacture and/or installation may not proceed.
 4. "Rejected," which means do not proceed; make arrangements for the review of the proposed Work with the Owner as soon as possible.

1.06 PROCESSING

- A. Review submittals, make necessary corrections, and become familiar with the content of the submittals.
- B. Mark each item with Contractor's stamp.
- C. Accompany submittals with a transmittal letter bearing the project name, Contractor's name, number of items, and other pertinent data.
- D. Keep one copy of each reviewed submittal on the job site at all times.
- E. Be responsible for obtaining and distributing prints of shop drawings to the various suppliers, and the Owner once review process has been completed. Make prints of reviewed shop drawings only from transparencies which carry the appropriate stamp and endorsement.

END OF SECTION

SECTION 01 42 13

ABBREVIATIONS AND SYMBOLS

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Words which may be found elsewhere in the Project Manual and Drawings are abbreviated in accordance with the standards set forth in the following table:

A/C	air conditioning	CEM	cement
AB	anchor bolt	CF	cubic foot
AC	asphaltic concrete	CFOI	contractor furnished owner installed
ACT	acoustical tile	CG	corner guard
AD	area drain	CH	ceiling height
ADD	addendum	CI	cast iron
ADD'L	additional	CJ	control joint
ADH	adhesive	CKBD	chalkboard
AFF	above finish floor	CL	centerline
AGG	aggregate	CLG	ceiling
AL	aluminum	CLR	clear(ance)
ALLOW	allowable	CM	construction manager
ALT	alternate	CMT	ceramic mosaic (tile)
ANOD	anodized	CMU	concrete masonry unit
AP	access panel	COL	column
APPRX	approximate	COM	communications
ARCH	architect(ural)	CONC	concrete
ASPH	asphalt	CONN	connect(ion)
AUTO	automatic	CONST	construction
AVE	avenue	CONT	continuous or continue
BD	board	CONTR	contract(or)
BIT	bituminous	CPT	carpet
BLDG	building	CRS	course(s)
BLKG	blocking	CS	countersink
BM	bench mark, beam(s)	CSMT	casement
BOT	bottom	CT	ceramic tile
BRZ	bronze	CTR	center
BS	both side	CVG	clear vertical grain
CB	catch basin	CW	cold water
		CWT	ceramic wall tile
		CY	cubic yard

D	depth	FA	fire alarm
DEMO	demolish, demolition	FAF	fluid applied flooring
DEP	depressed	FARF	fluid applied resilient floor
DF	drinking fountain	FAS	fasten, fastener
DIA	diameter	FBD	fiberboard
DIAG	diagonal	FBT	finished blowing temperature
DIM	dimension	FD	floor drain, fire damper
DISP	dispenser	FE	fire extinguisher
DIV	division	FEC	fire extinguisher cabinet
DL	dead load	FF	factory finish
DMT	demountable	FGL	fiberglass
DN	down	FHMS	flathead machine screw
DP	dampproofing	FHWS	flathead wood screw
DR	door	FIN	finish(ed)
DS	downspout	FLCO	floor cleanout
DT	drain tile	FLR	floor(ing)
DTL	detail	FLUR	fluorescent
DW	dumbwaiter	FND	foundation
DWG	drawing(s)	FOC	face of concrete
DWR	drawer	FOIC	furnished by owner/installed by contractor
EA	each	FOIO	furnished by owner/installed by owner
EB	expansion bolt	FOM	face of masonry
EF	each face	FP	fireproofing, flash point
EJ	expansion joint	FPHB	freeze-proof hose bib
EL	elevation	FR	fire resistive, fire rated
ELEC	electric(al)	FRM	frame(d), (ing)
EMBED	embedment	FS	full size
EMER	emergency	FSS	finished structural slab
ENCL	enclose(ure)	FT	foot
EP	electrical panel board	FTG	footing
EQ	equal	FTS	finished topping slab
EQUIP	equipment	GA	gage, gauge
EST	estimate	GALV	galvanized
EVT	equiviscous temperature	GB	grab bar or gypsum board
EW	each way	GC	general contractor
EWC	electric water cooler	GI	galvanized iron
EX.EXIT	existing	GL	glass, glazing
EXH	exhaust	GLS	glass resin wall surfacing
EXP	exposed		
EXT	exterior		

GP	gypsum	LL	live load
HB	hose bib	LONGIT	longitudinal
HBD	hardboard	LP	low point
HC	hollow core	LW	lightweight
HD	heavy duty	MAX	maximum
HDR	header	MB	machine bolt
HDW	hardware	M. MECH	mechanic(al)
HM	hollow metal	MFR	manufacture(r)
HOR	horizontal	MH	manhole
HP	high point	Min	minimum, minute
HR	hour	MISC	miscellaneous
HT	height	MO	masonry opening
HTG	heating	MO#	model number
HVAC	heating, ventilating, air conditioning	MOD	modular
HWD	hardwood	MPH	miles per hour
HWH	hot water heater	MS	machine screw
ID	inside diameter, identification	MTL	metal
IN	inch	MULL	mullion
INCIN	incinerator	MWP	membrane waterproofing
INCL	include(d), ion)	NAT	natural, natural finish
INT	interior	NIC	not in contract
INV	invert	NO	number
JB	junction box	NOM	nominal
JC	janitor's closet	NTS	not to scale
JT	joint	OA	overall
KD	kiln dried	OBS	obscure
KCP	Keene's cement plaster	OC	on center(s)
KO	knockout	OD	outside diameter
KP	kick plate	OF	overflow
LAB	laboratory	OFCI	owner furnished contractor installed
LAM	laminated)	OFOI	owner furnished owner installed
LAV	lavatory	OHMS	ovalhead machine screw
LBS	pounds	OHWS	ovalhead wood screw
LH	left hand	OPG	opening
		OPP	opposite
		OZ	ounce(s)
		P	paint(ed)

PB	push button	SIM	similar
PCF	pounds per cubic foot	SL	sleeve
PCP	putting coat plaster	SOG	slab on grade
PERF	perforate(d)	SPEC	specification(s)
PL	plate, property line	SQ	square
PLAM	plastic laminate	SS	storm sewer
PLAS	plaster	S4S	finished 4 sides
PNL	panel	SD	storm drain
PP	push plate	ST	steel, street
PR	pair	ST ST	stainless steel
PREP	prepare	STD	standard
PSF	pounds per square foot	STR	structural
PSI	pounds per square inch	SUPP	supplement
PT	point, pressure treated	SUPT	support
PTN	partition	SUSP	suspended
PVC	polyvinyl chloride	SV	sheet vinyl
PWD	plywood		
		T	tread
QT	quarry tile	TBM	top bench mark
		T&G	tongue and groove
R	rise	TB	towel bar
RA	return air	TC	top of curb
RAD	radius	TEL	telephone
RCP	reflected ceiling plan	TEMP	tempered
RD	roof drain	THK	thickness
REF	reference	TKBD	tackboard
REFR	refrigerator	TO	top of
REINF	reinforce(ing)	TP	top of paving
REQ	required	TRANS	transverse
RET'G	retaining	TS	top of slab
REV	revision(s), revised	TV	television
RH	right hand	TW	top of wall
RM	room	TYP	typical
RO	rough opening		
RSF	resilient sheet flooring	UNO	unless noted otherwise
SC	solid core	VAT	vinyl asbestos tile
SCHED	schedule	VB	vapor barrier
SEC	section	VCT	Vinyl Composition Tile
SF	square feet (foot)	VERT	vertical
SHT	sheet	VG	vertical grain
SHTHG	sheathing	VIF	verify in field

VWC	vinyl wall covering	WP	waterproof(ing)
W	width, wide, water	WNS	wainscot
W/	with	WR	water resistant
W/O	without	WS	waterstop
WC	water closet	WW	window wall
WD	wood, wood finish	WWC	wood wall covering
		WWF	woven wire fabric

B. Words which may be found elsewhere in the Project Manual and Drawings are abbreviated in accordance with the standards set forth in the following table:

&	and
λ	angle
@	at
ι	diameter, round
"	inches
:	is, shall b
'	feet
ζ	perpendicular
/	per
%	percent
#	pound, number
X	by (as in 2 by 4)

END OF SECTION

SECTION 01 42 16

DEFINITIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Words which may be found elsewhere in the Contract Documents are defined in accordance with the standards set forth in the following table:

Approve:

Where used in conjunction with Architect's response to submittals, requests, applications, inquiries, reports and claims by Contractor, the meaning of term "approved" will be limited to the Architect's responsibilities and duties as specified in General and Supplementary Conditions. In no case will "approval" by Architect be interpreted as a release of Contract requirements.

As Detailed, As Shown:

Where "as detailed", "as shown" or words of similar importance are used, it shall be understood that reference to the Drawings accompanying the Specifications is made unless otherwise stated.

As Directed, As Required, As Authorized, As Reviewed, As Accepted:

Where "as directed", "as required", "as authorized", "as reviewed", "as accepted" or words of similar importance are used, it shall be understood that the direction, requirement, permission, authorization, review, or acceptance of the Architect is intended, unless otherwise stated.

As Indicated:

Where "as indicated" is used it shall be understood that reference to Drawings and/or Specifications is made unless otherwise stated.

Directed, Requested, etc.:

Terms such as "directed," "requested," "authorized," "selected," will be understood as "directed by Architect," "requested by Architect," and similar phrases shall not be interpreted to extend Architect's responsibility into Contractor's responsibility for construction supervision.

Furnish:

Except as otherwise defined in greater detail the term "furnish" is used to mean supply and deliver to project site, ready for unloading, unpacking, assembly, installation, etc., as applicable in each instance.

Indicated:

The term "indicated" is a cross-reference to graphic representations, notes or schedules on drawings, to other paragraphs or schedules in the specifications and to similar means of recording requirements in Contract Documents. Where terms such as "shown," "noted," "scheduled," and "specified" are used in lieu of "indicated," it is for purpose of helping reader locate cross-reference and no limitation of location is intended except as specifically noted.

Install:

Except as otherwise defined in greater detail, the term "install" is used to describe operations at project site including unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning and similar operations, as applicable in each instance.

Installer:

The term "installer" is defined as the entity (person or firm) engaged by Contractor, or its subcontractor or sub-subcontractor for performance of a particular unit of Work at project site, including installation, erection, application and similar required operations. It is a general requirement that such entities (Installers) be expert in operations they are engaged to perform.

Provide:

Except as otherwise defined in greater detail, term "provide" means furnish and install, complete and ready for intended use, as applicable in each instance.

END OF SECTION

SECTION 01 42 19

REFERENCE STANDARDS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Quality Assurance.
- B. Location of References.
- C. Schedule of References.

1.02 QUALITY ASSURANCE

- A. For products or quality of work specified by association, trade, or federal standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.
- B. Conform to reference standard by date of issue current on date of Contract Documents.
- C. General Applicability of Standards: Except where Contract Documents include more stringent requirements, applicable standards of the construction industry have the same force and effect as if bound or copied directly into Contract Documents.
- D. Such standards are made a part of the Contract Documents by reference.
- E. Individual sections indicate which codes and standards the Contractor must keep at the project site, available for reference.
- F. Referenced industry standards take precedence over standards which are not referenced but recognized in industry as applicable.
- G. Non-referenced standards are not directly applicable to the Work, except as a general requirement of whether the Work complies with standards recognized in the construction industry.

1.03 LOCATION OF REFERENCES

- A. Valley Library, Oregon State University.

1.04 SCHEDULE OF REFERENCED ASSOCIATIONS

AIA American Institute of Architects

	WWW.AIA.ORG
AISC	American Institute of Steel Construction WWW.AISC.ORG
AISI	American Iron and Steel Institute WWW.STEEL.ORG
ANSI	American National Standards Institute WWW.ANSI.ORG
APA	American Plywood Association WWW.APAWOOD.ORG
ASHRAE	American Society of Heating, Refrigerating, and Air Conditioning Engineers WWW.ASHRAE.ORG
ASTM	American Society for Testing and Materials WWW.ASTM.ORG
AWPA	American Wood Protection Association WWW.AWPA.COM
AWS	American Welding Society WWW.AWS.ORG
BIA	Masonry Institute of America WWW.MASONRYINSTITUTE.ORG
BOLI	Oregon Bureau of Labor and Industries WWW.BOLI.STATE.OR.US
CCB	Construction Contractors Board WWW.OREGON.GOV.CCB/
CDA	Copper Development Association WWW.COPPER.ORG
CISPI	Cast Iron Soil Pipe Institute WWW.CISPI.ORG
CSI	Construction Specification Institute WWW.CSINET.ORG
DEQ	Department of Environmental Quality (Oregon) WWW.OREGON.GOV/DEQ/

DHI	Door and Hardware Institute WWW.DHI.ORG
DOT	Department of Transportation WWW.DOT.GOV
EPA	U.S. Environmental Protection Agency WWW.EPA.GOV
FM	Factory Mutual System WWW.FMGLOBAL.COM
FS	Federal Specification General Services Administration Specifications and Consumer Information Distribution Section (WFSIS) WWW.GSA.GOV/PORTAL/CONTENT/103856
IBC	International Building Code WWW.ICCSAFE.ORG
ICBO	International Conference of Building Officials PUBLICECODES.CITATION.COM/ICOD/IBG/INDEX.HTM
IRS	Internal Revenue Service WWW.IRS.GOV
ISA	Instrumentation Systems and Automation Society WWW.ISA.ORG
NAAMM	National Association of Architectural Metal Manufacturers WWW.NAAMM.ORG
NBFU	National Board of Fire Underwriters WWW.NFPA.ORG
NEC	National Electric Code WWW.NECPLUS.ORG
NEMA	National Electrical Manufacturers' Association WWW.NEMA.ORG
NESC	National Electrical Safety Code WWW.IEEE.ORG
NFPA	National Fire Protection Association WWW.NFPA.ORG

NRCA	National Roofing Contractors' Association WWW.NRCA.NET
OAR	Oregon Administrative Rules ARCWEB.SOS.STATE.OR.US/404.HTML
OESP	State of Oregon Electrical Specialty Code http://www.bcd.oregon.gov/programs/online_codes.html
ORS	Oregon Revised Statutes LANDRU.LEG.STATE.OR.US/ORS/
OSHA	Occupational Safety and Health Administration WWW.OSHA.GOV
OSSC	Oregon Structural Specialty Code http://www.bcd.oregon.gov/programs/online_codes.html
PS	Product Standard STANDARDS.GOV/STANDARDS.CFM
SDI	Steel Door Institute WWW.STEELDOOR.ORG
SMACNA	Sheet Metal and Air Conditioning Contractors' National Association WWW.SMACNA.ORG
SPRI	Single Ply Roofing Institute WWW.SPRI.ORG
SSPC	Steel Structures Painting Council WWW.SSPC.ORG
SWRI	Sealing, Waterproofing and Restoration Institute WWW.SWIRONLINE.ORG
UBC	Uniform Building Code (See ICBO)
UFC	Uniform Fire Code WWW.NFPA.ORG
UL	Underwriters' Laboratories, Inc. WWW.UL.COM
UMC	Uniform Mechanical Code WWW.UBC.COM

UPC Uniform Plumbing Code
 WWW.UBC.COM

WHL Warnock Hersey Laboratories
 WWW.INTEK.COM/MARKS/WH/

WCLIB West Coast Lumber Inspection Bureau
 WWW.WCLIB.ORG

WWPA Western Wood Products Association
 WWW.WWPA.ORG

END OF SECTION

SECTION 01 45 00

QUALITY CONTROL

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Codes, regulations and permits.
- B. Procedures for quality control.

1.02 OWNER RESPONSIBILITIES

- A. Owner will employ and pay for services of an independent testing laboratory to perform inspection, sampling and testing as required by local building authority.
- B. Owner's Authorized Representative will provide on-site observation during construction.

1.03 CODES, REGULATIONS AND PERMITS

- A. All Work shall conform with the Oregon Structural Specialty Code (OSSC) based on the International Building Code (IBC), as amended by the State of Oregon Building Codes Division and the edition designated by the governing authority.
- B. Contractor shall comply with all applicable state and local construction codes.
- C. References to codes, Specifications and standards referred to in the Contract Documents shall mean, and are intended to be, the latest edition, amendment or revision of such reference standard in effect as of the date of these Contract Documents.
- D. The Owner shall be responsible for all permits and City of Corvallis plan review fees; the Contractor shall be responsible for all licenses and associated fees required for the Project.
- E. Contractor shall arrange and attend all required permit inspections and furnish evidence of approved City inspection reports per Section 01 77 00.

1.04 QUALITY OF WORK

- A. It is the true and specific intent of these Specifications that quality of Work on all phases of the construction and embracing all the trade sections shall be of high quality performed by workers skilled in their trade and performing their Work only according to the standard of best practice of the trade.
- B. All manufactured articles, materials, and equipment shall be applied, installed, connected, erected, used, cleaned and conditioned in accordance with manufacturer's directions unless otherwise specified.
- C. If Work is required in a manner to make it impossible to produce first quality Work, or should discrepancies appear among Contract Documents, request interpretation from

Architect before proceeding with Work.

- D. Failure to secure interpretation may cause rejection by Architect or owner of installation.

1.05 LAYOUT

- A. Be responsible for properly laying out the Work and for lines and measurements for the Work.
- B. Verify the figures shown on the drawings before laying out the Work and report errors or inaccuracies to the Architect before commencing Work.
- C. Strict compliance with maximum slopes is required. Accessible parking spaces and adjacent access aisles with slope exceeding 2% in any direction, as determined by OSU, shall be removed and replaced by the contractor at their expense.
- D. Strict compliance with maximum slopes is required. New sidewalks exceeding 1:20 slope or with cross slope exceeding 2%, as determined by OSU, shall be removed and replaced by the contractor at their expense. Ramps exceeding 1:16 slope or with cross slope exceeding 2%, as determined by OSU, shall be removed and replaced by the contractor at their expense.

1.06 SUPERVISION

- A. The Contractor shall maintain effective supervision on the project at all times Work is being performed.
- B. The superintendent shall be the same person throughout the project and shall attend the preconstruction conference.

1.07 INSPECTIONS AND TESTING

- A. Contractor shall notify the Owner at least twenty-four (24) hours in advance of any required progress inspection or final inspection including final punch list inspection.
- B. Cooperate with laboratory personnel, provide access to Work and furnish incidental equipment material and labor required for field testing and sample taking.

1.08 EVALUATION OF TESTS AND INSPECTIONS

- A. Results of laboratory and/or field control tests and inspections shall be the principal basis upon which satisfactory completion of Work shall be judged.
- B. If results of tests and inspections indicate Work is below requirements of Contract Documents, that portion of Work is subject to rejection.

1.09 ADJUSTMENTS

- A. Remove and replace Work so rejected at Contractor's expense including costs of subsequent tests and inspections until Work meets requirements of Contract Documents.

- B. The Owner reserves the right to perform any testing as may be required to determine compliance with the Contract Documents.
- C. Costs for such testing will be the Owner's responsibility unless testing indicates noncompliance. Cost for such testing indicating noncompliance shall be borne by the Contractor.
- D. Noncomplying Work shall be corrected and testing will be repeated until the Work complies with the Contract Documents.
- E. Contractor will pay costs for retesting noncomplying Work.

END OF SECTION

SECTION 01 51 00

CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. This Section specifies requirements for temporary services and facilities, including utilities, construction and support facilities, security and protection.

1.02 REQUIREMENTS OF REGULATORY AGENCIES

- A. Regulations: Comply with industry standards and applicable laws and regulations of authorities having jurisdiction.
- B. Standards: Comply with NFPA Code 241, "Building Construction and Demolition Operations", ANSI-A10 Series standards for "Safety Requirements for Construction and Demolition".
- C. Electrical Service: Comply with NEMA, NEC and UL standards and regulations for temporary electric service; install service in compliance with National Electric Code (NFPA 70).
- D. Inspections: Arrange for authorities having jurisdiction to inspect and test each temporary utility before use; obtain required certifications and permits if required.

1.03 PROTECTION

- A. Protect sidewalks, asphalt paving, concrete, trees, shrubs, and lawn areas at all times from damage resulting from construction activities.
- B. Prevent materials from clogging catch basins and yard drains; leave drains clean and in proper working condition.
- C. Protect Existing Irrigation Systems:
 - 1. In the event damage occurs to an underground irrigation system as a direct result of a Contractor's activities, the Contractor shall repair/replace or be assessed a charge at the discretion of the Owner.
 - 2. If repairs are to be made by the Contractor, the repairs will be inspected by the Owner's Authorized Representative prior to backfilling.
 - 3. Any galvanized pipe that requires repair shall be repaired at a threaded coupling, not by use of a compression coupling.
- D. Protect Existing Air Handling Systems:
 - 1. Contractor shall be responsible for protection of the cleanliness of the existing air handling system at all times. This protection shall include:
 - a. During site work or building demolition, prefilters shall be provided and maintained on all building outside air intakes at all times throughout the construction duration.

- b. During any interior work that may create dust in the interior space and adjacent corridor/hallways, air filters shall be provided and maintained on all affected air return and exhaust grilles. Where air flow in or out of the space is not required, all air duct openings shall be temporarily blanked off with plywood or sheet metal.
 - c. Prior to starting any work, the Contractor shall record and submit to the Owner's Authorized Representative, pressure readings across all existing air handler air filter banks before installation of new prefilters.
 - d. Upon completion of all Work affecting existing air handling systems, the Contractor shall remove all temporary filters, covers and associated parts and restore the system to its original operating condition unless otherwise stated elsewhere in the Contract Documents
- E. Clean, repair, resurface, or restore existing surfaces to their original, or better, condition, or completely replace such surfaces to match existing, where damaged by construction operations.
- F. Security is the responsibility of the Contractor.
- G. Construction Debris:
- 1. Debris shall not be allowed to remain around the buildings during performance of Work, but shall be disposed of as rapidly as it accumulates.
 - 2. On completion of Work, the buildings and grounds shall be left in a condition that is equal to or better than original condition.
 - 3. In case of failure to do so, the Owner may remove rubbish and charge the cost to the Contractor.
- H. The Contractor shall manage a safe job environment for both the safety of all the people around the Work site as well as the safety of the Owner's and general public's property.
- I. The Contractor shall provide and maintain suitable barricades, shelters, lights, and danger signals during the progress of the Work; they shall meet the requirements of the local building code and OSHA.

1.04 DRAINAGE

- A. Verify that all rain drains in the construction areas are in working order and notify the Owner's Authorized Representative in writing of any rain drains that are plugged, prior to the start of the Work.
- B. Start of Work will be considered as acknowledgment that all drains are clear and in good working order.
- C. All drains shall be left in a clean and proper working condition.

1.05 CONSTRUCTION PROJECT SAFETY FORM

- A. Contractor shall submit to the Owner, prior to signing the Contract, the completed

"Construction Project Safety Form", which is provided with instructions at the end of this Section.

1.06 TEMPORARY UTILITIES

- A. Temporary Utilities:
 - 1. Prepare a schedule indicating dates for implementation and termination of each temporary utility.
 - 2. At the earliest feasible time, when acceptable to the Owner, change over from use of temporary service to use of the permanent service.
- B. Conditions of Use:
 - 1. Keep temporary services and facilities clean and neat in appearance.
 - 2. Operate in a safe and efficient manner.
 - 3. Take necessary fire prevention measures.
 - 4. Do not overload facilities or permit them to interfere with progress.
 - 5. Do not allow hazardous, dangerous or unsanitary conditions, or public nuisances to develop or persist on the site.
- C. Electrical Service:
 - 1. Service limited to 20 amp 120V circuits will be paid for by the Owner.
 - 2. Connection to the service shall be the responsibility of the Contractor, with the Owner's approval.
 - 3. Coordinate with the Owner's Authorized Representative.
- D. Water Service:
 - 1. Service in reasonable quantities for the Project will be paid for by the Owner.
 - 2. Connection to the service shall be the responsibility of the Contractor, with the Owner's approval.
 - 3. Coordinate with the Owner's Authorized Representative.

1.07 TEMPORARY SUPPORT FACILITIES

- A. Temporary Sanitary Facilities:
 - 1. Provide and maintain an adequate number of facilities for the use of all persons employed on the Work during construction.
 - 2. Provide enclosed, weatherproof facilities with heat as required.
 - 3. Use of new or existing Owner's facilities will not be permitted.
- B. Temporary Heat and Ventilation:
 - 1. As necessary, provide temporary heat and ventilation required by construction activities, for curing or drying of completed installations or protection of installed construction from adverse effects of low temperatures or high humidity. Select safe equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce the ambient condition required and minimize consumption of energy.

- C. Telephone Equipment: Provide telephone communications at project site.
- D. Existing Services:
 - 1. Do not interrupt any existing service.
 - 2. Prior request and approval of the Owner's Representative will enable the Owner to shut down any utility required by the Work.
 - 3. Contractor shall not shut down utilities.

1.08 TEMPORARY BARRIERS AND ENCLOSURES

- A. Provide barriers and fencing to prevent unauthorized entry to construction areas and to protect existing facilities and adjacent properties from damage.
- B. Provide Commercial grade chain link fence construction.
- C. Provide 6 foot high fence around construction site as directed by Owner's Authorized Representative; equip with vehicular and pedestrian gates with lock.
- D. Exterior Closures: Provide temporary secured, weather-tight closures at exterior openings, to permit acceptable working conditions and protection of the Work.
- E. Interior Closures:
 - 1. Provide temporary floor to ceiling partitions (not plastic sheeting) and ceilings as required to separate work areas from Owner occupied areas, to prevent penetration of dust and moisture into Owner occupied areas, to reduce construction noise, and to prevent damage to existing materials and equipment.
 - 2. Paint surfaces exposed to view from Owner occupied areas.

1.09 ODORS

- A. Work that causes excessive odors shall be performed only after coordination with the Owner's Authorized Representative. Filtering of air intakes to units may be required to prevent odors and vapors from entering the buildings.
- B. Contractor shall provide 7 days advance notice to the Owner's Authorized Representative in order for advance notice to be forwarded to building occupants. Work stoppage may occur if advance notification has not been coordinated or odors and vapors from the work are found to generate complaints from building occupants.

1.10 FIRE SAFETY

- A. Ensure that required exit routes remain unobstructed while building is occupied.
- B. Abide by all fire safety requirements for buildings under construction, alteration or demolition as required by Article 87, of the Uniform Fire Code as adopted by the State of Oregon.
- C. An emergency telephone shall be provided on site. Cellular telephone equipment is acceptable.
- D. Fire Suppression Equipment:

1. Install and maintain temporary fire protection facilities of the types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 10 "Standard for Portable Fire Extinguishers", and NFPA 241 "Standard for Safeguarding Construction, Alterations and Demolition Operations".
2. Maintain equipment in working condition with current inspection certificate attached to each.
3. Locate fire extinguishers where convenient and effective for their intended purpose, but not less than one extinguisher on each floor at or near each usable stairwell.
4. Store combustible materials in containers in fire-safe locations.
5. Maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire protection facilities, stairways, and other access routes for fighting fires.
- 6.
6. Provide continual supervision of welding operations, combustion type temporary heating units, and similar sources of fire ignition.
7. When possible, relocate hot work to a designated hot work area.
8. If the materials or equipment cannot be relocated to a designated hot work area, use the least hazardous form of hot work that will get the job done and prepare the area properly.
9. Manage mobile hot work using the formal hot work permit system. (mentioned in the next bullet point and also a directive in the OSU Hot Work Safety Program)
10. Make sure both fire protection and hot work equipment work properly.
11. Train all personnel involved in hot work operations and activities so that they have the understanding, knowledge, and skills necessary to safely perform their jobs.

1.11 CONSTRUCTION AIDS

- A. Scaffolding: comply with applicable OSHA requirements.
- B. Material Handling Equipment:
 1. Provide necessary cranes, hoists, towers, or other lifting devices.
 2. Use only experienced operators.
 3. Remove equipment as soon as possible after task is ended.
 4. Coordinate placement of such equipment with Owner's Authorized Representative.
 5. Obtain required permits and meet requirement of governing authorities regarding applicable regulations.
- C. Materials or debris shall not be allowed to free fall from building.
- D. The use of chutes or conveyors must be approved by Owner.

1.12 TEMPORARY CONTROLS

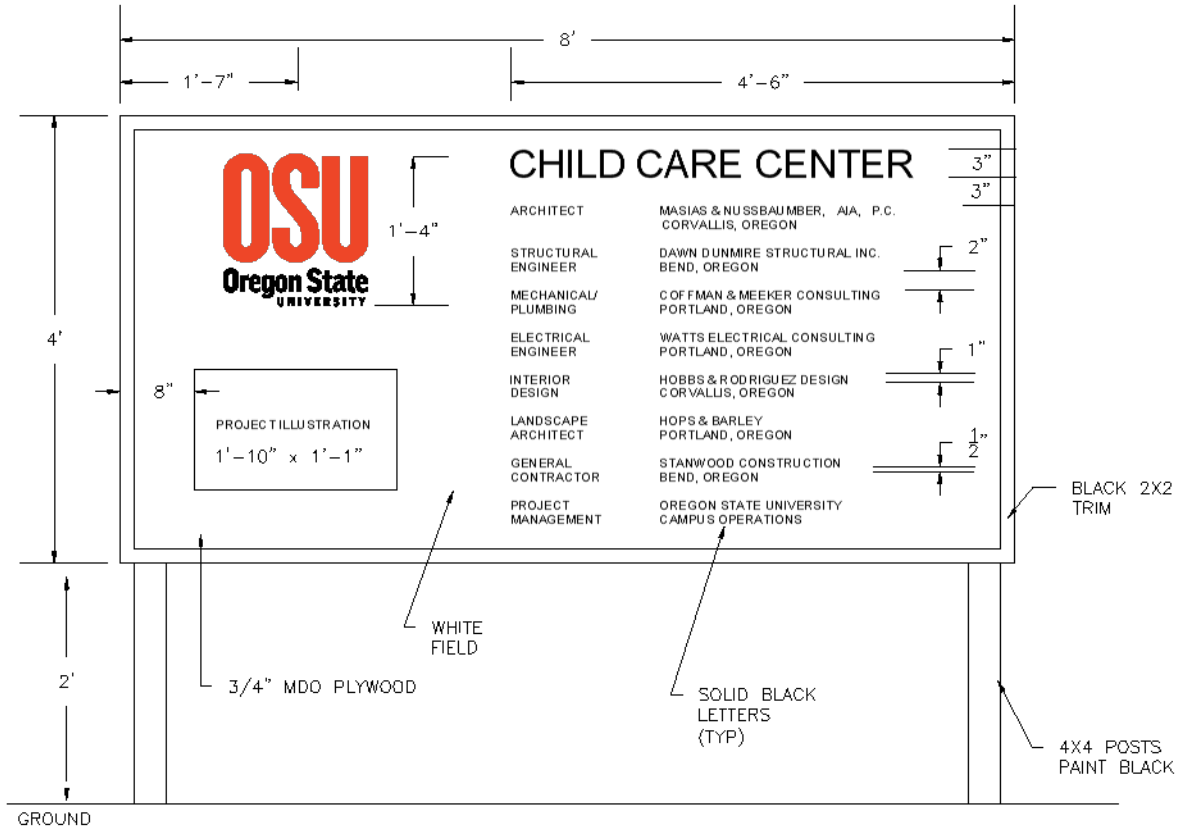
- A. Water Control:
 1. Maintain excavations free of water.
 2. Provide, operate, and maintain necessary pumping equipment.

- B. Protection:
 - 1. Protect installed Work and provide special protection where specified in individual specification sections.
 - 2. Prohibit traffic or storage upon waterproofed or roofed surfaces.
- C. Security:
 - 1. Provide security and facilities to protect Work and existing facilities and Owner's operations from unauthorized entry, vandalism, or theft.
 - 2. Coordinate operations with Owner's Authorized Representative.
- D. Temporary Traffic Control /Pedestrian Accessibility
 - 1. A continuous route for all pedestrians, including persons with disabilities and bicyclists, shall be maintained at all times. When existing pedestrian facilities are disrupted, closed, or relocated in a construction zone, temporary pedestrian facilities shall be provided.
 - 2. Temporary pedestrian facilities should be safe and accessible. There should be no curbs or abrupt changes in grade that could cause tripping or be a barrier to wheelchair use.
 - 3. Signage shall be provided directing people to the temporary accessible route. The signage shall include the International Symbol of Accessibility.
 - 4. Contractors shall not block temporary walkways with vehicles, equipment, construction materials, signs, trash, or other objects that might prohibit pedestrian passage.
 - 5. Construction equipment and equipment operation must be separated from any open walkways. At construction zones, pedestrian fences or other protective barriers shall be provided to prevent access into the construction zone.

1.13 PROJECT SIGNAGE

- A. Contractor is permitted to post only one project identification sign based on the following example:

OSU TYPICAL JOB SIGN



1.14 PREPARATION

- Consult with Owner to review jobsite areas required for field offices, material storage and stockpiles, equipment storage, access to different locations, etc.

1.15 PERFORMANCE

- Confine equipment, apparatus, and storage of material to work limits. The Owner will not be responsible for protection of materials and equipment from damage, pilfering, etc.
- Install temporary facilities in such a manner that the installed work will not be damaged.
- Do not use facilities of existing building unless authorized in writing by the Owner.
- Effective September 1, 2012, OSU became a non-smoking campus and smoking is prohibited on all Campus property.
- Keep facilities well maintained.
- Relocate temporary facilities as required during job progress.

- G. At Substantial Completion, clean and renovate permanent facilities that have been used during the construction period, including but not limited to:
1. Replace air filters and clean inside of ductwork and housings.
 2. Replace significantly worn parts and parts that have been subject to unusual operating conditions.
 3. Replace lamps that are burned out or noticeably dimmed by substantial hours of use.

END OF SECTION

Oregon State University Construction and Maintenance Safety Requirements

EH&S, 130 Oak Creek Building, Corvallis, OR 97331-7405, (541) 737-2505,
FAX (541) 737-9090

Complete OSU Construction and Maintenance Safety Form - Send completed documents (including Site Safety Plan and all separate answer pages) to Construction Contract Administration along with the signed contract and bonds.

Project Isolation - All construction and remodeling activities regardless of size and/or scope must be fenced, barricaded, or otherwise protected to restrict entrance and to ensure the safety of those in the general area. See isolation requirements.

Site Safety Plan - A site safety plan will be required and will address:

- General Information
- Emergency Information
- Key Organization Personnel
- Hazard Evaluation/Facility Impact
- Emergency Procedures
- Work Zones
- Security Measures
- Fire Protection

A model plan is attached. This form can be used if another plan has not already been prepared. Contact OSU Environmental Health & Safety for more information 737-2505.

Isolation Requirements

General: All construction, maintenance, and remodeling activities, regardless of size or scope, must be fenced, barricaded, or otherwise isolated to restrict entrance and to ensure the safety of those in the general area.

Outdoor Activities: Outdoor projects require the following perimeter isolation:

- A six foot chain-link fence, with controlled access points, extending in all directions around the excavation or building site such that no area of the construction is accessible to pedestrians or unauthorized personnel or vehicles.
- Isolation area will include vehicle loading and unloading areas.
- At the University's option, other barricading plans may be accepted. These may apply to projects such as road resurfacing, parking lot striping, exterior building water proofing, deliveries, etc. Contact EH&S regarding other barricading plans.

Overnight: Any excavation across or adjacent to sidewalks or pathways which must be left open overnight, must be identified with working, blinking construction lights in addition to solid barricades

Indoor Activities: Indoor construction or maintenance projects which will create dust, potentially hazardous fumes or vapors, or offensive odors are subject to the following isolation:

- Areas where existing doors can provide isolation will be labeled "Construction Area--Authorized Personnel Only".

- All other areas will be isolated by a solid barrier. The minimum barrier allowed is 4 mil poly sheeting sealed to prevent migration of dust.
- Mechanical ventilation may be required.
- A solid wall is required if building envelope is opened to the outside.

Contractor Responsibilities

- The contractor will provide all barricading, isolation, and fencing material. OSU will not provide any materials.
- The contractor will also provide all appropriate warning and detour signs when sidewalks, exits, or roads are closed.
- Contractor will provide all other construction area signs.

OSU Construction and Maintenance Safety Form

Send completed safety documents to Construction Contract Administration with contract and bonds.

Date: _____ Project: _____

Start Date: _____ Completion date: _____

Contractor: _____ Contact: _____

Work # _____ 24 hr #: _____

OSU Project Mgr: _____ Work / 24hr #'s: _____

Dept Contact: _____ OSU EH&S Contact: _____

Preconstruction meeting? **Y N** Date/Time/Location: _____

For the following items, prepare answers on a separate sheet for all items marked "Yes". Precede each answer with the appropriate item number. All boxes need to be checked

Y	N	For This Project	If YES, then:
		1 Will any confined spaces be accessed?	Describe location of entry Specify location of permit Notify EH&S prior to entry See SAF 209
		2 Will hot work be performed (welding, cutting, brazing, etc.)?	Provide min. 5# 2A10BC extinguisher within 10 ft If indoors - provide and describe ventilation See SAF 214
		3 Any products brought to campus?	Provide MSDS on site prior to first use; Make available to OSU on request
		4 Will lead paint be impacted?	Describe plan to limit contamination
		5 Will asbestos-containing-material be impacted?	Coordinate with OSU asbestos manager
		6 Will <u>any</u> materials (construction debris, soil, water, etc) be removed from campus?	Describe in detail identity and disposition of material (how, where)
		7 Any open trenches or holes?	Describe isolation procedures (see Page 1)
		8 Will a crane be used?	Describe crane safety plan (include plan to prevent loads above occupied areas)
		9 Is this project building a new facility, a major remodel?	Provide Site Safety plan Describe isolation procedures (see Page 1)
		10 Is this a minor remodeling project?	Provide, or fill out model Site Safety Plan form (see Page 3) Describe isolation procedures (see Page 1)
		11 Will air contamination be produced (e.g. dust, CO, solvent vapors, VOCs, odors)?	Describe project ventilation and isolation Indicate position of building air intake(s)
		12 Will there be noise > 85 dB?	Describe noise minimization plan
		13 Will this project use a scaffold or an external chute?	Describe isolation, dust control, installation
		14 Will this project involve a working surface >6' above a lower level	Describe fall protection
		15 Will any "blind" saw-cuts or penetrations be made in existing foundations, floors, ceilings and/or walls?	Describe plan for detecting and protecting power lines or other building utility lines.

EH&S Review: _____ Date: _____

Model Site Safety Plan

1. General Information

Contractor name _____
 Address _____
 City, State, Zip _____
 Site Safety Officer _____ Project Dates _____
 Project Name _____

2. Emergency Information

Emergency Response	911	OSU EH&S and OSU Facilities Services must be notified in the event of an emergency
Hazardous Materials Spill		
MSDS on-site location		
OSU EH&S	(541) 737-2505	
Facilities Services	(541) 737-2969	

3. Contractor Key Personnel

	Name	Phone	Emergency Contact
Company Owner			
Project Manager			
Job Supervisor			
Site Safety Officer			
Other Responsible Individual			
24 Hour Notification			

List of employees on site _____

4. Hazard Evaluation/ Facility Impact	
Physical	Yes / No
Heavy Equipment	
Noise	
Heat	
Elevation	
Radiation Materials	
Excavations	
Underground Utilities	
Confined Spaces	
Fire Prevention	
Electrical	

5. Emergencies
Services
Evacuation Route
First Aid Location
Hazardous Materials Spill Procedure

6. Work Zones

Material Storage _____
 Parking locations _____
 Individuals with OSU keys _____
 Access issues _____

7. Security measures

8. Fire protection

SECTION 01 56 39

TREE AND PLANTING PROTECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Section includes temporary fencing, barricades, and guards to protect trees, plants and groundcovers not indicated to be removed, as necessary and required to prevent damage above and below grade.

1.02 DEFINITIONS

- A. Dripline: Outer perimeter of branches of any tree or plant.
- B. Groundcover: Includes but not limited to plants and grass.

1.03 PERFORMANCE REQUIREMENTS

- A. The Contractor shall exercise utmost care to protect existing trees and plants designated to remain and shall comply with all protection requirements provided by Owner and City of Corvallis as conveyed through the Owner's Authorized Representative.
- B. The Contractor shall install tree protection fencing as detailed and shall prevent damage to shrubs, groundcover, trees, root systems, soil, bark, foliage, branches and limbs due to construction activities, including but not limited to:
 - 1. Soil contamination, erosion, and compaction.
 - 2. Excessive wetting, and ponding due to storm water, and construction run-off.
 - 3. Alteration of grade, stockpiling of soil, debris, and materials.
 - 4. Damage to soil, roots, bark, trunk, limbs, branches, and foliage.
 - 5. Prevent unauthorized cutting, breaking, skinning and bruising of roots, branches, and bark.

1.04 SUBMITTALS

- A. Procedural proposal for tree and plant protection, describe methods of protection, and stabilization, provide drawings and supporting documentation as directed.
- B. Contractor's Condition Inspection; include written report and color photographs.

1.05 PROJECT CONDITIONS

- A. Install protection during initial mobilization at the Work site, and maintain until substantial completion.
- B. If, in the opinion of the Owner's arborist, additional protection is required, the Contractor shall install additional fencing as directed and without cost to the Owner.
- C. The location and requirements for additional fencing shall be determined by the

Owner's arborist prior to, and at any time during the course of the Work.

- D. Fencing:
 - 1. Fencing shall be installed at the tree and plant protection areas as detailed on Plans, or as directed by the Owner's Authorized Representative.
 - 2. Tree and plant protection fences shall remain in place until all Work is completed and shall not be removed or relocated without the approval of the Owner's Authorized Representative.
- E. Driving and Parking:
 - 1. Not permitted off paved surfaces without the approval of the Owner's Authorized Representative.
 - 2. When approved, the Contractor shall place plywood of sufficient thickness and width to support vehicles and prevent rutting on the area to be driven on.
 - 3. Care shall also be taken with respect to existing lawn sprinkler systems.
- F. Storage of materials and Debris: Not permitted off paved surfaces.

PART 2 PRODUCTS

2.01 MANUFACTURED COMPONENTS

- A. Chain Link Fencing: 11 gage galvanized chain link, six feet tall, and 1.5 inch inside diameter galvanized steel line posts and 2.5 inch inside diameter corner posts, provide lockable gates as necessary.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verification of Conditions: Inspect trees, plants, and groundcovers, document existing conditions prior to installation of protection.

3.02 EXECUTION

- A. Pruning and Cutting of Roots, Branches and Foliage:
 - 1. Review conditions with Architect or Owner prior to need for work, and proceed as directed.
 - 2. All pruning to be done by Owner's landscape maintenance personnel or ISA Certified arborist under the direction of Owner's Landscape Management Department.
 - 3. Perform pruning and cutting with sharp instruments intended for the purpose; do not break or chop.
- B. Root Cuttings:
 - 1. Carefully and cleanly cut roots and branches of trees indicated to be left standing

- where such roots and branches obstruct new construction.
2. Protect exposed roots with wet burlap until they can be covered with soil.
- C. Excavation and Trenching Within Drip Lines:
1. Permitted where indicated, and at other specifically approved locations.
 2. Tunnel under or around roots by hand digging or boring.
 3. Do not cut main lateral roots and tap roots over one inch diameter; cut smaller roots which interfere with installation of new Work.
 4. Do not allow exposed roots to dry out before permanent backfill is placed; provide temporary earth cover, or pack with peat moss and wrap with burlap.
 5. Water and maintain roots in moist condition and temporarily support and protect from damage until permanently relocated and covered with backfill.
- D. Existing Grading: Maintain within drip line of trees and plants unless otherwise indicated on the drawing and approved by the Owner's Authorized Representative.
- E. Tree Protection:
1. Provide temporary fence complying with Section 01 51 00 for protection of trees to remain.
 2. Extend fencing ten feet beyond dripline, except where greater distance is required for protection of Elm trees.
 3. Prevent entry into protected areas except as authorized in writing by the Owner's Authorized Representative.

3.03 REPAIR AND REPLACEMENT OF TREES AND PLANTS

- A. Repair trees or shrubs damaged by construction operations as directed by the Owner.
- B. Make repairs promptly after damage occurs to prevent progressive deterioration of damaged trees.
- C. Damaged Trees, Shrubs and Groundcover:
1. Replace where Owner's Authorized Representative determines restoration to normal growth pattern is not possible; plant and maintain as directed.
 2. Replacement trees up to 13 inches caliper and shrubs up to 4 feet tall: Same size as damaged tree or shrub, species selected by the Owner's Authorized Representative.
 3. Trees over 13 inch caliper and shrubs greater than 4 feet tall: Compensate Owner as determined by an acceptable consulting arborist registered with the American Society of Consulting Arborists.
 4. Replacement groundcovers: Same size and quality as damaged species selected by Owner's Authorized Representative.

END OF SECTION

SECTION 01 60 00

PRODUCT REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Summary:
 - 1. Product options.
 - 2. Owner-furnished products.
 - 3. Product delivery, storage and handling.

1.02 PRODUCTS

- A. Products:
 - 1. New material, machinery, components, equipment, fixtures, and systems forming the Work, but does not include machinery and equipment used for preparation, fabrication, conveying and erection of the Work.
 - 2. Products may also include existing materials or components specifically identified for reuse.
- B. Use interchangeable components of the same manufacture for similar components.
- C. Unless otherwise specified, all material and equipment shall be new; free from defects impairing strength, durability, and appearance; of current manufacture.
- D. Items specified shall be considered minimum as to quality, function, capacity, and suitability for application intended.
- E. Items incorporated into the Work shall conform to applicable specifications and standards designated, and shall be of size, make, type, and quality specified.
- F. Design, fabricate, and assemble in accordance with current best engineering, industry, and shop practices.
- G. Manufacture like parts of duplicate units to standard size and gauge to make them interchangeable.
- H. Two or more items of the same kind shall be identical and made by the same manufacturer.

1.03 PRODUCT OPTIONS

- A. Products Specified by Reference Standards or by Description Only: Any product meeting those standards or description.
- B. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named.
- C. Products Specified by Naming One [or More] Manufacturer[s]: Products of manufacturer[s] named and meeting specifications, no options or substitutions

allowed.

D. Substitution Procedure: Under Section 01 25 00.

1.04 REUSE OF EXISTING PRODUCTS

- A. Except as specifically indicated or specified, materials and equipment removed from existing construction shall not be used in the completed Work.
- B. For material and equipment specifically indicated or specified to be reused in the Work:
 - 1. Use care in removal, handling, storage, and reinstallation to assure proper function in the completed Work.
 - 2. Arrange for transportation, storage, and handling of products which require off-site storage, restoration, or renovation.
 - 3. Remove and reinstall mechanical units, vents, guys, antennae, and electrical and grounding wires or conduits.

1.05 OWNER FURNISHED PRODUCTS

- A. Designate delivery dates of Owner-furnished items in the construction schedule.
- B. Receive, unload, store and handle Owner-furnished items at the site; protect from damage.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Transport, handle, store and protect products in accordance with manufacturer's instructions.
- B. Arrange deliveries in accordance with construction schedules; coordinate to avoid conflict with Work and site conditions.
- C. Deliver and store products in undamaged condition in manufacturer's original containers or packaging with identifying labels intact and legible.
- D. Inspect shipments to assure compliance with Contract Documents and reviewed submittals, and that products are undamaged.
- E. Prevent soiling or damage to products or packaging.
- F. Interior Storage: Maintain required temperature and humidity ranges. Verify that Owner furnished storage meets product manufacturer's requirements.
- G. Exterior Storage:
 - 1. Store materials above ground to prevent soiling and/or moisture infiltration.
 - 2. Cover materials with waterproof breathable sheet coverings; provide adequate ventilation.
 - 3. All storage locations to be approved in advance by the Owner.
- H. Arrange storage to provide access for inspection.
- I. Coordinate with Owner's Authorized Representative all on-site storage activities.

J. Provide for security of stored products.

END OF SECTION

SECTION 01 73 29

CUTTING AND PATCHING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Requirements and limitations for cutting and patching of Work.

1.02 RELATED SECTIONS

- A. Section 01 25 00, Product Substitution Procedures.
- B. Section 01 33 23, Shop Drawings, Product Data, Samples

1.03 SUBMITTALS

- A. Submit written request in advance of cutting or alteration which affects:
 - 1. Structural integrity of any element of the Work.
 - 2. Efficiency, maintenance, or safety of any operational element.
 - 3. Visual qualities of sight exposed elements.
 - 4. Work of Owner or separate contractor.
- B. Include in request:
 - 1. Identification of project.
 - 2. Location and description of affected work.
 - 3. Necessity for cutting or alteration.
 - 4. Description of proposed work, and products to be used.
 - 5. Alternatives to cutting and patching.
 - 6. Effect on work of Owner or separate contractor.
 - 7. Written permission of affected separate contractor.
 - 8. Date and time work will be executed.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Primary Products: Those required for original installation.
- B. Product Substitution: For any proposed change in materials, submit request for substitution under provisions of Section 01 25 00.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Inspect existing conditions prior to commencing Work, including elements subject to

damage or movement during cutting and patching.

- B. After uncovering existing work, inspect conditions affecting performance of Work.
- C. Beginning of cutting or patching means acceptance of existing conditions.

3.02 PREPARATION

- A. Provide temporary supports to ensure structural integrity of the Work.
- B. Provide devices and methods to protect other portions of the Work from damage.
- C. Provide protection from elements for areas which may be exposed by uncovering work.

3.03 CUTTING AND PATCHING

- A. Execute cutting, fitting and patching to complete work.
- B. Fit products together, to integrate with other work.
- C. Remove and replace defective or non-conforming work.
- D. Provide openings in the work for penetration of mechanical and electrical work.

3.04 PERFORMANCE

- A. Execute work by methods to avoid damage to other Work, and which will provide appropriate surfaces to receive patching and finishing.
- B. Cut rigid materials using masonry saw or core drill. Pneumatic tools are not allowed without prior approval from Owner's Authorized Representative.
- C. Restore work with new products in accordance with requirements of Contract Documents.
- D. At penetrations of fire rated walls, partitions, ceiling or floor construction, completely seal voids with approved fire rated material, to full thickness of the penetrated element.
- E. Refinishing:
 - 1. Refinish surfaces to match adjacent finish.
 - 2. For continuous surfaces, refinish to nearest intersection or natural break.
 - 3. For an assembly, refinish entire unit.

END OF SECTION

SECTION 01 74 00

CLEANING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Related requirements specified elsewhere, cleaning for specific products or work: Specification section for that work.
- B. Maintain premises and public properties free from accumulations of waste, debris, and rubbish, caused by operations.
- C. At completion of Work remove waste materials, rubbish, tools, equipment, machinery and surplus materials, and clean all sight-exposed surfaces; leave project clean and ready for occupancy.

1.02 QUALITY ASSURANCE

- A. Standards: Maintain project in accord with applicable safety and insurance standards.
- B. Hazard Control:
 - 1. Store volatile wastes in covered metal containers.
 - 2. Provide adequate ventilation during use of volatile or noxious substances.

1.03 MATERIALS

- A. Use only cleaning materials recommended by manufacturer of surface to be cleaned.
- B. Use cleaning materials only on surfaces recommended by cleaning material manufacturer.

1.04 DURING CONSTRUCTION:

- A. Wet down dry materials and rubbish to lay dust and prevent blowing dust.
- B. At reasonable intervals during progress of Work clean site and public properties, and dispose of waste materials, debris and rubbish.
- C. Provide on-site containers for collection of waste materials, debris and rubbish.
- D. Remove waste materials, debris and rubbish from site and legally dispose of at public or private dumping areas off Owner's property.
- E. Vacuum clean interior building areas when ready to receive finish painting, and continue vacuum cleaning on an as-needed basis until project is ready for Substantial Completion or occupancy.
- F. Handle materials in a controlled manner with as few handlings as possible; do not drop or throw materials from heights.

1.05 FINAL CLEANING

- A. Employ experienced workers, or professional cleaners, for final cleaning.
- B. In preparation for Substantial Completion or occupancy, conduct final inspection of sight-exposed interior and exterior surfaces, and of concealed spaces.
- C. Remove grease, dust, dirt, stains, labels, and other foreign materials from exposed interior and exterior finished surfaces.
- D. Remove putty, paint, labels, lubricants, etc., from windows, mirrors, and sash, and then polish, taking care not to scratch glass.
- E. Vacuum carpeting (shampoo where required), removing debris and excess nap.
- F. Repair, patch and touch up marred surfaces to specified finish, to match adjacent surfaces.
- G. Replace air filters where units were operated during construction.
- H. Maintain cleaning until project, or portion thereof, is occupied by Owner.

END OF SECTION

SECTION 01 77 00

CONTRACT CLOSEOUT

PART 1 GENERAL

1.01 DESCRIPTION

- A. The requirements specified in this section relate to all Contractors individually performing under these Contract Documents:
 - 1. Project Record Documents.
 - 2. Final review and payment.
- B. Related work specified elsewhere:
 - 1. OSU General Conditions.
 - 2. Shop Drawings, Product Data and Samples, Section 01 33 23.

1.02 PROJECT RECORD DOCUMENTS

- A. The Project Record Documents shall be organized to include the following information:
 - 1. Table of Contents
 - 2. Project Team List
 - 3. Specifications (Including Addenda and Change Orders)
 - 4. Drawings
 - 5. Inspection Reports, as applicable
 - 6. Signed Warranty(ies)
 - 7. Maintenance Instructions
- B. Draft Project Record Documents shall be submitted for review upon 75% completion of the Work.
- C. Project Record Documents shall be submitted electronically to the Owner. Hard copies will not be accepted.
- D. The project team list shall include the name, address, and phone number of the Owner, Contractor, Inspector, Subcontractors, and the materials manufacturers.
- E. Legibly mark each Specification section to indicate actual as-built condition indicating changes in the Work made by addenda or change order or actual materials used and actual manufacturer(s) used.
- F. Maintain current and accurate as-built mark-ups during construction and make available to Owner's Authorized Representative upon request.
- G. Legibly mark the drawings to indicate actual as-built conditions indicating changes in the Work made by addenda or change order or actual conditions which differ from the drawings.
- H. Redraw or provide new drawings as required for a complete as-built set of drawings. The Contractor shall maintain current and accurate as-built mark-ups during

construction and make available to Owner's Authorized Representative.

- I. Include inspection reports if applicable.
- J. Include, in a single section, all copies of the Project's labor and material warranties clearly marked to identify the Owner's responsibilities under the terms of each warranty and the section of Work that each warranty covers. One set must be clearly marked as containing original documents.
- K. In the case of an elevator installation, the Contractor's and manufacturer's warranty shall provide for the Owner's right to respond to emergency/car failure situations for the purpose of extricating individuals trapped in the elevator.
- L. Include maintenance instructions complete with technical information and name, address, and phone number of the Contractor(s) and manufacturer(s) of each material and product.

1.03 FINAL REVIEW AND PAYMENT

- A. Prior to completion, the Contractor shall inspect the Work and make a Punch-list noting all items that are incomplete and/or incorrect.
- B. The Contractor shall notify all Subcontractors in writing of incomplete and/or incorrect items. Notify far enough in advance of the completion date that the Work can be completed on schedule. Said Work shall be immediately corrected.
- C. Should conditions prevail which prohibit some elements of the Work from being accomplished, but the work-in-place will perform the primary function (i.e., painting cannot be completed due to high moisture content of masonry walls.) the Contractor shall record the reason with this Punch-list item requesting temporary delay in completion from the Owner in writing.
- D. Notify the Owner in writing that all items are completed and ready for final review or else that the Work product is fully usable, but some listed deficiencies remain to be completed. Submit all record documents at this time.
- E. The Owner will review all documents. When the documents include a Contractor's request for delay in completion, the Owner will review all Work which is certified as complete to the best knowledge of the Contractor. The Owner will also review the listed incomplete Work and assign a value to such uncompleted work.
- F. The Contractor shall make the required corrections to the Work expeditiously. A letter will be addressed to the Contractor informing the Contractor of the project status.
- G. When Contract closeout procedures are completed and all Punch-list deficiencies have been corrected, provide Owner with final corrected Project Record Documents based on Owner's preliminary review. Correct Project Record Documents shall be in electronic format.
- H. Final Completion by the Owner will be documented and the Contractor will receive

written notice of acceptance of the Work and notification that final payment may be billed and released.

- I. All warranties shall commence and become effective beginning on the date of Substantial Completion.

END OF SECTION

SECTION 03 10 00
CONCRETE FORMS AND ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Formwork for cast-in place concrete, with shoring, bracing and anchorage.
- B. Openings for other work.
- C. Form accessories.
- D. Form stripping.
- E. Special considerations for Exposed Architectural Concrete.

1.02 RELATED REQUIREMENTS

- A. Section 03 20 00 - CONCRETE REINFORCEMENT.
- B. Section 03 30 00 - Cast-in-Place Concrete.
- C. Section 04 20 00 - Unit Masonry: Reinforcement for masonry.
- D. Section 03 39 00 - Concrete Curing.
- E. Section 05 12 00 - Structural Steel Framing: Placement of embedded steel anchors and plates in cast-in-place concrete.
- F. Section 05310 - Steel Deck: Steel form deck.

1.03 REFERENCE STANDARDS

- A. ACI 117 - Standard Specifications for Tolerances for Concrete Construction and Materials; 2010.
- B. ACI 117 - Standard Specification for Tolerances for Concrete Construction and Materials, American Concrete Institute International.
- C. ACI 301 - Specifications for Structural Concrete; 2010 (Errata 2012).
- D. ACI 318 - Building Code Requirements for Structural Concrete and Commentary; 2011.
- E. ACI 347R - Guide to Formwork for Concrete; 2014.
- F. ASTM D 1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types); American Society for Testing and Materials.
- G. ASTM D 1752 - Standard Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction; American Society for Testing and Materials.

1.04 DEFINITIONS

- A. Exposed Architectural Concrete: Concrete prominently exposed to public view, and concrete bearing special textures, reveals or patterns of tie cone pockets defined in the Drawings.

1.05 DESIGN REQUIREMENTS

- A. Formwork design is the responsibility of the Contractor.
- B. Design, engineer and construct formwork, shoring and bracing to conform to code requirements; resultant concrete to conform to required shape, line and dimension. Provide rigidity and stability sufficient for conformance to tolerance limits of ACI 117.

1.06 QUALITY ASSURANCE

- A. Perform work of this section in accordance with ACI 347, ACI 301, and ACI 318.
 - 1. Maintain one copy of standards on project site.

PART 2 PRODUCTS**2.01 FORMWORK - GENERAL**

- A. Provide concrete forms, accessories, shoring, and bracing as required to accomplish cast-in-place concrete work.
- B. Design and construct concrete that complies with design with respect to shape, lines, and dimensions.
- C. Comply with applicable State and local codes with respect to design, fabrication, erection, and removal of formwork.
- D. Comply with relevant portions of ACI 347R, ACI 301, and ACI 318.

2.02 WOOD FORM MATERIALS

- A. Forms for Flat Exposed Smooth Concrete:
 - 1. "Exposed Architectural Concrete" board form material shall be selected by contractor and approved by Architect by completed and accepted mock-up.
 - 2. APA High Density Overlay (HDO) Plyform, Class I & II.
 - 3. APA Plyform, Class I & II or APA Structural I Plyform.
- B. Forms for Flat Concealed Smooth Concrete:
 - 1. Form Materials: At the discretion of the Contractor.

2.03 FORMWORK ACCESSORIES

- A. Form Release Agent: Capable of releasing forms from hardened concrete without staining or discoloring concrete or forming bugholes and other surface defects, compatible with concrete and form materials, and not requiring removal for satisfactory bonding of coatings to be applied.
- B. Form Ties for Exposed Concrete: Removable type, factory fabricated, galvanized steel, fixed length, cone type, with waterproofing washer, 1" inch back break dimension, free of defects that could leave holes larger than 1 inch in concrete surface.
- C. Form Ties for Concealed Concrete: Removable or snap-off type, factory-fabricated, galvanized steel or bare steel, fixed or adjustable length.
- D. Form Release Agent: Chemically reactive (versus "barrier type"), non-staining formulation for exposed concrete where clean stripping and compatibility with finishes, caulks, sealants or coatings is desired. Form release agent shall be selected by the Contractor, compatible with the form material used final finish required. The following manufacturers specialize in form release agents and have different products for different form material (surfaces) and various conditions. Contractor shall select their products as best suited for the conditions and finishes of this project. The Manufacturers are:
 - 1. Cresset Chemical Company.
 - 2. Nox-Crete Product Group.
 - 3. Approved substitution.
 - a. Other manufactures including Dayton Superior (Conspec), Tamms Industries, W.R. Meadows and L&M Construction Chemicals, Inc. possibly manufacture chemically active products for limited form surfaces. Contractor may use chemically reactive products from these manufacturers only with personnel experience of prior use of the proposed chemicals by the form work providers of this project and approval of a submitted Substitution Request Form.

- E. Corners: Chamfered, wood strip type; 1/2" x 1/2" size; maximum possible lengths. Provide Sylvan wood chamfer strip manufactured by Sylvan Industries Incorporated, or equal.
- F. Form Joint Tape: Closed-cell PVC foam with pressure-sensitive adhesive on one side.
- G. Embedded Anchor Shapes, Plates, Angles and Bars: As specified in Section 05 12 00.
- H. Waterstops: Rubber type, COE CRD-C 513, minimum 2,000 psi tensile strength, minimum minus 50 degrees F to plus 175 degrees F working temperature range, 8" wide, maximum possible lengths, ribbed profile, preformed corner sections, heat welded jointing.
- I. Concrete Joint Filler:
 - 1. Interior Use Expansion and Isolation Joint Filler: Asphalt-saturated cellulosic fiber, ASTM D 1751, 1/2" thick or as specified in the drawings.
 - 2. Exterior Use Expansion and Isolation Joint Filler: Granulated cork in a synthetic resin binder, ASTM D 1752, Type II, 1/2" thick or as specified in the drawings.
- J. Crack Control Joint Former: Continuous plastic strips with T-shaped cross section consisting of arrow-shaped stem approximately 1/8" thick by not less than 1 inch deep and 1 inch wide detachable crossbar at top. Provide Zipstrip by White Cap or approved.
- K. Construction Joint Devices: Integral galvanized steel, height as required, formed to tongue and groove keyway profile, knockout holes spaced at 6 inches, ribbed steel spikes with tongue to fit top screed edge.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify lines, levels and centers before proceeding with formwork. Ensure that dimensions agree with drawings.

3.02 EARTH FORMS

- A. Permitted only for footings and where the earth is capable of maintaining its shape during concrete placement. Horizontal dimensions of the footing shall be increased 1 inch at every vertical surface.

3.03 ERECTION - FORMWORK

- A. Erect formwork, shoring and bracing to achieve design requirements, in accordance with requirements of ACI 301.
- B. Provide bracing to ensure stability of formwork. Shore or strengthen formwork subject to overstressing by construction loads.
- C. Arrange and assemble formwork to permit dismantling and stripping. Do not damage concrete during stripping. Permit removal of remaining principal shores.
- D. Align joints and make watertight. Keep form joints to a minimum. Provide solid blocking behind joints.
- E. Obtain approval before framing openings in structural members that are not indicated on drawings.
- F. Coordinate this section with other sections of work that require attachment of components to formwork.

3.04 FORMS FOR EXPOSED ARCHITECTURAL CONCRETE BOARD FORMED

- A. Appearance shall be free of bugholes
- B. Use forms free from wood end grain, patches and rust.
- C. Seal form joints and penetrations with form joint tape.

3.05 APPLICATION - FORM RELEASE AGENTS

- A. Verify compliance of form release agents with local VOC regulations.
- B. Verify compatibility of form release agents with aluminum, polystyrene, latex, HDO plywood or MDO plywood forms or forming accessories, if used.
- C. Apply form release agents on formwork in accordance with manufacturer's recommendations.
- D. Apply form release agents prior to placement of reinforcing steel, anchoring devices, and embedded items. Do not apply form release agents to reinforcing steel.
- E. Do not apply form release agent where concrete surfaces will receive special finishes or applied coverings that are affected by agent. Soak inside surfaces of untreated forms with clean water. Keep surfaces coated prior to placement of concrete.

3.06 INSERTS, EMBEDDED PARTS, AND OPENINGS

- A. Provide formed openings where required for items to be embedded in passing through concrete work.
- B. Locate and set in place items that will be cast directly into concrete.
- C. Coordinate with work of other sections in forming and placing openings, slots, reglets, recesses, sleeves, bolts, anchors, other inserts, and components of other work.
- D. Install accessories in accordance with manufacturer's instructions, so they are straight, level, and plumb. Ensure items are not disturbed during concrete placement.
- E. Install waterstops in accordance with manufacturer's instructions, so they are continuous without displacing reinforcement. Heat seal joints so they are watertight.

3.07 FORM CLEANING

- A. Clean forms as erection proceeds. Remove foreign matter within forms.
- B. Clear formed cavities of debris prior to placing concrete.
 - 1. Flush with water or use compressed air to remove remaining foreign matter. Ensure that water and debris drain to exterior through clean-out ports.
 - 2. During cold weather, remove ice and snow from within forms. Do not use de-icing salts. Do not use water to clean out forms, unless formwork and concrete construction proceed within heated enclosure. Use compressed air or other means to remove foreign matter.

3.08 FORMWORK TOLERANCES

- A. Construct formwork to maintain tolerances required by ACI 117. Use Class C surface tolerances for typical offsets between adjacent pieces of formwork facing material. Use Class A surface tolerances for offsets between adjacent pieces of formwork facing material for concrete exposed to view.
 - 1. Architectural Exposed Concrete:
 - a. Additional Tolerance Requirements: In accordance with the additional requirements of ACI 301, chapter 13. Form surfaces at the joints between each panel shall be flush within a tolerance of plus or minus 1/16 inch.

3.09 FORM REMOVAL

- A. Do not remove forms or bracing until concrete has gained sufficient strength to carry its own weight and superimposed loads.
- B. Loosen forms carefully. Do not wedge pry bars, hammers, or tools against finish concrete surfaces scheduled for exposure to view.

3.10 WASTE MANAGEMENT

- A. Place materials defined as hazardous or toxic waste in designated containers.
- B. Use trigger operated spray nozzles for water hoses.

END OF SECTION

SECTION 03 20 00
CONCRETE REINFORCEMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Reinforcing steel for cast-in-place concrete.
- B. Supports and accessories for steel reinforcement.
- C. Polypropylene fibrous reinforcing for concrete slabs-on-grade.

1.02 RELATED REQUIREMENTS

- A. Section 03 10 00 - CONCRETE FORMS AND ACCESSORIES.
- B. Section 03 30 00 - Cast-in-Place Concrete.
- C. Section 03 45 00 - Precast Architectural Concrete: Reinforcement for precast concrete panels.
- D. Section 04 29 00 - Engineered Unit Masonry: Reinforcement for engineered masonry.

1.03 REFERENCES

- A. ACI 117 - Standard Specification for Tolerances for Concrete Construction and Materials, American Concrete Institute International.
- B. ACI 301 - Specifications for Structural Concrete; 2010 (Errata 2012).
- C. ACI 315 - Details and Detailing of Concrete Reinforcement, American Concrete Institute International.
- D. ACI 318 - Building Code Requirements for Structural Concrete and Commentary; 2011.
- E. ACI SP-66 - ACI Detailing Manual; 2004.
- F. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon Steel Bars for Concrete Reinforcement; 2015.
- G. ASTM A706/A706M - Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement; 2014.
- H. AWS D1.4/D1.4M - Structural Welding Code - Reinforcing Steel; 2011.

1.04 DESIGN REQUIREMENTS

- A. Contractor is responsible for reinforcing support accessory selection and design.
- B. Contractor is responsible for design of supplementary reinforcing for precast concrete to resist handling and erection loads.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Comply with the requirements of ACI 315, making reference to ACI SP-66. Include bar schedules, shapes of bent bars, spacing of bars and locations of splices.
- C. Obtain, and maintain on file, until receipt of a certificate of occupancy, mill test reports and other documentation demonstrating that reinforcing steel and accessories supplied for this project meet or exceed specified requirements.

1.06 QUALITY ASSURANCE

- A. Perform work of this section in accordance with ACI 301 and ACI 318.

- B. Notify testing agency and Architect well in advance of concrete placement. Do not place concrete prior to completion of testing agency's or Architect's representative's review of reinforcement placement.
- C. Welders' Certificates: Submit certifications for welders employed on the project, verifying AWS qualification within the previous 12 months. Provide continuous inspection of all welded reinforcement in accordance with AWS D1.1 and Chapter 17 of the 2006 IBC.

PART 2 PRODUCTS

2.01 REINFORCEMENT

- A. Reinforcing Steel: ASTM A 615/A 615M Grade 60 (420).
 - 1. Deformed billet-steel bars.
 - 2. Unfinished.
- B. Reinforcing Steel for Welded Assemblies, Frame Members Resisting Earthquake-Induced Forces, and Structural Wall Boundary Elements: ASTM A 706/A 706M, deformed low-alloy steel bars or ASTM A 615/A 615M Grade 60 steel complying with ACI 318 Section 21.5.2.1 as modified by IBC Section 1908.1.3.
 - 1. Unfinished.
- C. Fibrous Reinforcing: 100% virgin polypropylene fibers with multi-design gradation, containing no reprocessed olefin materials: Fibermesh InForce e3 Fibrous Concrete Reinforcement manufactured by Fibermesh Division of Synthetic Industries, Incorporated, or approved equal.
- D. Reinforcement Accessories:
 - 1. Tie Wire: ASTM A82, double annealed, minimum 16 gage.
 - 2. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for adequate support of reinforcement during concrete placement.
 - 3. Provide plastic or plastic coated steel components for placement within 1-1/2 inches of weathering surfaces.

2.02 FABRICATION

- A. Fabricate concrete reinforcing in accordance with ACI SP-66 - ACI Detailing Manual and ACI 318.
- B. Welding of reinforcement is permitted only as shown in the drawings or with the specific approval of Architect. Perform welding in accordance with AWS D1.4.
- C. Locate reinforcing splices not indicated on drawings at point of minimum stress, unless shown otherwise in the drawings.
- D. Mix concrete containing fibrous reinforcing in accordance with manufacturer's recommendations, including product data and product technical bulletins.

PART 3 EXECUTION

3.01 PLACEMENT

- A. Place, support and secure reinforcement against displacement. Do not deviate from required position. Comply with tolerance requirements of ACI 117.
- B. Correct placement of reinforcement as directed by testing agency or Architect's representative prior to concrete placement.
- C. Clean reinforcement, removing dirt, oil, grease, paint, rust, form release agent and other materials which would impair bond strength, prior to concrete placement.
- D. Do not displace or damage vapor barriers.
- E. Comply with applicable code for concrete cover over reinforcement.

- F. Add fibrous reinforcing to concrete materials at time concrete is batched in amounts consistent with approved submittals for each type of concrete required.
 - 1. Mix concrete for thorough and uniform distribution of fibrous reinforcing.

3.02 FIELD QUALITY CONTROL

- A. An independent testing agency, as specified in Section 01 40 00 - Quality Requirements, will inspect installed reinforcement for conformance to contract documents before concrete placement.

3.03 WASTE MANAGEMENT

- A. Coordinate with suppliers on reducing packing material, and backhauling of reuse or recycling.
- B. Fold up metal banding, flatten, and place in designated area.

END OF SECTION

SECTION 03 30 00
CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Concrete footings and grade beams.
- B. Concrete slabs-on-grade.
- C. Concrete sidewalks.
- D. Concrete reinforcement.
- E. Concrete curing.

1.02 RELATED REQUIREMENTS

- A. Section 07 19 00 - Water Repellents
- B. Section 32 13 13 - Concrete Paving: Sidewalks, curbs and gutters.
- C. Division 1 - General Requirements

1.03 REFERENCE STANDARDS

- A. ACI 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete; 1991 (Reapproved 2009).
- B. ACI 301 - Specifications for Structural Concrete; 2010 (Errata 2012).
- C. ACI 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete; 2000.
- D. ACI 305R - Hot Weather Concreting; 2010.
- E. ACI 306R - Cold Weather Concreting; 2010.
- F. ACI 308R - Guide to Curing Concrete; 2001 (Reapproved 2008).
- G. ACI 318 - Building Code Requirements for Structural Concrete and Commentary; 2011.
- H. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon Steel Bars for Concrete Reinforcement; 2015.
- I. ASTM C33/C33M - Standard Specification for Concrete Aggregates; 2013.
- J. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens; 2015a.
- K. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete; 2015.
- L. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic-Cement Concrete; 2012.
- M. ASTM C150/C150M - Standard Specification for Portland Cement; 2015.
- N. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete; 2015.
- O. ASTM C1240 - Standard Specification for Silica Fume Used in Cementitious Mixtures; 2014.

1.04 SUBMITTALS

- A. Mix Design Data: Submit two copies of a mix design formula bearing the seal and signature of a Professional Engineer registered in the state of the project to the Architect/Engineer as least 14 days prior to the delivery of concrete to the site. Indicate location for each mix design.
- B. Mix Design: Submit proposed concrete mix design.

1. Indicate proposed mix design complies with requirements of ACI 301, Section 4 - Concrete Mixtures.
 2. Indicate proposed mix design complies with requirements of ACI 318, Chapter 5 - Concrete Quality, Mixing and Placing.
- C. Test Reports: Submit report for each test or series of tests specified.

1.05 QUALITY ASSURANCE

- A. Perform work of this section in accordance with ACI 301 and ACI 318.
- B. Follow recommendations of ACI 305R when concreting during hot weather.
- C. Follow recommendations of ACI 306R when concreting during cold weather.

PART 2 PRODUCTS

2.01 FORMWORK

- A. Design of formwork is the responsibility of the Contractor.
- B. Form Materials: Contractor's choice of standard products with sufficient strength to withstand hydrostatic head without distortion in excess of permitted tolerances.
 1. Form Facing for Exposed Finish Concrete: Contractor's choice of materials that will provide smooth, stain-free final appearance.

2.02 REINFORCEMENT MATERIALS

- A. Reinforcing Steel: ASTM A615/A615M, Grade 60 (60,000 psi).
- B. Reinforcement Accessories:
 1. Tie Wire: Annealed, minimum 16 gage, 0.0508 inch.
 2. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for adequate support of reinforcement during concrete placement.

2.03 CONCRETE MATERIALS

- A. Portland Cement: ASTM C 150, Type I or Type II with maximum equivalent alkalis not to exceed 0.60 percent.
- B. Normal Weight Fine and Coarse Aggregates: ASTM C 33. Alkali reactivity shall be "innocuous" as determined by ASTM C 289.
- C. Fly Ash: ASTM C 618, Class F. Use only fly ash obtained from sources known to produce a uniform product consistently resulting in satisfactory concrete.
- D. Slag: ASTM C989, Class 100. Use only slag obtained from sources known to produce a uniform product consistently resulting in satisfactory concrete.
- E. Silica Fume: ACI 211.1.
- F. Water (and Ice, when used): Clean and not detrimental to concrete. Free of deleterious quantities of oils, acids, alkalis, organic substances or other materials.

2.04 CONCRETE MIX DESIGN

- A. Proportioning Normal Weight Concrete: Comply with ACI 211.1 recommendations.
- B. Concrete Strength: Establish required average strength for each type of concrete on the basis of field experience, as specified in ACI 318 Section 5.3. Submit documentation for review.
- C. Ensure that maximum aggregate sizes used in concrete comply with the ACI 318 based on the member dimensions and clear distances shown in the Drawings and in the reinforcement shop drawings. For

each class of concrete, use the maximum practical aggregate size consistent with this requirement up to 1 1/2 inch.

D. Normal Weight Concrete:

1. Compressive Strength, when tested in accordance with ASTM C 39/C 39M at 28 days: As indicated on drawings.
2. Fly Ash Content: a maximum 25 percent of cementitious materials by weight.
3. Slag Content: a maximum 50 percent of cementitious materials by weight.
4. Silica Fume Content: Maximum 5 percent of cementitious materials by weight.
5. Water-Cement Ratio: Maximum 40 percent by weight.
6. Total Air Content: For concrete exposed to the elements, percentage in accordance with 2003 International Building Code Section 1904.2 and Table 19-A-1 for moderate exposure, measured per ASTM C 173.
7. Maximum Slump: Per Structural General Notes.

2.05 MIXING

- A. Comply with ASTM C 94/C 94M.
- B. Adding Water: If concrete arrives on-site with slump less than suitable for placement, do not add water that exceeds the maximum water-cement ratio or exceeds the maximum permissible slump.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify lines, levels, and dimensions before proceeding with work of this section.

3.02 PREPARATION

- A. Formwork: Comply with requirements of ACI 301. Design and fabricate forms to support all applied loads until concrete is cured, and for easy removal without damage to concrete.
- B. Coordinate placement of embedded items with erection of concrete formwork and placement of form accessories.

3.03 INSTALLING REINFORCEMENT AND OTHER EMBEDDED ITEMS

- A. Comply with requirements of ACI 301. Clean reinforcement of loose rust and mill scale, and accurately position, support, and secure in place to achieve not less than minimum concrete coverage required for protection.

3.04 PLACING CONCRETE

- A. Place concrete in accordance with ACI 304R.
- B. Notify Architect not less than 24 hours prior to commencement of placement operations.
- C. Do not place concrete in footing forms until Geotechnical Engineer has examined the compacted soil and aggregate base materials within the forms.
- D. Ensure reinforcement, inserts, waterstops, embedded parts, and formed construction joint devices will not be disturbed during concrete placement.

3.05 CONCRETE FINISHING

- A. Unexposed Form Finish: Rub down or chip off fins or other raised areas 1/4 inch or more in height.

3.06 CURING AND PROTECTION

- A. Comply with requirements of ACI 308R. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.
- B. Comply with requirements of ACI 308 and with the recommendations of ACI 305R and ACI 306R. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.
- C. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.

3.07 FIELD QUALITY CONTROL

- A. An independent testing agency will perform field quality control tests, as specified in Section 01 40 00 - Quality Requirements.
- B. Provide free access to concrete operations at project site and cooperate with appointed firm.
- C. Submit proposed mix design of each class of concrete to inspection and testing firm for review prior to commencement of concrete operations.
- D. Compressive Strength Tests: ASTM C39/C39M, for each test, mold and cure three concrete test cylinders. Obtain test samples for every 100 cubic yards or less of each class of concrete placed.
- E. Take one additional test cylinder during cold weather concreting, cured on job site under same conditions as concrete it represents.
- F. Perform one slump test for each set of test cylinders taken, following procedures of ASTM C143/C143M.
- G. Perform one air content test for each set of compressive strength specimens, complying ASTM C 31.

3.08 INADEQUATE OR DEFECTIVE CONCRETE

- A. Test Results: The testing agency shall report test results in writing to Architect and Contractor within 24 hours of test.
- B. Defective Concrete: Concrete not complying with required lines, details, dimensions, tolerances or specified requirements.
- C. Architecturally Defective Concrete: Concrete deviating from the approved mock-up to a degree that is not acceptable to the Architect.
- D. Repair or replacement of defective concrete will be determined by the Architect. The cost of additional testing shall be borne by Contractor when defective concrete is identified.
- E. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of Architect for each individual area.

3.09 PROTECTION

- A. Do not permit traffic over unprotected concrete surface until fully cured.
- B. Structurally Inadequate Concrete:
 - 1. Remove and replace, at no cost to the owner, concrete work rejected by the Engineer as lacking adequate structural quality. The cost of additional testing shall be borne by Contractor when structurally inadequate concrete is identified. Possible causes for rejection may include the following:
 - a. Failure to achieve specified minimum compressive strength.
 - b. Excessive plastic shrinkage cracking.
 - c. Slab curling or warping.
 - d. Surface crazing.

- e. Irreparable or widespread surface damage or weakness including rain damage or scaling.
- f. Excessive rock pockets or honeycombing.
- g. Inadequate member size.
- h. Partial or complete formwork failure.
- i. Incorrect reinforcement.

3.10 WASTE MANAGEMENT

- A. Place materials defined as hazardous or toxic waste in designated containers.
- B. Use trigger operated spray nozzles for water hoses.

END OF SECTION

SECTION 04 05 11

MORTAR AND MASONRY GROUT

PART 2 PRODUCTS

1.01 MORTAR AND GROUT APPLICATIONS

- A. Mortar Mix Designs: ASTM C270, Property Specification.

1.02 MATERIALS

- A. Mortar Aggregate: ASTM C144.
- B. Water: Clean and potable.

END OF SECTION

SECTION 04 29 00
ENGINEERED UNIT MASONRY

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Concrete block.
- B. Concrete building brick.
- C. Clay facing brick.
- D. Mortar and grout.
- E. Reinforcement and anchorage.

1.02 RELATED REQUIREMENTS

- A. Section 03200 - Concrete Reinforcing: Reinforcing steel for grouted masonry.
- B. Section 04 05 11 - Mortar and Masonry Grout.
- C. Section 04220 - Concrete Masonry Units
- D. Section 04 25 00 - Unit Masonry Panels.
- E. Section 07 19 00 - Water Repellents

1.03 REFERENCE STANDARDS

- A. ACI 530.1/ASCE 6/TMS 602 - Specification For Masonry Structures; American Concrete Institute International; 2008.
- B. ASTM A82/A82M - Standard Specification for Steel Wire, Plain, for Concrete Reinforcement; 2007.
- C. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon Steel Bars for Concrete Reinforcement; 2015.
- D. ASTM A706/A706M - Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement; 2014.
- E. ASTM C67/C67M - Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile; 2018.
- F. ASTM C90 - Standard Specification for Loadbearing Concrete Masonry Units; 2014.
- G. ASTM C91/C91M - Standard Specification for Masonry Cement; 2012.
- H. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete; 2015.
- I. ASTM C140/C140M - Standard Test Methods of Sampling and Testing Concrete Masonry Units and Related Units; 2014.
- J. ASTM C144 - Standard Specification for Aggregate for Masonry Mortar; 2011.
- K. ASTM C150/C150M - Standard Specification for Portland Cement; 2015.
- L. ASTM C207 - Standard Specification for Hydrated Lime for Masonry Purposes; 2006 (Reapproved 2011).
- M. ASTM C216 - Standard Specification for Facing Brick (Solid Masonry Units Made From Clay or Shale); 2014.
- N. ASTM C270 - Standard Specification for Mortar for Unit Masonry; 2014a.
- O. ASTM C404 - Standard Specification for Aggregates for Masonry Grout; 2011.
- P. ASTM C476 - Standard Specification for Grout for Masonry; 2010.
- Q. ASTM C1019 - Standard Test Method for Sampling and Testing Grout; 2013.
- R. ASTM C1072 - Standard Test Method for Measurement of Masonry Flexural Bond Strength; 2013.

- S. ASTM C1314 - Standard Test Method for Compressive Strength of Masonry Prisms; 2014.
- T. AWS D1.4/D1.4M - Structural Welding Code - Reinforcing Steel; 2011.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data for masonry units, fabricated wire reinforcement, and mortar and grout.
- C. Shop Drawings: Indicate bar sizes, spacings, reinforcement quantities, bending and cutting schedules, reinforcement supporting and spacing devices, and accessories.
- D. Design Data: Indicate required mortar strength, unit assembly strength in each plane, and supporting test data.
- E. Manufacturer's Certificate: Certify that masonry units meet or exceed specified requirements.

1.05 QUALITY ASSURANCE

- A. Comply with provisions of ACI 530/530.1/ERTA, except where exceeded by requirements of Contract Documents.

1.06 PRECONSTRUCTION TESTING

- A. Testing will be conducted by an independent test agency, in accordance with provisions of Section 01 40 00 - Quality Requirements.
- B. Clay Masonry: Test each type of clay masonry in accordance with ASTM C67/C67M.
- C. Compressive Strength: Where indicated, test masonry prisms in accordance with ASTM C1314.
 - 1. Prepare two sets of prisms; test one set at 7 days and the other at 28 days.
 - 2. Clay masonry prisms: Height-to thickness ration of 5.0.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, handle, and store masonry units by means that will prevent mechanical damage and contamination by other materials.

1.08 FIELD CONDITIONS

- A. Cold Weather Requirements: Comply with recommendations ACI 530.1 Section 1.8.
- B. Hot Weather Requirements: Comply with recommendations of ACI 530.1 Section 1.8.

PART 2 PRODUCTS

2.01 CONCRETE MASONRY UNITS

- A. Concrete Block: Comply with referenced standards and as follows:
 - 1. Size: Standard units with nominal face dimensions of 16 by 8 inches and nominal depth of 8 inches.
 - 2. Structural Units: ASTM C90, normal weight.

2.02 BRICK UNITS

- A. Facing Brick: ASTM C216, Type FBS, Grade SW.
 - 1. Actual Size: As indicated on drawings.
 - 2. Special Shapes: Molded units as required by conditions indicated, unless standard units can be sawn to produce equivalent effect.
 - 3. Compressive Strength: As indicated on drawings, measured in accordance with ASTM C67/C67M.

2.03 MORTAR AND GROUT MATERIALS

- A. Masonry Cement: ASTM C91/C91M Type N.
- B. Portland Cement: ASTM C150/C150M, Type I.
 - 1. Hydrated Lime: ASTM C207, Type S.
 - 2. Mortar Aggregate: ASTM C144.
 - 3. Grout Aggregate: ASTM C404.
- C. Water: Clean and potable.
- D. Grout Aggregate: Shall be in accordance with ASTM C404

2.04 REINFORCEMENT AND ANCHORAGE

- A. Reinforcing Steel: ASTM A615/A615M, Grade 40 (40,000 psi) yield strength.
 - 1. Deformed billet-steel bars.
 - 2. Unfinished.
- B. Reinforcing Steel: ASTM A706/A706M, deformed low-alloy steel bars.
 - 1. Unfinished.

2.05 MORTAR MIXES

- A. Mortar for Unit Masonry: ASTM C270, using the Proportion Specification.

2.06 MORTAR MIXING

- A. Thoroughly mix mortar ingredients using mechanical batch mixer, in accordance with ASTM C270 and in quantities needed for immediate use.
- B. Maintain sand uniformly damp immediately before the mixing process.
- C. Do not use anti-freeze compounds to lower the freezing point of mortar.
- D. If water is lost by evaporation, re-temper only within two hours of mixing.

2.07 GROUT MIXES

- A. Engineered Masonry: 3,000 psi strength at 28 days; 8-10 inches slump; provide premixed type in accordance with ASTM C94/C94M.

2.08 GROUT MIXING

- A. Mix grout in accordance with ASTM C94/C94M.
- B. Thoroughly mix grout ingredients in quantities needed for immediate use in accordance with ASTM C476 for fine and coarse grout.

2.09 PRECONSTRUCTION TESTING

- A. Test and evaluate masonry units in accordance with ASTM C 140 procedures and the provision of the Unit Strength Method of ACI 530.1. Strength to be in accordance with Table 1 of the ACI 530.1. For strength requirements for the wall assemble (f'm) see Structural General Notes.
- B. Prism Tests: At contractor's option, Prism Tests in accordance with ACI 530.1 can be completed in lieu of the Unit Strength Method. Test masonry and mortar panels for compressive strength in accordance with ASTM C 1314, and for flexural bond strength in accordance with ASTM C 1072 or ASTM E 518; perform tests and evaluate results as specified in individual masonry sections.

PART 3 EXECUTION**3.01 EXAMINATION**

- A. Verify that field conditions are acceptable and are ready to receive masonry.
- B. Verify that related items provided under other sections are properly sized and located.
- C. Verify that built-in items are in proper location, and ready for roughing into masonry work.

3.02 PREPARATION

- A. Direct and coordinate placement of metal anchors supplied for installation under other sections.
- B. Clean reinforcement of loose rust.
- C. Provide temporary bracing during installation of masonry work. Maintain in place until building structure provides permanent bracing.
- D. For areas where high-lift grouting will be employed, provide cleanout openings as follows:
 - 1. Concrete Masonry: Not less than 8 inches high at the bottom of each cell to be grouted, formed by cutting out face shell of masonry unit.

3.03 COURSING

- A. Establish lines, levels, and coursing indicated. Protect from displacement.
- B. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.
- C. Concrete Masonry Units:
 - 1. Bond: Running.
 - 2. Coursing: One unit and one mortar joint to equal 8 inches.
 - 3. Mortar Joints: Concave.

3.04 PLACING AND BONDING

- A. Lay solid masonry units in full bed of mortar, with full head joints, uniformly jointed with other work.
- B. Lay hollow masonry units with face shell bedding on head and bed joints.
- C. Buttering corners of joints or excessive furrowing of mortar joints is not permitted.
- D. Remove excess mortar as work progresses.
- E. Interlock intersections and external corners, except for units laid in stack bond.
- F. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.
- G. Perform job site cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.
- H. Cut mortar joints flush where wall tile is scheduled or resilient base is scheduled.

3.05 REINFORCEMENT AND ANCHORAGE

- A. Reinforcement Bars: Secure at locations indicated and to avoid displacement during grouting. Minimum spacing between bars or to masonry surfaces shall be one bar diameter.
- B. Reinforced Hollow Unit Masonry: Keep vertical cores to be grouted clear of mortar, including bed area of first course.
 - 1. Bond Beams: At bond beams or other locations for horizontally reinforced masonry, provide special masonry units or saw to accommodate reinforcement.

3.06 GROUTING

- A. Use either high-lift or low-lift grouting techniques, at Contractor's option, subject to other limitations of Contract Documents.
- B. Low-Lift Grouting:
 - 1. Limit height of pours to 16 inches.
 - 2. Limit height of masonry to 16 inches above each pour.
 - 3. Pour grout only after vertical reinforcing is in place; place horizontal reinforcing as grout is poured. Prevent displacement of bars as grout is poured.
 - 4. Place grout for each pour continuously and consolidate immediately; do not interrupt pours for more than 1-1/2 hours.
- C. High-Lift Grouting:
 - 1. Verify that horizontal and vertical reinforcement is in proper position and adequately secured before beginning pours.
 - 2. Clean out masonry cells and other cavities to be grouted by high pressure water spray or compressed air. Remove debris, allow to dry, and inspect before sealing cleanout openings.
 - 3. Brick: Limit pours to maximum 12 feet in height and 25 feet horizontally.
 - 4. Place grout for spanning elements in single, continuous pour.

3.07 CONTROL AND EXPANSION JOINTS

- A. Do not continue horizontal joint reinforcement through control or expansion joints.
- B. Form control joint with a sheet building paper bond breaker fitted to one side of the hollow contour end of the block unit. Fill the resultant core with grout fill. Rake joint at exposed unit faces for placement of backer rod and sealant.
- C. Install preformed control joint device in continuous lengths. Seal butt and corner joints in accordance with manufacturer's instructions.
- D. Size control joints as indicated on drawings; if not indicated, 3/4 inch wide and deep.
- E. Form expansion joint as detailed on drawings.

3.08 BUILT-IN WORK

- A. As work progresses, install built-in metal door frames and other items to be built into the work and furnished under other sections.
- B. Install built-in items plumb, level, and true to line.
- C. Bed anchors of metal door and glazed frames in adjacent mortar joints. Fill frame voids solid with grout.
- D. Do not build into masonry construction organic materials that are subject to deterioration.

3.09 TOLERANCES

- A. Maximum Variation from Alignment of Columns: 1/4 inch.
- B. Maximum Variation From Unit to Adjacent Unit: 1/16 inch.
- C. Maximum Variation from Plane of Wall: 1/4 inch in 10 ft and 1/2 inch in 20 ft or more.
- D. Maximum Variation from Plumb: 1/4 inch per story non-cumulative; 1/2 inch in two stories or more.
- E. Maximum Variation from Level Coursing: 1/8 inch in 3 ft and 1/4 inch in 10 ft; 1/2 inch in 30 ft.
- F. Maximum Variation of Joint Thickness: 1/8 inch in 3 ft.
- G. Maximum Variation from Cross Sectional Thickness of Walls: 1/4 inch.

3.10 CUTTING AND FITTING

- A. Cut and fit for chases. Coordinate with other sections of work to provide correct size, shape, and location.
- B. Obtain approval prior to cutting or fitting masonry work not indicated or where appearance or strength of masonry work may be impaired.

3.11 FIELD QUALITY CONTROL

- A. An independent testing agency will perform field quality control tests, as specified in Section 01 40 00 - Quality Requirements.
- B. Test and evaluate masonry units in accordance with ASTM C 140 procedures and the provisions of the ACI 530.1. Strength to be in accordance with Table 1 of the ACI 530.1. For strength requirements for the wall assemble (f'm) see Structural General Notes.
- C. Prism Tests: At contractor's option, Prism Tests in accordance with ACI 530.1 can be completed in lieu of the Unit Strength Method. Test masonry and mortar panels for compressive strength in accordance with ASTM C 1314, and for flexural bond strength in accordance with ASTM C 1072 or ASTM E 518; perform tests and evaluate results as specified in individual masonry sections.

3.12 CLEANING

- A. Remove excess mortar and mortar smears as work progresses.
- B. Replace defective mortar. Match adjacent work.
- C. Clean soiled surfaces with cleaning solution.
- D. Use non-metallic tools in cleaning operations.

3.13 PROTECTION

- A. Without damaging completed work, provide protective boards at exposed external corners that are subject to damage by construction activities.

END OF SECTION

SECTION 05 12 00
STRUCTURAL STEEL FRAMING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Structural steel framing members.
- B. Steel columns, base plates and anchor bolts, with nuts and washers.
- C. Steel purlins, beams and girders.
- D. Steel edge angles, closures, stiffeners, continuity plates and shear tabs.
- E. Other steel framing and accessories.
- F. Shop and field welding.
- G. Field bolting.
- H. Grouting beneath steel base plates.

1.02 RELATED REQUIREMENTS

- A. Section 03660 - Grout: Grout beneath steel base plates.
- B. Section 05 21 00 - STEEL JOISTS.
- C. Section 05 31 00 - Steel Decking: Support framing for small openings in deck.
- D. Section 05 50 00 - Metal Fabrications: Steel fabrications affecting structural steel work.

1.03 REFERENCE STANDARDS

- A. AISC (MAN) - Steel Construction Manual; 2011.
- B. AISC 303 - Code of Standard Practice for Steel Buildings and Bridges; 2016.
- C. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.
- D. ASTM A108 - Standard Specification for Steel Bar, Carbon and Alloy, Cold Finished; 2013.
- E. ASTM A 194/A 194 M - Standard Specification for Carbon and Alloy Steel Nuts and Bolts for High Pressure or High Temperature Service, or both.
- F. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength; 2014.
- G. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2013.
- H. ASTM A563 - Standard Specification for Carbon and Alloy Steel Nuts; 2007a (Reapproved 2014).
- I. ASTM A563M - Standard Specification for Carbon and Alloy Steel Nuts [Metric]; 2007.
- J. ASTM A992/A992M - Standard Specification for Structural Steel Shapes; 2011 (Reapproved 2015).
- K. ASTM B 695 - Standard Specification for Coatings of Zinc Mechanically Deposited on Iron and Steel.
- L. ASTM C1107/C1107M - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink); 2014.
- M. ASTM E164 - Standard Practice for Contact Ultrasonic Testing of Weldments; 2013.
- N. ASTM F436/F436M - Standard Specification for Hardened Steel Washers Inch and Metric Dimensions; 2016.
- O. ASTM F1554 - Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength; 2007a.

- P. ASTM F 1852 - Standard Specification for "Twist Off" Type Tension Control Structural Bolt/Nut/Washer Assemblies, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
- Q. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; 2012.
- R. AWS A5.1 - Specification for Carbon Steel Electrodes for Shielded Metal Arc Welding; American Welding Society.
- S. AWS A
- T. AWS A5.17-A5.17M - Specification for Carbon Steel Electrodes and Fluxes for Submerged Arc Welding; American Welding Society.
- U. AWS A5.20 - Specification for Carbon Steel Electrodes for Flux Cored Arc Welding; American Welding Society.
- V. AWS A5.23-A5.23M - Specification for Low Alloy Steel Electrodes and Fluxes for Submerged Arc Welding; American Welding Society.
- W. AWS A5.29 - Specification for Low Alloy Steel Electrodes for Flux Cored Arc Welding; American Welding Society.
- X. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2015.
- Y. AWS D1.8/D1.8M - structural Welding Code - Seismic Supplement.
- Z. RCSC (HSBOLT) - Specification for Structural Joints Using High-Strength Bolts; Research Council on Structural Connections; 2009.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings:
 - 1. Indicate profiles, sizes, spacing, locations of structural members, openings, attachments, and fasteners.
 - 2. Submit the entire structural steel submittal package at one time. Exceptions can be requested by the contractor prior to the first submittal to expedite the construction schedule by sub-dividing the submittal package.
 - 3. Connections not detailed.
 - 4. Indicate welded connections with AWS A2.4 welding symbols. Indicate net weld lengths.
- C. Manufacturer's Mill Certificate: Certify that products meet or exceed specified requirements.
- D. Welders Certificates: Certify welders employed on the Work, verifying AWS qualification within the previous 12 months. For Demand Critical Welds indicated in the drawings welders to have Supplemental Welder Qualifications in accordance with AWS D1.8/D1.8M.
- E. Quality Assurance Plan (QAP): For the Seismic Force Resisting System (SFRS) and Demand Critical Welds indicated in the drawings submit a QAP in accordance with AWS D1.8/D1.8M.

1.05 QUALITY ASSURANCE

- A. Fabricate structural steel members in accordance with AISC (MAN) "Steel Construction Manual."
- B. Structural steel members designated as architecturally-exposed structural steel (AESS) to also comply with Section 05 12 13.
- C. Welding of Demand Critical welds indicated in the drawings to be in accordance with AWS D1.8/D1.8M.
- D. Design connections not detailed on drawings under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in Oregon.

PART 2 PRODUCTS**2.01 MATERIALS**

- A. Steel Framing
 - 1. See Structural General Notes in Drawings for specification and grade of framing members.
- B. Fasteners, Anchor Bolts, Threaded Round Bars and Connectors:
 - 1. High-Strength Bolts, Nuts, and Washers: ASTM A 325 (ASTM A 325M), Type 1, medium carbon, plain, with ASTM A 563 (ASTM A 563M), Grade C, plain heavy hex nuts and ASTM F 436 (ASTM F 436M), Type 1, plain washers, where required.
 - 2. "Twist Off" Type Tension Control Structural Bolt/Nut/Washer Assemblies, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength (Equivalent to ASTM A 325): ASTM F 1852, Type 1, medium carbon, mechanically galvanized to ASTM B 695, Class 50, with ASTM A 563 (ASTM A 563M), Grade DH or ASTM A 194/A 194M, Grade 2H, mechanically galvanized heavy hex nuts and ASTM F 436 (ASTM F 436M), Type 1, mechanically galvanized washers, where required.
- C. Unheaded Anchor Rods: ASTM F1554, Grade 36, plain, with matching ASTM A563 or ASTM A563M nuts and ASTM F436/F436M Type 1 washers.
- D. Accessory Materials:
 - 1. Welding Electrodes (Filler Metal) and Fluxes:
 - a. Use electrodes and fluxes conforming to AWS A5.1, AWS A5.5, AWS A5.17, AWS A5.20, AWS A5.23 or AWS A5.29.
 - b. Use prequalified base metal/filler metal combinations in accordance with AWS D1.1.
 - c. Use filler metals classified for nominal 70 ksi tensile strength and complying with the following minimum mechanical property requirements for welds on members comprising the Seismic-Force-Resisting System.
 - 1) Minimum Charpy V-Notch toughness of 20 foot-pounds at 0 degrees Fahrenheit, using AWS A5 classification test methods.
 - 2) Minimum Charpy V-Notch toughness of 40 foot-pounds at 70 degrees Fahrenheit, using the test procedures prescribed in Appendix A of Part I of FEMA 353.
 - 3) Minimum yield strength of 58 ksi using both the AWS A5 classification test (for E70 classification electrodes) and the test procedures prescribed in Appendix A of Part I of FEMA 353.
 - 4) Minimum tensile strength of 70 ksi using both the AWS A5 classification test (for E70 classification electrodes) and the test procedures prescribed in Appendix A of Part I of FEMA 353.
 - 5) Minimum elongation of 22 percent using both the AWS A5 classification test (for E70 classification electrodes) and the test procedures prescribed in Appendix A of Part I of FEMA 353.
 - 2. Bolted members comprising the Seismic-Force-Resisting System to use pretensioned high-strength bolts. All faying surfaces shall be prepared as required for Class A or better Slip-Critical Joints. Use twist off tension control bolts.
 - 3. Members comprising the Seismic-Force-Resisting System include:
 - a. Beams and columns of ordinary moment-resisting frames.
 - b. Beams and columns of special moment-resisting frames.
 - c. Beams, columns and braces of ordinary concentric braced frames.
 - d. Beams, columns and braces of special concentric braced frames.
 - e. Beams, columns and braces of eccentric braced frames.
 - 4. Grout: See Section 03 30 00.
 - 5. Shop and Touch-Up Primer: Fabricator's standard, complying with VOC limitations of authorities having jurisdiction.

2.02 FABRICATION

- A. Shop fabricate to greatest extent possible.

2.03 FINISH

- A. Shop prime structural steel members. Do not prime surfaces that will be field welded, in contact with concrete, or high strength bolted.

2.04 SOURCE QUALITY CONTROL

- A. High-Strength Bolts indicated as Slip Critical (SC) on the drawings: Provide testing and verification of shop-bolted connections in accordance with AISC "Specification for Structural Joints Using ASTM A325 or A490 Bolts", testing at least 100 percent of bolts at each connection.
- B. Welded Connections: Visually inspect all shop-welded connections and test at least 25 percent of full pen welds using one of the following:
 - 1. Ultrasonic testing performed in accordance with ASTM E164.
 - 2. For Demand Critical Welds indicated in the drawings testing to be performed in accordance with ASTM E164 and D1.8/D1.8M.

PART 3 EXECUTION**3.01 EXAMINATION**

- A. Verify that conditions are appropriate for erection of structural steel and that the work may properly proceed.

3.02 ERECTION

- A. Erect structural steel in compliance with AISC 303.
- B. Allow for erection loads, and provide sufficient temporary bracing to maintain structure in safe condition, plumb, and in true alignment until completion of erection and installation of permanent bracing.
- C. Use carbon steel bolts only for temporary bracing during construction, unless otherwise specifically permitted on drawings. Install high-strength bolts in accordance with RCSC (HSBOLT) "Specification for Structural Joints Using High-Strength Bolts".
- D. Do not field cut or alter structural members without approval of Architect or Engineer.
- E. After erection, prime welds, abrasions, and surfaces not shop primed, except surfaces to be in contact with concrete.
- F. Grout solidly between column plates and bearing surfaces, complying with manufacturer's instructions for nonshrink grout. Trowel grouted surfaces smooth, splaying neatly to 45 degrees.

3.03 TOLERANCES

- A. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.
- B. Maximum Offset From True Alignment: 1/4 inch.

3.04 FIELD QUALITY CONTROL

- A. An independent testing agency will perform field quality control tests, as specified in Section 01 40 00 - Quality Requirements.
- B. High-Strength Bolts Indicated as Slip Critical (SC) on the drawings: Provide testing and verification of field-bolted connections in accordance with AISC "Specification for Structural Joints Using ASTM A325 or A490 Bolts", testing at least 100 percent of bolts at each connection.

- C. Welded Connections: Visually inspect all field-welded connections and test at least 25 percent of full pen welds using one of the following:
 - 1. Ultrasonic testing performed in accordance with ASTM E164.
 - 2. For Demand Critical welds, provide testing performed in accordance with ASM E164 and AWS 1.8/1.8M.

3.05 WASTE MANAGEMENT

- A. Coordinate with suppliers on reducing packing material, and backhauling of reuse or recycling.
- B. Fold up metal banding, flatten, and place in designated area.

END OF SECTION

SECTION 05 21 00**STEEL JOISTS****PART 1 GENERAL****1.01 SECTION INCLUDES DESIGN & BUILD**

- A. Open web standard joists, long span joists, deep long span joists, and joist girders.
- B. Bolts, welds, joist bridging and accessories in accordance with SJI requirements.

1.02 RELATED REQUIREMENTS

- A. Section 05 12 00 - Structural Steel: Structural steel framing and accessories.
- B. Section 05 31 00 - Steel Decking: Bearing plates and angles.
- C. Section 05 50 00 - Metal Fabrications: Non-framing steel fabrications attached to joists.
- D. Section 09900 Paints and Coatings: Field painting of joists.

1.03 DESIGN REQUIREMENTS

- A. Design joists and joist girders to meet requirements of SJI Standard Specifications.
- B. Design joists and joist girders to support the loads specified on the structural drawings. Properly account for the distribution of concentrated loads, live loads, net wind uplift and for the effect of openings. The General Contractor shall coordinate all mechanical, electrical, plumbing, and sprinkler equipment loads with the joist designer.
- C. Design joists and joist girders to the following live load deflection criteria: (L = span length, center-to-center of bearing)
 - 1. Roof joists: Vertical deflection not over 1/240 of the span.
- D. Design bottom-chord bridging and bolted diagonal bridging for net wind uplift under design wind load. Design bridging to meet SJI slenderness ratio criteria. Bridging shall not develop continuity in the joist system unless continuity has been provided for in the design of the joists as indicated in the Drawings.
 - 1. Do not develop continuity in the joist system unless it has been provided for on the drawings.
- E. Comply with provisions of SJI Standard specifications and OSHA regulations relating to stability during erection.

1.04 SUBMITTALS

- A. See Section 01300, for submittal procedures.
- B. Shop Drawings: Submit shop drawings indicating loading, standard designations, configurations, sizes, spacings, cambers, locations of joists, bridging, connections, attachments, extended ends, extended top chords, extended bottom chords, and bottom chord ceiling extensions.
- C. Calculations: Submit structural calculations bearing the seal of a qualified engineer registered in Oregon.
- D. Certification: Per International Building Code (latest edition) Section 2206.5, the joist manufacturer is to submit a certificate of compliance stating that the shop drawings and calculations were prepared in accordance with approved construction documents and with SJI standard specifications.
- E. Welders' Certificates: Submit manufacturer's certificates, certifying welders employed on the Work, verifying AWS qualification within the previous 12 months.

1.05 QUALITY ASSURANCE

- A. Design for the load designations specified on the structural drawings, properly accounting for the distribution of concentrated loads, live loads, net wind uplift, and for the effects of openings. Contractor to coordinate all mechanical, electrical, plumbing, and sprinkler equipment loads with the joist designer. Designs to meet the requirements of SJI.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Transport, handle, store, and protect products in conformance with SJI Technical Digest No. 9.
- B. Store products off the ground on wood sleepers.

PART 2 PRODUCTS**2.01 MANUFACTURERS**

- A. Steel Joists and Joist Girders:
 - 1. CMC Joist: www.cmcjoist.com.
 - 2. Nucor-Vulcraft Group: www.vulcraft.com/#sle.
- B. Wood Screws for Attachment of Joist Top-Chord Nailers:
 - 1. Simpson Strong-Tie Company, Inc.
 - 2. United Steel Products Company (USP)

2.02 COMPONENTS

- A. Open Web Joists: Types as indicated on drawings:
 - 1. Provide bottom and top chord extensions as indicated.
 - 2. Minimum End Bearing on Concrete or Masonry Supports: Comply with referenced SJI standard.
 - 3. Finish: Shop primed.
- B. Anchor Bolts, Nuts and Washers: ASTM A 307, plain, or galvanized to ASTM 153 where connecting galvanized components and all exterior components.
- C. High Strength Bolts, Nuts and Washers for Splices: ASTM A325 (A325 M). Use ASTM F 1852 (matched sets of twist-off spline type).
- D. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.
- E. Shop and Touch-Up Primer: SSPC-Paint 15, Type I, red oxide, complying with VOC limitations of authorities having jurisdiction.
- F. Wood Screws for Attachment of Joist Top-Chord Nailers: AISI 1022 steel (SAE Grade 5) with hex washer head, yellow zinc dichromate finish, type-17 self-drilling tip and built-in reamer. Size: 1/4" diameter by 2 inch length.

2.03 FABRICATION

- A. Fabricate joists in accordance with:
 - 1. Reviewed Shop Drawings.
 - 2. SJI Standard Specifications, and SJI Recommended Code of Standard Practice for Steel Joists and Joist Girders.
- B. Extensions: Provide joist extended ends, extended top chords, extended bottom chords, and bottom chord ceiling extensions where indicated.
- C. Bearing:
 - 1. Provide sloped bearing seats where joist or joist girder slope exceeds 1/4" in 12".
 - 2. Provide bearing lengths in accordance with SJI requirements unless greater bearing lengths are shown on the Drawings.

2.04 FINISH

- A. Shop prime joists as specified.
- B. Remove loose scale, rust, and other foreign material from fabricated joists, joist girders and accessories. Prepare surfaces to be finished in accordance with SSPC-SP 2.

PART 3 EXECUTION**3.01 EXAMINATION**

- A. Verify existing conditions prior to beginning work. Verify completed construction will permit erection of joists and joist girders and will provide adequate support.

3.02 ERECTION

- A. Erect steel joists and joist girders in accordance with Drawings, reviewed Shop Drawings, SJI Standard Specifications, SJI Technical Digest No. 9 and OSHA regulations.
- B. Erect joists and joist girders with correct bearing on supports.
- C. Allow for erection loads. Provide sufficient temporary bracing to maintain framing safe, plumb, and in true alignment.
- D. After joist alignment and installation of framing, field weld joist seats to steel bearing surfaces.
- E. Position joists and joist girders to achieve:
 - 1. Horizontal sweep not over 1/360 of span.
 - 2. Vertical misalignment not over 1/48 of joist or joist girder depth.
 - 3. Variation from plumb not over 1/4 inch.
 - 4. Variation from true alignment at seats not over 1/4 inch.
- F. After alignment, positioning, and installation of bridging in the case of joists, field weld joist and joist girder seats to supports. Comply with AWD D1.1.
- G. Do not permit erection of decking until joists are braced and bridged.
- H. Do not field cut or alter structural members without written approval of Architect or Engineer.
- I. After erection, prime welds, damaged shop primer, and surfaces not shop primed .

3.03 TOLERANCES

- A. Maximum Variation From Plumb: 1/4 inch.
- B. Maximum Offset From True Alignment: 1/4 inch.

3.04 FIELD QUALITY CONTROL

- A. Assist independent testing agency in performing field quality control tests, as specified in Section 01400.
- B. High-Strength Bolts: Independent testing agency will provide testing and verification of field-bolted connections in accordance with AISC Allowable Stress Design Specification for Structural Joints Using ASTM A325 or A490 Bolts.
- C. Welded Connections:
 - 1. Independent testing agency will provide visually inspection of field-welded connections.
- D. Adjusting Defective Work:
 - 1. Repair rejected field welds.
 - 2. Replace or repair damaged or defective components.
 - 3. Clean field welds, bolted connections and abraded areas, and apply same type primer paint as used in shop.

3.05 WASTE MANAGEMENT

- A. Coordinate with suppliers on reducing packing material, and backhauling of reuse or recycling.
- B. Fold up metal banding, flatten, and place in designated area.

END OF SECTION

SECTION 05 31 00**STEEL DECKING****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Roof deck.
- B. Supplementary framing for openings up to and including 18 inches.
- C. Bearing plates and angles.

1.02 RELATED REQUIREMENTS

- A. Section 04 29 00 - Engineered Unit Masonry: Placement of anchors for bearing plates embedded in reinforced unit masonry.
- B. Section 05 12 00 - Structural Steel Framing: Support framing for openings larger than 18 inches and shear stud connectors.

1.03 REFERENCE STANDARDS

- A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.
- B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.
- C. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2015.
- D. AWS D1.3/D1.3M - Structural Welding Code - Sheet Steel; 2008.
- E. SDI (DM) - Publication No.30, Design Manual for Composite Decks, Form Decks, and Roof Decks; 2007.
- F. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); 2002 (Ed. 2004).

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittals procedures.
- B. Shop Drawings: Indicate deck plan, support locations, projections, openings, reinforcement, pertinent details, and accessories.
- C. Welders Certificates: Certify welders employed on the Work, verifying AWS qualification within the previous 12 months.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing the work of this Section with minimum 3 years of experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Cut plastic wrap to encourage ventilation.
- B. Separate sheets and store deck on dry wood sleepers; slope for positive drainage.

PART 2 PRODUCTS**2.01 MANUFACTURERS**

- A. Steel Deck:
 - 1. Verco Manufacturing Co.
 - 2. ASC Steel Deck: www.ascsd.com

3. Nucor-Vulcraft Group; ____: www.vulcraft.com/#sle.
4. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 STEEL DECK

- A. Roof Deck: Non-composite type, fluted steel sheet:
 1. Galvanized Steel Sheet: ASTM A653/A653M, Structural Steel (SS) Grade 33/230, with G90/Z275 galvanized coating.
 - a. Minimum yield stress $F_y = 38$ ksi.
 2. See Drawings for deck gage, height, type, side lap connection type and spacing, and attachment to supports.
 3. Formed Sheet Width: 36 inch.
 4. End Bearing: 2" minimum.
 5. Sheet Length: Sufficient to span at least three supports where framing configuration permits.

2.03 ACCESSORY MATERIALS

- A. Bearing Plates and Angles: ASTM A36/A36M steel, unfinished.
- B. Welding Materials: AWS D1.1/D1.1M.
- C. Weld Washers: Mild steel, uncoated, 3/4 inch outside diameter, 1/8 inch thick.
- D. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, complying with VOC limitations of authorities having jurisdiction.

2.04 FABRICATED DECK ACCESSORIES

- A. Sheet Metal Deck Accessories: Metal closure strips, wet concrete stops, and cover plates, 22 gage, 0.0299 inch thick sheet steel; of profile and size as indicated; finished same as deck.
- B. Roof Sump Pans: Formed sheet steel, 14 gage, 0.0747 inch minimum thickness, flat bottom, sloped sides, recessed 1-1/2 inches below roof deck surface, bearing flange 3 inches wide, sealed watertight.
- C. Hanger Clips: Use clips having ICBO approval.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Erect metal deck in accordance with SDI Design Manual and manufacturer's instructions. Align and level.
- B. On steel supports provide minimum 1-1/2 inch bearing.
- C. Fasten deck to steel support members at ends and intermediate supports at 12 inches on center maximum, parallel with the deck flute and at each transverse flute using methods indicated on drawings.
- D. Weld deck in accordance with AWS D1.3/D1.3M.
- E. Where deck (other than cellular deck electrical raceway) changes direction, install 6 inch minimum wide sheet steel cover plates, of same thickness as deck. Fusion weld 12 inches on center maximum.
- F. At openings between deck and walls, columns, and openings, provide sheet steel closures and angle flashings to close openings.
- G. Position roof drain pans with flange bearing on top surface of deck. Fusion weld at each deck flute.
- H. Immediately after welding deck and other metal components in position, coat welds, burned areas, and damaged surface coating, with touch-up primer.

3.02 FIELD QUALITY CONTROL

- A. An independent testing agency will perform field quality control tests, as specified in Section 01400.
- B. Welded Connections: Visually inspect all field-welded connections

END OF SECTION

SECTION 05 40 00
COLD-FORMED METAL FRAMING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Formed steel stud exterior wall framing.
- B. Formed steel joist framing and bridging.

1.02 RELATED REQUIREMENTS

- A. Section 04 20 01 - Masonry Veneer: Veneer masonry supported by wall stud metal framing.
- B. Section 05 31 00 - Steel Decking.
- C. Section 06 10 00 - Rough Carpentry: Wood blocking and miscellaneous framing.
- D. Section 01 35 15 - LEED Requirements.

1.03 REFERENCE STANDARDS

- A. AISI S100-12 - North American Specification for the Design of Cold-Formed Steel Structural Members; American Iron and Steel Institute; 2012.
- B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.
- C. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable; 2015.
- D. ASTM C955 - Standard Specification for Load-Bearing (Transverse and Axial) Steel Studs, Runners (Tracks), and Bracing or Bridging for Screw Application of Gypsum Panel Products and Metal Plaster Bases; 2011c.
- E. ASTM C1007 - Standard Specification for Installation of Load Bearing (Transverse and Axial) Steel Studs and Related Accessories; 2011a.
- F. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2015.
- G. AWS D1.3/D1.3M - Structural Welding Code - Sheet Steel; 2008.
- H. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer; 1999 (Ed. 2004).
- I. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); 2002 (Ed. 2004).

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate with work of other sections that is to be installed in or adjacent to the metal framing system, including but not limited to structural anchors, cladding anchors, utilities, insulation, and firestopping.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on standard framing members; describe materials and finish, product criteria, and limitations.
- C. Manufacturer's Installation Instructions: Indicate special procedures, conditions requiring special attention .

1.06 PROJECT CONDITIONS

- A. Verify that field measurements are as indicated on the drawings.

PART 2 PRODUCTS**2.01 MANUFACTURERS**

- A. Framing Connectors and Accessories:

2.02 FRAMING SYSTEM

- A. Provide primary and secondary framing members, bridging, bracing, plates, gussets, clips, fittings, reinforcement, and fastenings as required to provide a complete framing system.
- B. Metal Framing Connectors and Accessories:
 - 1. Same manufacturer as framing.

2.03 FRAMING MATERIALS

- A. Studs and Track: ASTM C955; studs formed to channel, "C", or "Sigma" shape with punched web; U-shaped track in matching nominal width and compatible height.
 - 1. Gage and Depth: As indicated on drawings.
 - 2. Galvanized in accordance with ASTM A653/A653M, G90/Z275 coating.
 - 3. Section properties in accordance with ICBO Report ER-4943P
- B. Joists and Purlins: Fabricated from ASTM A653/A653M steel sheet, with G90/Z275 hot dipped galvanized coating.
 - 1. Base Metal: Structural Steel (SS), Grade 33/230.
 - 2. Gage and Depth: As indicated on drawings.
 - 3. Section properties in accordance with ICBO Report ER-4943P
- C. Framing Connectors: Factory-made, formed steel sheet.
 - 1. Material: ASTM A653/A653M SS Grade 33 and 40 (minimum), with G90/Z275 hot dipped galvanized coating for base metal thickness less than 10 gage, 0.1345 inch, and factory punched holes and slots.
 - 2. Structural Performance: Maintain load and movement capacity required by applicable code, when evaluated in accordance with AISI S100-12.
 - 3. Movement Connections: Provide mechanical anchorage devices that accommodate movement using slotted holes, shouldered screws or screws and anti-friction or stepped bushings, while maintaining structural performance of framing. Provide movement connections where indicated on drawings.
 - a. Where continuous studs bypass elevated floor slab, connect stud to slab in manner allowing vertical and horizontal movement of slab without affecting studs; allow for minimum movement of 1/2 inch.
 - b. Where top of stud wall terminates below structural floor or roof, connect studs to structure in manner allowing vertical and horizontal movement of slab without affecting studs; allow for minimum movement of 1/2 inch.
 - c. Provide top track preassembled with connection devices spaced to fit stud spacing indicated on drawings; minimum track length of 10 feet.
 - 4. Fixed Connections: Provide non-movement connections for tie-down to foundation, floor-to-floor tie-down, roof-to-wall tie-down, joist hangers, gusset plates, and stiffeners.

2.04 ACCESSORIES

- A. Bracing, Furring, Bridging: Formed sheet steel, thickness determined for conditions encountered; finish to match framing components.

- B. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic, complying with VOC limitations of authorities having jurisdiction and LEED limitations as specified.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that substrate surfaces are ready to receive work.

3.02 INSTALLATION OF STUDS

- A. Install components in accordance with manufacturers' instructions and ASTM C1007 requirements.
- B. Align floor and ceiling tracks; locate to wall layout. Secure in place with fasteners at maximum 24 inches on center. Coordinate installation of sealant with floor and ceiling tracks.
- C. Place studs at 16 inches on center; not more than 2 inches from abutting walls and at each side of openings. Connect studs to tracks using clip and tie method.
- D. Construct corners using minimum of three studs. Install double studs at wall openings, door and window jambs.
- E. Install load bearing studs full length in one piece. Splicing of studs is not permitted.
- F. Install load bearing studs, brace, and reinforce to develop full strength and achieve design requirements.
- G. Coordinate placement of insulation in multiple stud spaces made inaccessible after erection.
- H. Install intermediate studs above and below openings to align with wall stud spacing.
- I. Provide deflection allowance in stud track, directly below horizontal building framing at non-load bearing framing.
- J. Attach cross studs to studs for attachment of fixtures anchored to walls.
- K. Install framing between studs for attachment of mechanical and electrical items, and to prevent stud rotation.
- L. Touch-up field welds and damaged galvanized surfaces with primer.

3.03 INSTALLATION OF JOISTS AND PURLINS

- A. Install framing components in accordance with manufacturer's instructions.
- B. Make provisions for erection stresses. Provide temporary alignment and bracing.
- C. Set ceiling joists parallel and level, with lateral bracing and bridging.
- D. Locate joist end bearing directly over load bearing studs or provide load distributing member to top of stud track.
- E. Provide web stiffeners at reaction points.
- F. Touch-up field welds and damaged galvanized surfaces with primer.

3.04 FIELD QUALITY CONTROL

- A. An independent testing agency will perform field quality control tests, as specified in Section 01 40 00.
- B. Welded Connections: Visually inspect all field-welded connections.

3.05 ERECTION TOLERANCES

- A. Maximum Variation from True Position: 1/2 inch.

- B. Maximum Variation of any Member from Plane: 1/2 inch.

END OF SECTION

SECTION 06 10 00
ROUGH CARPENTRY

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Structural dimension lumber framing.
- B. Sheathing.
- C. Roofing nailers.
- D. Preservative treated wood materials.
- E. Miscellaneous framing, blocking, bridging and sheathing.

1.02 RELATED REQUIREMENTS

- A. Section 01 74 19- Construction Waste Management: Waste Management Plan requirements.
- B. Section 05 12 00 - Structural Steel Framing: Prefabricated beams and columns for support of wood framing.
- C. Section 05 50 00 - Metal Fabrications: Miscellaneous steel connectors and support angles for wood framing.
- D. Section 06 17 53 - Shop-Fabricated Wood Trusses.
- E. Section 07 25 00 - Weather Barriers: Water-resistive barrier over sheathing.
- F. Section 07 72 00 - Roof Accessories: Roof hatches.
- G. Section 09 21 16 - Gypsum Board Assemblies: Gypsum-based sheathing.

1.03 REFERENCE STANDARDS

- A. AWC (WFCM) - Wood Frame Construction Manual for One- and Two-Family Dwellings; 2015.
- B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.
- C. AWC (WFCM) - Wood Frame Construction Manual for One- and Two-Family Dwellings; 2015.
- D. AWPA U1 - Use Category System: User Specification for Treated Wood; 2012.
- E. PS 1 - Structural Plywood; 2009.
- F. PS 20 - American Softwood Lumber Standard; 2010.
- G. WCLIB (GR) - Standard Grading Rules for West Coast Lumber No. 17; 2004, and supplements.
- H. WWPA G-5 - Western Lumber Grading Rules; 2011.

1.04 QUALITY ASSURANCE

- A. Lumber: Comply with PS 20 and approved grading rules and inspection agencies.
 - 1. Acceptable Lumber Inspection Agencies: WCLB and WWPA.
- B. Sheathing Regulatory Requirements:
 - 1. Comply with applicable recommendations in APA E 30, Design/Construction Guide-Residential and Commercial.
 - 2. Comply with PS 1 (ANSI A 199.1) or, for products not manufactured under PS 1 provisions, with applicable APA Performance Standard for type of panel indicated.
 - 3. Furnish laminated wood panels graded by American Plywood Association (APA).

1.05 DELIVERY, STORAGE, AND HANDLING

- A. General: Cover wood products to protect against moisture. Support stacked products to prevent deformation and to allow air circulation.
- B. Sheathing acceptance at Site: Examine panels upon delivery and reject panels which are delivered with broken corners or edges crushed by bundling straps or other means.

PART 2 PRODUCTS**2.01 GENERAL REQUIREMENTS**

- A. Dimension Lumber: Comply with PS 20 and requirements of specified grading agencies.
 - 1. Species: Douglas Fir-Larch, unless otherwise indicated.
 - 2. Grading Agency: Any grading agency whose rules are approved by the Board of Review, American Lumber Standard Committee (www.alsc.org) and who provides grading service for the species and grade specified; provide lumber stamped with grade mark unless otherwise indicated.
- B. Lumber fabricated from old growth timber is not permitted.
- C. Provide wood harvested within a 500 mile radius of the project site.

2.02 DIMENSION LUMBER FOR CONCEALED APPLICATIONS

- A. Grading Agency: West Coast Lumber Inspection Bureau; WCLIB (GR).
- B. Grading Agency: Western Wood Products Association; WWPA G-5.
- C. Sizes: Nominal sizes as indicated on drawings, S4S.
- D. Moisture Content: S-dry or MC19.
- E. Stud Framing (2 by 2 through 2 by 6):
 - 1. Species: Douglas Fir-Larch.
 - 2. Grade: No. 2.
- F. Joist, Rafter, and Small Beam Framing (2 by 6 through 4 by 16):
 - 1. Species: Douglas Fir-Larch.
 - 2. Grade: No. 2.
- G. Miscellaneous Framing, Blocking, Nailers, Grounds, and Furring:
 - 1. Lumber: S4S, No. 2 or Standard Grade.
- H. Miscellaneous Blocking, Furring, and Nailers:
 - 1. Wood Panel Blocking:
 - a. Industry Standard: APA, Construction and Industrial Softwood Plywood, PS 1.
 - b. OSB Blocking: 1/2 inch thick, Oriented Strand Board, Index 24/0, exterior glue, square edges, APA Rated, Struc-One by Weyerhaeuser

2.03 EXPOSED DIMENSION LUMBER

- A. Grading Agency: West Coast Lumber Inspection Bureau; WCLIB (GR).
- B. Grading Agency: Western Wood Products Association; WWPA G-5.
- C. Sizes: Nominal sizes as indicated on drawings.
- D. Surfacing: S4S.
- E. Sizes: Nominal sizes as indicated on drawings, S4S.
- F. Moisture Content: S-dry or MC19.
- G. Stud Framing (2 by 2 through 2 by 6):
 - 1. Species: Douglas Fir-Larch.
 - 2. Grade: No. 1 or better.

- H. Joist, Rafter, and Small Beam Framing (2 by 6 through 4 by 16):
 - 1. Species: Douglas Fir-Larch.
 - 2. Grade: No. 1 or better.

2.04 EXPOSED BOARDS

- A. Submit manufacturer's certificate that products meet or exceed specified requirements, in lieu of grade stamping.
- B. Moisture Content: Kiln-dry (15 percent maximum).
- C. Surfacing: S4S.
- D. Species: Douglas Fir.
- E. Grade: No. 1, 1 Common, or Select.

2.05 CONSTRUCTION PANELS

- A. Plywood Roof Sheathing: 1/2 or 5/8 inch thick unless otherwise noted, C-D Interior with exterior glue, square edges, Index 24/0 or 32/16, APA Rated, Exposure 1.
- B. OSB Roof Sheathing: 7/16 inch thick unless otherwise noted, Oriented Strand Board, Index 24/16, exterior glue, square edges, APA Rated, Struc-One by Weyerhaeuser.
- C. Plywood Roof Sheathing at Exposed Eaves: Exposure , APA Rated1, Match adjacent sheathing thickness, C-C plugged, Exterior with exterior glue, square edges, touch-sanded with paint grade finish on exposed face.
- D. OSB Wall Sheathing: 1/2 inch thick unless otherwise noted, Oriented Strand Board, Index 24/0, exterior glue, square edges, APA Rated, Struc-One by Weyerhaeuser.

2.06 ACCESSORIES

- A. Fasteners (Nails, Staples & Sheathing Screws):
 - 1. Industry Standard for Nails and Staples: FS FF-N-105.
 - 2. Nails for Framing, Floor Sheathing, and Underlayment: Common; Submit alternate nailing types to A/E for review of type and spacing.
 - 3. Exterior, Wet Area and Preservative Treated Wood: Hot Dip Galvanized Common wire nails, except as indicated otherwise.
 - 4. Interior Dry Area Wood: Cadmium plated Common wire nails, except as indicated otherwise.
 - 5. Fastener Lengths: As indicated in minimum nailing schedule and of size which will not penetrate framing members which will be exposed or will receive finish materials.
 - 6. Staples for Wood Sheathing and Underlayment: 14 gage steel.
 - 7. Screws: Bugle head screws, Type S or Type W, in size recommended by sheathing manufacturer for thickness of sheathing and type of framing.
- B. Joist Hangers and Strapping: Hot dipped galvanized steel for wet, high humidity, and treated wood locations; Cadmium plated elsewhere. Size to suit framing conditions.
 - 1. For contact with preservative treated wood in exposed locations, provide minimum G185 galvanizing per ASTM A 653/A 653M.
 - 2. Size to suit framing conditions
 - 3. Manufacturer: Simpson Strong Tie
- C. Steel Framing Connectors:
 - 1. Indicated Manufacturer: Numbers indicated on Drawings are from Simpson Strong-Tie Company, Inc.
 - 2. Other Manufacturers: P.H. Bowman, Cleveland Steel Specialty, Harlen Metal Products KC Metal Products, Silver Metal Products, and Teco connectors of same strength are acceptable.

3. Finish for Connectors to be Installed in Exterior and Wet Interior Locations: Hot-Dip galvanized to comply with ASTM A 153.
 4. Finish for Connectors to be Installed in Dry Interior Locations: Manufacturer's standard rust inhibitive prime coating or zinc coating.
- D. Bolts, Nuts, Washers, and Screws:
1. Lag Screws and Lag Bolts: FS FF-B-561, square or hex head.
 2. Wood Screws: FF-S-11D, flat head carbon steel.
 3. Bolts: FS FF-B-575.
 4. Nuts: FS FF-N-836.
 5. Machine Screws: FS FF-S-92, cadmium plated steel.
 6. Plain Washers: FS FF-W-92, round carbon steel.
 7. Lock Washers: FS FF-W-84, helical spring carbon steel.
 8. Expansion Shields: FS FF-S-325.
 9. Toggle Bolts: FS FF-B-588, tumble wing type.
- E. Powder Driven Fasteners and Anchors:
1. Acceptable Fasteners: Powder Driven Fasteners by Hilti or Ramset.
 2. Concrete Anchors: Kwik-Bolt or Sleeve Anchor by Hilti, Red Head Wedge Anchors by Phillips, Trubolt or Dynabolt by Ramset, Strongbolt 2 by Simpson, Rawl-Bolt or Rawl-Stud by Rawlplug, Parabolt by U.S.M.
 3. Masonry Anchors: Sleeve Anchor by Hilti, Strongbolt by Simpson, Red Head Sleeve Anchor by Phillips.
- F. Anchor Finish & Type:
1. Metal and Finish: Hot-dipped galvanized steel complying with ASTM A153/A153M for high humidity and preservative-treated wood locations, unfinished steel elsewhere.
- G. Water-Resistive Barrier: As specified in Section 07 25 00.

2.07 FACTORY WOOD TREATMENT

- A. Treated Lumber and Plywood: Comply with requirements of AWWA U1 - Use Category System for wood treatments determined by use categories, expected service conditions, and specific applications.
1. Preservative-Treated Wood: Provide lumber and plywood marked or stamped by an ALSC-accredited testing agency, certifying level and type of treatment in accordance with AWWA standards.
- B. Preservative Pressure Treatment of Lumber Above Grade: AWWA U1, Use Category UC3B, Commodity Specification A using waterborne preservative.
1. Kiln dry lumber after treatment to maximum moisture content of 19 percent.
 2. Treat lumber in contact with roofing, flashing, or waterproofing.
 3. Treat lumber in contact with masonry or concrete.
 4. Treat lumber less than 18 inches above grade.
 - a. Treat lumber in other locations as indicated.
- C. Preservative Pressure Treatment of Lumber in Contact with Soil: AWWA U1, Use Category UC4A, Commodity Specification A using waterborne preservative.
1. Preservative for Field Application to Cut Surfaces: As recommended by manufacturer of factory treatment chemicals for brush-application in the field.
 2. Restrictions: Do not use lumber or plywood treated with chromated copper arsenate (CCA) in exposed exterior applications subject to leaching.

PART 3 EXECUTION**3.01 PREPARATION**

- A. Where wood framing bears on cementitious foundations, install full width sill flashing continuous over top of foundation, lap ends of flashing minimum of 4 inches and seal.
- B. Install sill gasket under sill plate of framed walls bearing on foundations; puncture gasket cleanly to fit tightly around protruding anchor bolts.
- C. Coordinate installation of rough carpentry members specified in other sections.

3.02 INSTALLATION - GENERAL

- A. Select material sizes to minimize waste.
- B. Reuse scrap to the greatest extent possible; clearly separate scrap for use on site as accessory components, including: shims, bracing, and blocking.
- C. Where treated wood is used on interior, provide temporary ventilation during and immediately after installation sufficient to remove indoor air contaminants.

3.03 FRAMING INSTALLATION

- A. Set structural members level, plumb, and true to line. Discard pieces with defects that would lower required strength or result in unacceptable appearance of exposed members.
- B. Make provisions for temporary construction loads, and provide temporary bracing sufficient to maintain structure in true alignment and safe condition until completion of erection and installation of permanent bracing.
- C. Install structural members full length without splices unless otherwise specifically detailed.
- D. Comply with member sizes, spacing, and configurations indicated, and fastener size and spacing indicated, but not less than required by applicable codes, and AWC (WFCM) Wood Frame Construction Manual.
- E. Install horizontal spanning members with crown edge up and not less than 1-1/2 inches of bearing at each end.
- F. Construct double joist headers at floor and ceiling openings and under wall stud partitions that are parallel to floor joists; use metal joist hangers unless otherwise detailed.
- G. Frame wall openings with two or more studs at each jamb; support headers on cripple studs.

3.04 BLOCKING, NAILERS, AND SUPPORTS

- A. Provide framing and blocking members as indicated or as required to support finishes, fixtures, specialty items, and trim.
- B. In framed assemblies that have concealed spaces, provide solid wood fireblocking as required by applicable local code, to close concealed draft openings between floors and between top story and roof/attic space; other material acceptable to code authorities may be used in lieu of solid wood blocking.
- C. In walls, provide blocking attached to studs as backing and support for wall-mounted items, unless item can be securely fastened to two or more studs or other method of support is explicitly indicated.
- D. Where ceiling-mounting is indicated, provide blocking and supplementary supports above ceiling, unless other method of support is explicitly indicated.

3.05 ROOF-RELATED CARPENTRY

- A. Coordinate installation of roofing carpentry with deck construction, framing of roof openings, and roofing assembly installation.
- B. Install joists and rafters at not more than 24 inches on center and at spacing indicated on Drawings.
- C. Install studs at not more than 16 inches on center and at spacing indicated on Drawings.
- D. Install single bottom plates and double top plates, except where indicated otherwise.
- E. Single top plates may be installed at interior nonload bearing walls.
- F. Overlap top plates at corners, intersections, and ends.
- G. Triple studs at corners and wall intersections.
- H. Install framing with 1/4 inch maximum deviation from indicated alignment.
- I. Install preservative treated framing at locations indicated on Drawings.
- J. Do not splice structural framing members between supports.

3.06 INSTALLATION OF BLOCKING

- A. Install 2 inch nominal thick blocking as indicated and as required to support toilet accessories, cabinets, toilet compartments, plumbing, fire protection, mechanical, and electrical equipment.
- B. Install blocking for wall mounted door stops in wood framed walls.
- C. Install solid blocking between joists and rafters at bearing walls and beams.
- D. Install blocking between studs at wood-framed walls and partitions at floor and ceiling lines.
- E. Install smoke stop blocking at double stud wood-framed walls and partitions at maximum horizontal intervals of 10 feet.
- F. Install smoke stop blocking along and in line with the run of each stairway in adjacent wood stud walls and partitions.
- G. Install smoke stop blocking at all similar combustible blind spaces exceeding 10 feet in any dimension to the effect that a barrier to the passage of flame is provided at maximum intervals, both vertical and horizontal, of 10 feet.
- H. Anchor wood blocking and bridging to substrates to support applied loads.
- I. Install 2 inch nominal thick by width of stud blocking at mid-height of single story walls over 8 feet high and at mid-height of multistory walls.

3.07 INSTALLATION OF BRIDGING

- A. Install code-required bridging between structural joists, rafters and trusses.

3.08 INSTALLATION OF STEEL CONNECTORS FOR WOOD FRAMING

- A. Install connectors indicated with nails or bolts of sizes and types specified by manufacturer of connector.

3.09 NAILING AND BOLTING

- A. Minimum nailing in accordance with the General Notes and on the Drawings.
- B. Install washers under nuts and under bolt heads bearing on wood.
- C. Soap threads of lag bolts prior to installing.
- D. Install fasteners for plates to foundation using anchor bolts at not more than 48 inches on center or powder driven fasteners at not more than 32 inches on center.

- E. Drill Lag Bolt Holes 9/16 inch diameter for 3/4 inch bolts and 1/2 inch diameter for 5/8 inch bolts.
- F. Drill Machine Bolt Holes 1/16 inch larger than bolt diameter.
- G. Furnish bolts with threads for nuts not bearing on wood.
- H. Enlarge lag bolt holes to shank diameter for length of unthreaded shank.
- I. Do not drive lag screws, wood screws, and lag bolts.
- J. Predrill nail holes and screw holes when required to prevent wood splitting.

3.10 INSTALLATION OF TEMPORARY SUPPORT

- A. Adequately brace structure for wind and earthquake forces until roof and wall panels have been secured.

3.11 INSTALLATION OF CONSTRUCTION PANELS

- A. Roof Sheathing: Secure panels with face grain perpendicular to framing. Sheet ends to be over firm bearing.
 - 1. Provide solid edge blocking between sheets as indicated on the Drawings.
 - 2. Nail panels to wood framing; staples are not permitted. Screw panels to metal framing.
 - 3. Eliminate sheathing pieces less than 1 foot wide with adjustments in layout.
 - 4. Space sheathing panels as recommended by sheathing manufacturer
- B. Wall Sheathing: Secure with long dimension perpendicular to wall studs, with ends over firm bearing and staggered, using screws.
 - 1. Provide solid edge blocking between sheets.
 - 2. Screw panels to framing; staples are not permitted.
 - 3. Eliminate sheathing pieces less than 1 foot wide with adjustments in layout.
 - 4. Space sheathing panels as recommended by sheathing manufacturer
- C. Communications and Electrical Room Mounting Boards: Secure with screws to studs with edges over firm bearing; space fasteners at maximum 24 inches on center on all edges and into studs in field of board.
 - 1. At fire-rated walls, install board over wall board indicated as part of the fire-rated assembly.
 - 2. Where boards are indicated as full floor-to-ceiling height, install with long edge of board parallel to studs.
 - 3. Install adjacent boards without gaps.
- D. Provide miscellaneous panels for electrical and mechanical items as may be required by their manufacturer's and authorities having jurisdiction.

3.12 MINIMUM FASTENING SCHEDULE

- A. Wood Sheathing Fastening
 - 1. Roof Sheathing: 8d Common nails or bugle head screws, 6 inches on center at interior walls, roof edges, and panel edges and 12 inches on center at panel interior.
 - 2. Wall and Soffit Sheathing: 8d Common nails or bugle head screws, 6 inches on center at wall, soffit and panel edges and 12 inches on center at panel interior.
- B. Wood Panel Blocking:
 - 1. Blocking at Steel Framing: Screw wood panels to steel studs and runners with bugle head screws at 8 inches on center.
 - 2. Blocking at Wood Framing: Screw wood panels to wood studs and joists with bugle head screws at 8 inches on center

3.13 CLEANING

- A. Waste Disposal: Comply with the requirements of Section 01 74 19 - Construction Waste Management and Disposal.
- B. Do not leave any wood, shavings, sawdust, etc. on the ground or buried in fill.
- C. Prevent sawdust and wood shavings from entering the storm drainage system.

3.14 COMPLETION

- A. Remove split and warped framing prior to installation of sheathing and gypsum wall panels.
- B. Adjust framing to comply with location and deflection requirements of National Design Specifications.
- C. Adjusting Defective Work: Remove and replace defective sheathing and underlayment panels and panels with edges split or damaged by fasteners.
- D. Daily Cleaning: Remove excess wood, sawdust, and loose fasteners from the site.
- E. Final Cleaning: Remove fasteners, gypsum dust, wood sawdust, and unused panel pieces from the site.

END OF SECTION

SECTION 07 19 00
WATER REPELLENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Water repellents applied to exterior masonry, cast stone, and concrete surfaces.
- B. Water repellents applied to concrete and masonry to protect from graffiti.

1.02 RELATED SECTIONS

- A. Section 04 20 00 - Concrete Masonry Units

1.03 REFERENCE STANDARDS

- A. ASTM D3960 - Standard Practice for Determining Volatile Organic Compound (VOC) Content of Paints and Related Coatings; 2005 (Reapproved 2013).
- B. ASTM D5095 - Standard Test Method for Determination of the Nonvolatile Content in Silanes, Siloxanes, and Silane-Siloxane Blends Used in Masonry Water Repellent Treatments; 1991 (Reapproved 2013).

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene a meeting at least one week prior to starting work; require attendance of affected installers; invite Architect and Owner.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide product description.
- C. Manufacturer's Installation Instructions: Indicate special procedures and conditions requiring special attention; cautionary procedures required during application.
- D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- E. Manufacturer's Field Reports: Report whether manufacturer's "best practices" are being followed; if not, state corrective recommendations. Email report to Architect the same day as inspection occurs; mail report on manufacturer's letterhead to Architect within 2 days after inspection.
- F. Manufacturer's Qualification Statement.
- G. Installer's Qualification Statement.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years documented experience.
- B. Installer Qualifications: Company specializing in performing work of type specified and with at least three years of documented experience

1.07 MOCK-UP

- A. Prepare a representative surface 36 inch by 36 inch in size using specified materials and preparation and application methods on surfaces identical to those to be coated; approved mock-up constitutes standard for workmanship.
- B. Locate where directed.

- C. Mock-up may remain as part of the Work.

1.08 PRE-INSTALLATION MEETING

- A. Convene a meeting at least one week prior to starting work; require attendance of affected installers; invite Architect and Owner.

1.09 FIELD CONDITIONS

- A. Protect liquid materials from freezing.
- B. Do not apply water repellent when ambient temperature is lower than 50 degrees F or higher than 100 degrees F.

1.10 EXTRA MATERIALS

- A. See Section 01 60 00 - Product Requirements, for additional provisions.
- B. Provide two gallons of water repellent.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Silane, Siloxane, Silane-Siloxane Blend, and Siliconate Water Repellents:
 - 1. BASF Construction Chemicals: www.buildingsystems.basf.com/#sle.
 - 2. PROSOCO, Inc: www.prosoco.com/#sle.
 - 3. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 MATERIALS

- A. Exact Anti Graffiti product to be used will be determined by side-by-side mock-up testing of at least 3 products meeting specified requirements; prepare mock ups as specified above; submit cost breakdown for each product used in mock-up, including both unit and total costs. Coating by same manufacturer as Water Repellent, compatible with repellent.
- B. Water Repellent: Non-glossy, colorless, penetrating, water-vapor-permeable, non-yellowing sealer, that dries invisibly leaving appearance of substrate unchanged.
 - 1. Applications: Vertical surfaces and non-traffic horizontal surfaces.
 - 2. Number of Coats: Two.
- C. Products: Water-based siloxane, silane, or blend that reacts chemically with concrete and masonry; minimum seven percent nonvolatile content.
 - 1. PROSOCO Sure Klean Weather Seal Siloxane PD undiluted.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify joint sealants are installed and cured.
- C. Verify surfaces to be coated are dry, clean, and free of efflorescence, oil, or other matter detrimental to application of water repellent.

3.02 PREPARATION

- A. Protection of Adjacent Work:
 - 1. Protect adjacent landscaping, property, and vehicles from drips and overspray.
 - 2. Protect adjacent surfaces not intended to receive water repellent.

- B. Prepare surfaces to be coated as recommended by water repellent manufacturer for best results.
- C. Remove loose particles and foreign matter.
- D. Scrub and rinse surfaces with water and let dry.
- E. Allow surfaces to dry completely to degree recommended by water repellent manufacturer before starting coating work.

3.03 APPLICATION

- A. Apply water repellent in accordance with manufacturer's instructions, using procedures and application methods recommended as producing the best results.
- B. Apply two coats, minimum.
- C. Remove water repellent from unintended surfaces immediately by a method instructed by water repellent manufacturer.
- D. Provide manufacturer's field service representative to inspect preparation and application work continuously during entire application period to ensure that manufacturer's "best practices" for preparation and application are being followed.

END OF SECTION

SECTION 07 21 00
THERMAL INSULATION

PART 1 GENERAL**1.01 SECTION INCLUDES**

- A. Board insulation and integral vapor retarder at cavity wall construction and over roof deck Systems specified in other Sections.
- B. Batt insulation and vapor retarder in exterior wall construction.
- C. Batt insulation for filling perimeter window and door shim spaces and crevices in exterior wall and roof.

1.02 REFERENCE STANDARDS

- A. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2010.
- B. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation; 2015a.
- C. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2012.
- D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.
- E. ASTM E136 - Standard Test Method for Behavior of Materials in a Vertical Tube Furnace At 750 Degrees C; 2012.
- F. FM DS 1-28 - Wind Design; 2007.

1.03 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on product characteristics, performance criteria, and product limitations.
- C. Manufacturer's Installation Instructions: Include information on special environmental conditions required for installation and installation techniques.

PART 2 PRODUCTS**2.01 MANUFACTURERS****2.02 APPLICATIONS**

- A. Insulation in Metal Framed Walls: Batt insulation with separate vapor retarder.
- B. Insulation Over Roof Deck: Polyisocyanurate board.

2.03 FOAM BOARD INSULATION MATERIALS

- A. Polyisocyanurate (ISO) Board Insulation: Rigid cellular foam, complying with ASTM C1289.
 - 1. Classifications:
 - a. Type I: Faced with aluminum foil on both major surfaces of the core foam.
 - 1) Class 1 - Non-reinforced core foam.
 - 2) Compressive Strength: 16 psi, minimum.
 - 3) Thermal Resistance, R-value: 22, At 3-1/2" thick at 75 degrees F.
 - 2. Board Size: 48 inch by 96 inch.
 - 3. Board Thickness: 3.5 inch.
 - 4. Board Edges: Square.
 - 5. Manufacturers:

- a. Johns Manville; AP Foil-Faced: www.jm.com/#sle.
- b. Substitutions: See Section 01 60 00 - Product Requirements.

2.04 BATT INSULATION MATERIALS

- A. Where batt insulation is indicated, either glass fiber or mineral fiber batt insulation may be used, at Contractor's option.
- B. Glass Fiber Batt Insulation: Flexible preformed batt or blanket, complying with ASTM C665; friction fit.
 1. Combustibility: Non-combustible, when tested in accordance with ASTM E136, except for facing, if any.
- C. Mineral Fiber Batt Insulation: Flexible or semi-rigid preformed batt or blanket, complying with ASTM C665; friction fit; unfaced flame spread index of 0 (zero) when tested in accordance with ASTM E84.
 1. Smoke Developed Index: 0 (zero), when tested in accordance with ASTM E84.

2.05 ACCESSORIES

- A. Tape: Reinforced polyethylene film with acrylic pressure sensitive adhesive.
 1. Application: Sealing of interior circular penetrations, such as pipes or cables.
 2. Width: Are required for application.
- B. Tape: Bright aluminum self-adhering type, mesh reinforced, 2 inch wide.
- C. Tape joints of rigid insulation in accordance with roofing and insulation manufacturers' instructions.
- D. Insulation Fasteners: Appropriate for purpose intended and approved by roofing manufacturer.
- E. Protection Board for Below Grade Insulation: Cementitious, 1/2 inch thick.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that substrate, adjacent materials, and insulation materials are dry and that substrates are ready to receive insulation.
- B. Verify substrate surfaces are flat, free of honeycomb, fins, or irregularities.

3.02 BOARD INSTALLATION OVER LOW SLOPE ROOF DECK

- A. Board Installation Over Roof Deck, General:
 1. See applicable roofing specification section for specific board installation requirements.
 2. Fasten insulation to deck in accordance with roofing manufacturer's written instructions.
 3. Do not apply more insulation than can be covered with roofing in same day.

3.03 BATT INSTALLATION

- A. Install insulation and vapor retarder in accordance with manufacturer's instructions.
- B. Install in exterior wall and roof spaces without gaps or voids. Do not compress insulation.
- C. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.
- D. Fit insulation tightly in cavities and tightly to exterior side of mechanical and electrical services within the plane of the insulation.
- E. At metal framing, place vapor retarder on warm side of insulation; lap and seal sheet retarder joints over member face.
- F. Tape seal tears or cuts in vapor retarder.
- G. Extend vapor retarder tightly to full perimeter of adjacent window and door frames and other items interrupting the plane of the membrane. Tape seal in place.

3.04 FIELD QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements, for additional requirements.
- B. PROTECTION
 - 1. Do not permit installed insulation to be damaged prior to its concealment.

END OF SECTION

SECTION 07 21 19
FOAMED-IN-PLACE INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Foamed-in-place insulation.
 - 1. At junctions of dissimilar wall and roof materials.
- B. Foamed-in-place intumescent insulation, monolithic system.

1.02 REFERENCE STANDARDS

- A. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2010.
- B. ASTM D1621 - Standard Test Method for Compressive Properties Of Rigid Cellular Plastics; 2010.
- C. ASTM D1622/D1622M - Standard Test Method for Apparent Density of Rigid Cellular Plastics; 2014.
- D. ASTM D1623 - Standard Test Method for Tensile And Tensile Adhesion Properties of Rigid Cellular Plastics; 2009.
- E. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.
- F. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2014.
- G. ASTM E2178 - Standard Test Method for Air Permeance of Building Materials; 2013.

1.03 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide product description, insulation properties, overcoat properties, and preparation requirements.
- C. ABAA Field Quality Control Submittals: Submit third-party reports of testing and inspection as required by ABAA QAP.
- D. Manufacturer's Installation Instructions: Indicate special procedures, and perimeter conditions requiring special attention.
- E. ABAA Manufacturer Qualification: Submit documentation of current evaluation of proposed manufacturer and materials.
- F. Installer Qualification: Submit documentation of current contractor accreditation and current installer certification. Keep copies of all contractor accreditation and installer certification on site during and after installation. Present on-site documentation upon request.

1.04 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing work of the type specified, with minimum three years documented experience, and approved by manufacturer.
- B. Air Barrier Association of America (ABAA) Quality Assurance Program (QAP); www.airbarrier.org/#sle:
 - 1. Installer Qualification: Use accredited contractor, certified installers, evaluated materials, and third-party field quality control audit.
 - 2. Manufacturer Qualification: Use evaluated materials from a single manufacturer regularly engaged in air barrier material manufacture. Use secondary materials approved in writing by primary material manufacturer.

1.05 FIELD CONDITIONS

- A. Do not apply foam when temperature is below that specified by the manufacturer for ambient air and substrate.

PART 2 PRODUCTS**2.01 MANUFACTURERS**

- A. Foamed-In-Place Insulation:
 - 1. BASF Corporation; WALLTITE US Series Closed Cell: www.spf.basf.com/#sle.
 - 2. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 MATERIALS

- A. Foamed-In-Place Intumescent Insulation (Monolithic System): Medium-density, rigid, two-part, closed cell polyurethane foam; foamed on-site using blowing agent of non-ozone-depleting gas.
 - 1. Thermal Resistance: R-value of 4.6, minimum, per 1 inch thickness at 140 degrees F mean temperature, at 90 days, when tested in accordance with ASTM C518.
 - 2. Water Vapor Permeance: 0.99 perms, maximum, when tested at 2.4 inch thickness in accordance with ASTM E96/E96M.
 - 3. Air Permeance: 0.0014 cfm per square foot, maximum, when tested at 1-1/4 inch thickness in accordance with ASTM E2178 at 1.57 psf.
 - 4. Closed Cell Content: At least 90 percent.
 - 5. Density: 2.0 lbs/cu ft, nominal, in accordance with ASTM D1622/D1622M.
 - 6. Tensile Strength: 28 psi, minimum, in accordance with ASTM D1623.
 - 7. Compressive Strength: 22 psi, minimum, in accordance with ASTM D1621.
 - 8. Surface Burning Characteristics: Flame spread/Smoke developed index of 25/450, maximum, at 4 inch thick when tested in accordance with ASTM E84.

2.03 ACCESSORIES

- A. Primer: As required by insulation manufacturer.

PART 3 EXECUTION**3.01 EXAMINATION**

- A. Verify work within construction spaces or crevices is complete prior to insulation application.
- B. Verify that surfaces are clean, dry, and free of matter that may inhibit insulation or overcoat adhesion.

3.02 PREPARATION

- A. Mask and protect adjacent surfaces from over spray or dusting.
- B. Apply primer in accordance with manufacturer's instructions.

3.03 APPLICATION

- A. Apply insulation in accordance with manufacturer's instructions.

3.04 FIELD QUALITY CONTROL

- A. Field inspections and tests will be performed by an independent testing agency under provisions of Section 01 40 00 - Quality Requirements.

3.05 PROTECTION

- A. Do not permit subsequent construction work to disturb applied insulation.

END OF SECTION

SECTION 07 25 00
WEATHER BARRIERS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Water-Resistive Barrier: Under exterior wall cladding, over sheathing or other substrate; not air tight or vapor retardant.
- B. Vapor Retarders: Materials to make exterior walls, joints between exterior walls and roof, joints around frames of openings in exterior walls, and _____ water vapor resistant and air tight.

1.02 DEFINITIONS

- A. Weather Barrier: Assemblies that form either water-resistive barriers, air barriers, or vapor retarders.
- B. Vapor Retarder: Air tight barrier made of material that is relatively water vapor impermeable, to the degree specified, with sealed seams and with sealed joints to adjacent surfaces.
 - 1. Water Vapor Permeance: For purposes of conversion, $57.2 \text{ ng}/(\text{Pa s sq m}) = 1 \text{ perm}$.
- C. Water-Resistive Barrier: Water-shedding barrier made of material that is moisture resistant, to the degree specified, intended to be installed to shed water without sealed seams.

1.03 REFERENCE STANDARDS

- A. AATCC Test Method 127 - Water Resistance: Hydrostatic Pressure Test; 2014.
- B. ASTM D1970/D1970M - Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection; 2013.
- C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.
- D. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2014.
- E. ASTM E2178 - Standard Test Method for Air Permeance of Building Materials; 2013.
- F. ICC-ES AC308 - Acceptance Criteria for Water-Resistive Barriers; ICC Evaluation Service, Inc; 2013.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on material characteristics.
- C. Shop Drawings: Provide drawings of special joint conditions.
- D. Manufacturer's Installation Instructions: Indicate preparation.

PART 2 PRODUCTS

2.01 WEATHER BARRIER ASSEMBLIES

- A. Water-Resistive Barrier: Provide on exterior walls under exterior cladding.
- B. Interior Vapor Retarder:
 - 1. On inside face of studs of exterior walls, under cladding, use mechanically fastened vapor retarder sheet.

2.02 AIR BARRIER MATERIALS (WATER VAPOR PERMEABLE AND WATER-RESISTIVE)

- A. Air Barrier Sheet, Mechanically Fastened:
 - 1. Air Permeance: 0.004 cubic feet per minute per square foot, maximum, when tested in accordance with ASTM E2178.

2. Water Vapor Permeance: 5 perms, minimum, when tested in accordance with ASTM E96/E96M Procedure A (desiccant procedure).
3. Ultraviolet (UV) and Weathering Resistance: Approved in writing by manufacturer for up to 180 days of weather exposure.
4. Surface Burning Characteristics: Flame spread index of 25 or less, and smoke developed index of 50 or less, when tested in accordance with ASTM E84.
5. Seam and Perimeter Tape: Polyethylene self adhering type, mesh reinforced, 2 inches wide, compatible with sheet material; unless otherwise specified.
6. Manufacturers:
 - a. DuPont Building Innovations; Tyvek Commercial Wrap with Tyvek Fluid Applied Flashing - Brush Formulation, Tyvek Fluid Applied Flashing and Joint Compound, FlexWrap NF, StraightFlash, StraightFlash VF, Tyvek Wrap Caps, and Tyvek Tape: www.dupont.com/#sle.
 - b. Fortifiber Building Systems Group; WeatherSmart Commercial: www.fortifiber.com/#sle.
 - c. Substitutions: See Section 01 60 00 - Product Requirements.

2.03 VAPOR RETARDER MATERIALS (AIR BARRIER AND WATER-RESISTIVE)

2.04 ACCESSORIES

- A. Flexible Flashing: Self-adhesive sheet flashing complying with ASTM D1970/D1970M, except slip resistance requirement is waived if not installed on a roof.
 1. Composition: Modified bituminous sheet laminated to polyethylene sheet.
- B. Sill Plate Sealer: Closed-cell foam tape with rubberized adhesive membrane; bridges gap between foundation structure and sill plate or skirt board.
 1. Width: match stud size inches.
 2. Width: Match stud size
 3. Ultraviolet (UV) and Weathering Resistance: Approved in writing by manufacturer for up to 30 days of weather exposure.
- C. Thinners and Cleaners: As recommended by material manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces and conditions are ready to accept the work of this section.

3.02 PREPARATION

- A. Remove projections, protruding fasteners, and loose or foreign matter that might interfere with proper installation.

3.03 INSTALLATION

- A. Install materials in accordance with manufacturer's instructions.
- B. Air Barriers: Install continuous air tight barrier over surfaces indicated, with sealed seams and with sealed joints to adjacent surfaces.
- C. Vapor Retarders: Install continuous air tight barrier over surfaces indicated, with sealed seams and with sealed joints to adjacent surfaces.
- D. Mechanically Fastened Sheets - On Exterior:
 1. Install sheets shingle-fashion to shed water, with seams generally horizontal.
 2. Overlap seams as recommended by manufacturer but at least 6 inches.
 3. Overlap at outside and inside corners as recommended by manufacturer but at least 12 inches.

4. For applications specified to be air tight, seal seams, laps, penetrations, tears, and cuts with self-adhesive tape; use only large-headed, gasketed fasteners recommended by the manufacturer.
 5. Install air barrier and vapor retarder UNDER jamb flashings.
 6. Install head flashings under weather barrier.
 7. At openings to be filled with frames having nailing flanges, wrap excess sheet into opening; at head, seal sheet over flange and flashing.
- E. Mechanically Fastened Sheets - Vapor Retarder On Interior:
1. When insulation is to be installed in assembly, install vapor retarder over insulation.
 2. Seal seams, laps, perimeter edges, penetrations, tears, and cuts with self-adhesive tape, making air tight seal.
 3. Locate laps at a framing member; at laps fasten one sheet to framing member then tape overlapping sheet to first sheet.
 4. Seal entire perimeter to structure, window and door frames, and other penetrations.
 5. Where conduit, pipes, wires, ducts, outlet boxes, and other items are installed in insulation cavity, pass vapor retarder sheet behind item but over insulation and maintain air tight seal.
- F. Openings and Penetrations in Exterior Weather Barriers:
1. Install flashing over sills, covering entire sill frame member, extending at least 5 inches onto weather barrier and at least 6 inches up jambs; mechanically fasten stretched edges.
 2. At openings to be filled with frames having nailing flanges, seal head and jamb flanges using a continuous bead of sealant compressed by flange and cover flanges with sealing tape at least 4 inches wide; do not seal sill flange.
 3. At openings to be filled with non-flanged frames, seal weather barrier to each side of opening framing, using flashing at least 9 inches wide, covering entire depth of framing.
 4. At head of openings, install flashing under weather barrier extending at least 2 inches beyond face of jambs; seal weather barrier to flashing.
 5. At interior face of openings, seal gap between window/door frame and rough framing, using joint sealant over backer rod.
 6. Service and Other Penetrations: Form flashing around penetrating item and seal to weather barrier surface.

3.04 FIELD QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements, for additional requirements.
- B. Coordination of ABAA Tests and Inspections:
1. Provide testing and inspection required by ABAA QAP.
 2. Notify ABAA in writing of schedule for air barrier work, and allow adequate time for testing and inspection.
 3. Cooperate with ABAA testing agency.
 4. Allow access to air barrier work areas and staging.
 5. Do not cover air barrier work until tested, inspected, and accepted.
- C. Obtain approval of installation procedures by the weather barrier manufacturer based on a mock-up installed in place, prior to proceeding with remainder of installation.
- D. Take digital photographs of each portion of the installation prior to covering up.

3.05 PROTECTION

- A. Do not leave materials exposed to weather longer than recommended by manufacturer.

END OF SECTION

SECTION 07 46 46
FIBER-CEMENT SIDING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Wood-fiber cement panel siding.

1.02 RELATED REQUIREMENTS

- A. Section 06 10 00 - Rough Carpentry: Siding substrate.
- B. Section 07 25 00 - Weather Barriers: Weather barrier under siding.
- C. Section 09 91 13 - Exterior Painting: Field painting.

1.03 REFERENCE STANDARDS

- A. ASTM C1186 - Standard Specification for Flat Fiber Cement Sheets; 2008 (Reapproved 2012).

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Submit manufacturer's data sheets on each product to be used, including:
 - 1. Manufacturer's requirements for related materials to be installed by others.
 - 2. Preparation instructions and recommendations.
 - 3. Storage and handling requirements and recommendations.
 - 4. Installation methods, including nail patterns.
- C. Installer's Qualification Statement.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing work of the type specified in this section with minimum three years of experience.

1.06 MOCK-UP

- A. Install siding materials on wall mock-up specified in Section 01 40 00 Quality Requirements.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Store products under waterproof cover and elevated above grade, on a flat surface.

PART 2 PRODUCTS

2.01 FIBER-CEMENT SIDING

- A. Lap Siding: Individual horizontal boards made of cement and cellulose fiber formed under high pressure with integral surface texture, complying to ASTM C1186, Type A, Grade II; with machined edges, for nail attachment.
 - 1. Style: Standard lap style.
 - 2. Texture: Smooth.
 - 3. Width (Height): 9-1/4 inches.
 - 4. Thickness: 5/16 inch, nominal.
 - 5. Finish: Factory applied primer.
 - 6. Warranty: 50 year limited; transferable.

7. Manufacturers:
 - a. CertainTeed Corporation : www.certainteed.com.
 - b. James Hardie Building Products, Inc: www.jameshardie.com/#sle.
 - c. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 ACCESSORIES

- A. Trim: Same material and texture as siding. Trim board thickness to be as noted on details for specific condition.
- B. Fasteners: Galvanized or corrosion resistant; length as required to penetrate minimum 1-1/4 inch.
- C. Finish Paint: Latex house paint acceptable to siding manufacturer; primer recommended by paint manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine substrate, clean and repair as required to eliminate conditions that would be detrimental to proper installation.
- B. Verify that weather barrier has been installed over substrate completely and correctly.
- C. Do not begin until unacceptable conditions have been corrected.
- D. If substrate preparation is responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

- A. Install Sheet Metal Flashing:
 1. Above door and window trim and casings.
 2. Above horizontal trim in field of siding.

3.03 INSTALLATION

- A. Install in accordance with manufacturer's instructions and recommendations.
 1. Read warranty and comply with terms necessary to maintain warranty coverage.
 2. Use trim details indicated on drawings.
 3. Touch up field cut edges before installing.
 4. Pre-drill nail holes if necessary to prevent breakage.
- B. Over Steel Studs: Use hot-dipped galvanized self-tapping screws, with the points of at least three screws penetrating each stud the panel crosses and at panel ends.
- C. Joints in Horizontal Siding: Avoid joints in lap siding except at corners; where joints are inevitable stagger joints between successive courses.
- D. Do not install siding less than 6 inches from surface of ground nor closer than 1 inch to roofs, patios, porches, and other surfaces where water may collect.
- E. After installation, seal joints except lap joints of lap siding; seal around penetrations, and paint exposed cut edges.
- F. Finish Painting: Refer to Section 09 91 13.

3.04 PROTECTION

- A. Protect installed products until Date of Substantial Completion.

- B. Touch-up, repair or replace damaged products before Date of Substantial Completion.

END OF SECTION

SECTION 07 54 23
THERMOPLASTIC POLYOLEFIN (TPO) MEMBRANE ROOFING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Adhered system with thermoplastic polyolefin (TPO) roofing membrane.
- B. Insulation, flat.
- C. Deck sheathing.

1.02 RELATED REQUIREMENTS

- A. Section 08 62 00 - Unit Skylights: Skylight frame, integral curb, and counterflashing.

1.03 REFERENCE STANDARDS

- A. ASTM C1325 - Specification for Non-Asbestos Fiber-Mat Reinforced Cementitious Backer Units; 2014.
- B. ASTM D6878/D6878M - Standard Specification for Thermoplastic Polyolefin Based Sheet Roofing; 2013.
- C. NRCA (RM) - The NRCA Roofing Manual; 2017.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's written information listed below.
- C. Shop Drawings: Indicate joint or termination detail conditions, conditions of interface with other materials, and paver layout.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products in manufacturer's original containers, dry, undamaged, with seals and labels intact.
- B. Protect products in weather protected environment, clear of ground and moisture.
- C. Protect foam insulation from direct exposure to sunlight.
- D. Provide Safety Data Sheets (SDS) at the project site at all times during transportation, storage, and installation of materials.
- E. Comply with requirements from Owner to prevent overloading or disturbance of the structure when loading materials onto the roof.

1.06 FIELD CONDITIONS

- A. Do not apply roofing membrane during unsuitable weather. Refer to manufacturer's written instructions.
- B. Do not apply roofing membrane when ambient temperature is below 40 degrees F or above manufacture recommended degrees F.
- C. Do not apply roofing membrane to damp or frozen deck surface or when precipitation is expected or occurring.
- D. Do not expose materials vulnerable to water or sun damage in quantities greater than can be weatherproofed the same day.
- E. Proceed with work so new roofing materials are not subject to construction traffic as work progresses.
- F. Do not allow grease, oil, fats, or other contaminants to come into direct contact with membrane.

PART 2 PRODUCTS**2.01 MANUFACTURER**

- A. Carlisle SynTec: www.carlisle-syntec.com/#sle. contour rib, slate gray

2.02 ROOFING APPLICATIONS

- A. TPO Membrane Roofing: One ply membrane, asphalt adhered, over insulation.
- B. Roofing Assembly Performance Requirements and Design Criteria:

2.03 ROOFING MEMBRANE AND ASSOCIATED MATERIALS

- A. Membrane:
 - 1. Material: Thermoplastic Polyolefin (TPO) complying with ASTM D6878/D6878M.
 - 2. Color: dark slate.
 - 3. Product:
 - a. Carlisle Contour Rib
- B. Seaming Materials: As recommended by membrane manufacturer.
- C. Flexible Flashing Material: Same material as membrane.
- D. Base Flashing: Provide waterproof, fully adhered base flashing system at all penetrations, plane transitions, and terminations.

2.04 DECK SHEATHING AND COVER BOARDS

- A. Coverboard: Cement roof board, complying with ASTM C1325.
 - 1. Board Thickness: 1/2 inch.

2.05 ACCESSORIES

- A. Prefabricated Flashing Accessories:
 - 1. Corners and Seams: Same material as membrane, in manufacturer's standard thicknesses.
 - 2. Penetrations: Same material as membrane, with manufacturer's standard cut-outs, rigid inserts, clamping rings, and flanges.
 - 3. Sealant Pockets: Same material as membrane, with manufacturer's standard accessories, in manufacturer's standard configuration.
 - 4. Pressure Sensitive Cover Strips: 6 inch wide, 45 mils (0.045 inch) thick, non-reinforced TPO membrane laminated to 35 mils (0.035 inch) thick cured synthetic rubber with pressure sensitive adhesive.
 - 5. TPO Pressure Sensitive RUSS:
 - 6. Miscellaneous Flashing: Non-reinforced TPO membrane; 80 mils (0.080 inch) thick, in manufacturer's standard lengths and widths.
- B. Membrane Adhesive: As recommended by membrane manufacturer.
- C. Surface Conditioner for Adhesives: Compatible with membrane and adhesives.
- D. Sealants: As recommended by membrane manufacturer.
- E. Cleaner: Manufacturer's standard, clear, solvent-based cleaner.
- F. Edgings and Terminations: Manufacturer's standard edge and termination accessories.
 - 1. Snap-On Edge System:
 - 2. Anchor Bar Fascia System:
 - 3. Drip Edge: Carlisle Sure-Seal Drip Edge.
 - 4. Coping:

5. TPO Coated Sheet Metal.
6. Termination Bar.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces and site conditions are ready to receive work.
- B. Verify deck is supported and secure.
- C. Verify deck is clean and smooth, flat, free of depressions, waves, or projections, properly sloped and suitable for installation of roof system.
- D. Verify deck surfaces are dry and free of snow or ice.
- E. Verify that roof openings, curbs, and penetrations through roof are solidly set, and cant strips are in place.

3.02 PREPARATION, GENERAL

- A. Clean substrate thoroughly prior to roof application.

3.03 INSTALLATION - GENERAL

- A. Perform work in accordance with manufacturer's instructions and NRCA (RM) applicable requirements.
- B. Do not apply roofing membrane during unsuitable weather.
- C. Do not apply roofing membrane when ambient temperature is outside the temperature range recommended by manufacturer.
- D. Do not apply roofing membrane to damp or frozen deck surface or when precipitation is expected or occurring.
- E. Do not expose materials vulnerable to water or sun damage in quantities greater than can be weatherproofed the same day.

3.04 MEMBRANE APPLICATION

- A. Roll out membrane, free from wrinkles or tears. Place sheet into place without stretching.
- B. Shingle joints on sloped substrate in direction of drainage.
- C. Asphalt Adhered Application: Apply asphalt at manufacturer's recommended rate. Fully embed membrane in adhesive except in areas directly over or within 3 inches of expansion joints. Fully adhere one roll before proceeding to adjacent rolls.
- D. Seam Welding:
 1. Seam Welding: Overlap edges and ends and seal seams by heat welding, minimum 2 inches.
 2. Cover seams with manufacturer's recommended joint covers.
 3. Probe seams once welds have thoroughly cooled. (Approximately 30 minutes.)
 4. Repair deficient seams within the same day.
 5. Seal cut edges of reinforced membrane after seam probe is complete.
- E. At intersections with vertical surfaces:
 1. Extend membrane over cant strips and up a minimum of 4 inches onto vertical surfaces.
 2. Fully adhere flexible flashing over membrane and up to nailing strips.
- F. Coordinate installation of roof drains and sumps and related flashings. Locate all field splices away from low areas and roof drains. Lap upslope sheet over downslope sheet.
- G. Daily Seal: Install daily seal per manufacturers instructions at the end of each work day. Prevent infiltration of water at incomplete flashings, terminations, and at unfinished membrane edges.

3.05 FIELD QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements, for general requirements for field quality control and inspection.
- B. Require site attendance of roofing and insulation material manufacturers daily during installation of the Work.

3.06 CLEANING

- A. See Section 01 74 19 - Construction Waste Management and Disposal, for additional requirements.
- B. Remove bituminous markings from finished surfaces.
- C. In areas where finished surfaces are soiled by work of this section, consult manufacturer of surfaces for cleaning advice and conform to their documented instructions.
- D. Repair or replace defaced or damaged finishes caused by work of this section.

3.07 PROTECTION

- A. Protect installed roofing and flashings from construction operations.
- B. Where traffic must continue over finished roof membrane, protect surfaces using durable materials.

END OF SECTION

SECTION 07 62 00
SHEET METAL FLASHING AND TRIM

PART 1 GENERAL**1.01 SECTION INCLUDES**

- A. Fabricated sheet metal items, including flashings, counterflashings, gutters, and downspouts.
- B. Sealants for joints within sheet metal fabrications.
- C. Flexible membrane flashing.

1.02 RELATED REQUIREMENTS

- A. Section 06 10 00 - Rough Carpentry: Wood nailers for sheet metal work.
- B. Section 07 71 23 - Manufactured Gutters and Downspouts.

1.03 REFERENCE STANDARDS

- A. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels; 2013.
- B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.
- C. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2015.
- D. CDA A4050 - Copper in Architecture - Handbook; current edition.
- E. SMACNA (ASMM) - Architectural Sheet Metal Manual; 2012.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations, and installation details.

1.05 QUALITY ASSURANCE

- A. Perform work in accordance with SMACNA (ASMM) and CDA A4050 requirements and standard details, except as otherwise indicated.
- B. Fabricator and Installer Qualifications: Company specializing in sheet metal work with ____ years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Stack material to prevent twisting, bending, and abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.
- B. Prevent contact with materials that could cause discoloration or staining.

PART 2 PRODUCTS**2.01 MANUFACTURERS**

- A. Sheet Metal Flashing and Trim Manufacturers:
 - 1. Metal Deck, Foam deck closure, <https://www.metaldeck.com/metal-decking-foam-closures.html>.

2.02 SHEET MATERIALS

- A. Pre-Finished Galvanized Steel: ASTM A653/A653M, with G90/Z275 zinc coating; minimum 24 gage, (0.0239) inch thick base metal, shop pre-coated with PVDF coating.
 - 1. PVDF (Polyvinylidene Fluoride) Coating: Superior Performance Organic Finish, AAMA 2605; multiple coat, thermally cured fluoropolymer finish system.
 - 2. Color: As indicated on drawings.
- B. Stainless Steel: ASTM A666, Type 304 alloy, soft temper, 28 gage, (0.0156 inch) thick; smooth No. 4 - Brushed finish.
- C. Flexible membrane flashing:
 - 1. Composite, self-adhesive flashing product consisting of a pliable, rubberized asphalt compound, bonded to a high-density, cross-laminated polyethylene film to produce an overall thickness of not less than 0.40 inch.
 - 2. Primer: As recommended by manufacturer for membrane.

2.03 FABRICATION

- A. Form sections true to shape, accurate in size, square, and free from distortion or defects.
- B. Form pieces in longest possible lengths.
- C. Hem exposed edges on underside 1/2 inch; miter and seam corners.
- D. Form material with flat lock seams, except where otherwise indicated; at moving joints, use sealed lapped, bayonet-type or interlocking hooked seams.
- E. Fabricate corners from one piece with minimum 18 inch long legs; seam for rigidity, seal with sealant.
- F. Fabricate vertical faces with bottom edge formed outward 1/4 inch (6 mm) and hemmed to form drip.
- G. Fabricate flashings to allow toe to extend 2 inches over roofing gravel. Return and brake edges.

PART 3 EXECUTION**3.01 EXAMINATION**

- A. Verify roof openings, curbs, pipes, sleeves, ducts, and vents through roof are solidly set, reglets in place, and nailing strips located.
- B. Verify roofing termination and base flashings are in place, sealed, and secure.

3.02 PREPARATION

- A. Install starter and edge strips, and cleats before starting installation.
- B. Back paint concealed metal surfaces with protective backing paint to a minimum dry film thickness of 15 mil.

3.03 INSTALLATION

- A. Roof Penetration Flashing: SMACNA Architectural Sheet Metal Manual, figure 4-14 and construction documents.
- B. Secure flashings in place using concealed fasteners, and use exposed fasteners only where permitted..
- C. Apply plastic cement compound between metal flashings and felt flashings.
- D. Fit flashings tight in place; make corners square, surfaces true and straight in planes, and lines accurate to profiles.

3.04 FIELD QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements, for field inspection requirements.

- B. Inspection will involve surveillance of work during installation to ascertain compliance with specified requirements.

END OF SECTION

SECTION 07 71 23
MANUFACTURED GUTTERS AND DOWNSPOUTS

PART 1 GENERAL**1.01 SECTION INCLUDES**

- A. Pre-finished aluminum gutters and downspouts.

1.02 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on prefabricated components.

1.03 DELIVERY, STORAGE, AND HANDLING

- A. Stack material to prevent twisting, bending, or abrasion, and to provide ventilation. Slope to drain.
- B. Prevent contact with materials that could cause discoloration, staining, or damage.

PART 2 PRODUCTS**2.01 MANUFACTURERS**

- A. Gutters and Downspouts:
 - 1. ATAS International, Inc; Water Control System: www.atas.com/#sle.
 - 2. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 MATERIALS

- A. Pre-Finished Aluminum Sheet: ASTM B209 (ASTM B209M); 0.032 inch thick.
 - 1. Finish: Plain, shop pre-coated with modified silicone coating.
 - 2. Color: As indicated.

2.03 COMPONENTS

- A. Gutters: SMACNA rectangular style profile.
- B. Downspouts: SMACNA Square profile.

2.04 ACCESSORIES

- A. Downspout Boots: Cast iron; ASTM A48.
 - 1. Manufacturers:
 - a. Downspoutboots.com, a division of J. R. Hoe & Sons: www.downspoutboots.com/#sle.
 - b. Substitutions: See Section 01 60 00 - Product Requirements.

2.05 FABRICATION

- A. Form gutters and downspouts of profiles and size indicated.
- B. Fabricate with required connection pieces.
- C. Form sections square, true, and accurate in size, in maximum possible lengths, free of distortion or defects detrimental to appearance or performance. Allow for expansion at joints.
- D. Hem exposed edges of metal.
- E. Fabricate gutter and downspout accessories; seal watertight.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that surfaces are ready to receive work.

3.02 PREPARATION

- A. Paint concealed metal surfaces and surfaces in contact with dissimilar metals with protective backing paint to a minimum dry film thickness of 15 mil.

3.03 INSTALLATION

- A. Install gutters, downspouts, and accessories in accordance with manufacturer's instructions.
- B. Slope gutters 1/8 inch per foot.

END OF SECTION

SECTION 07 92 00**JOINT SEALANTS****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Nonsag gunnable joint sealants.
- B. Joint backings and accessories.

1.02 REFERENCE STANDARDS

- A. ASTM C794 - Standard Test Method for Adhesion-In-Peel of Elastomeric Joint Sealants; 2015.
- B. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2014.
- C. ASTM C1087 - Standard Test Method for Determining Compatibility of Liquid-Applied Sealants with Accessories Used in Structural Glazing Systems; 2000 (Reapproved 2011).
- D. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2013.
- E. ASTM C1248 - Standard Test Method for Staining of Porous Substrate by Joint Sealants; 2008 (Reapproved 2012).

1.03 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data for Sealants: Submit manufacturer's technical data sheets for each product to be used, that includes the following.
 - 1. Physical characteristics, including movement capability, VOC content, hardness, cure time, and color availability.
 - 2. List of backing materials approved for use with the specific product.
 - 3. Substrates that product is known to satisfactorily adhere to and with which it is compatible.
 - 4. Substrates the product should not be used on.
 - 5. Substrates for which use of primer is required.
 - 6. Substrates for which laboratory adhesion and/or compatibility testing is required.
 - 7. Installation instructions, including precautions, limitations, and recommended backing materials and tools.
- C. Color Cards for Selection: Where sealant color is not specified, submit manufacturer's color cards showing standard colors available for selection.
- D. Preconstruction Laboratory Test Reports: Submit at least four weeks prior to start of installation.

1.04 QUALITY ASSURANCE

- A. Preconstruction Laboratory Testing: Arrange for sealant manufacturer(s) to test each combination of sealant, substrate, backing, and accessories.
 - 1. Adhesion Testing: In accordance with ASTM C794.
 - 2. Compatibility Testing: In accordance with ASTM C1087.
 - 3. Allow sufficient time for testing to avoid delaying the work.
 - 4. Deliver to manufacturer sufficient samples for testing.
 - 5. Report manufacturer's recommended corrective measures, if any, including primers or techniques not indicated in product data submittals.
 - 6. Testing is not required if sealant manufacturer provides data showing previous testing, not older than 24 months, that shows satisfactory adhesion, lack of staining, and compatibility.

1.05 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Correct defective work within a five year period after Date of Substantial Completion.
- C. Warranty: Include coverage for installed sealants and accessories that fail to achieve watertight seal, exhibit loss of adhesion or cohesion, or do not cure.

PART 2 PRODUCTS**2.01 MANUFACTURERS**

- A. Non-Sag Sealants: Permits application in joints on vertical surfaces without sagging or slumping.
 - 1. Dow Chemical Company: consumer.dow.com/en-us/industry/ind-building-construction.html/#sle.
 - 2. Sika Corporation: www.usa-sika.com/#sle.
 - 3. Tremco Commercial Sealants & Waterproofing: www.tremcosealants.com/#sle.
 - 4. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 JOINT SEALANT APPLICATIONS

- A. Scope:
 - 1. Exterior Joints: Seal open joints, whether or not the joint is indicated on drawings, unless specifically indicated not to be sealed. Exterior joints to be sealed include, but are not limited to, the following items.
 - a. Wall expansion and control joints.
 - b. Joints between door, window, and other frames and adjacent construction.
 - c. Joints between different exposed materials.
 - d. Openings below ledge angles in masonry.
 - e. Other joints indicated below.
 - 2. Interior Joints: Do not seal interior joints unless specifically indicated to be sealed. Interior joints to be sealed include, but are not limited to, the following items.
 - a. Joints between door, window, and other frames and adjacent construction.
 - b. Other joints indicated below.
 - 3. Do not seal the following types of joints.
 - a. Intentional weepholes in masonry.
 - b. Joints indicated to be treated with manufactured expansion joint cover or some other type of sealing device.
 - c. Joints where sealant is specified to be provided by manufacturer of product to be sealed.
 - d. Joints where installation of sealant is specified in another section.
 - e. Joints between suspended panel ceilings/grid and walls.
- B. Exterior Joints: Use non-sag non-staining silicone sealant, unless otherwise indicated.
- C. Interior Joints: Use non-sag polyurethane sealant, unless otherwise indicated.

2.03 JOINT SEALANTS - GENERAL**2.04 NONSAG JOINT SEALANTS**

- A. Non-Staining Silicone Sealant: ASTM C920, Grade NS, Uses M and A; not expected to withstand continuous water immersion or traffic.
 - 1. Movement Capability: Plus and minus 50 percent, minimum.
 - 2. Non-Staining To Porous Stone: Non-staining to light-colored natural stone when tested in accordance with ASTM C1248.
 - 3. Dirt Pick-Up: Reduced dirt pick-up compared to other silicone sealants.

4. Service Temperature Range: Minus 20 to 180 degrees F.
5. Manufacturers:
 - a. Substitutions: See Section 01 60 00 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that joints are ready to receive work.
- B. Verify that backing materials are compatible with sealants.
- C. Verify that backer rods are of the correct size.

3.02 PREPARATION

- A. Remove loose materials and foreign matter that could impair adhesion of sealant.
- B. Clean joints, and prime as necessary, in accordance with manufacturer's instructions.
- C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.
- D. Mask elements and surfaces adjacent to joints from damage and disfigurement due to sealant work; be aware that sealant drips and smears may not be completely removable.

3.03 INSTALLATION

- A. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.
- B. Perform installation in accordance with ASTM C1193.
- C. Install bond breaker backing tape where backer rod cannot be used.
- D. Install sealant free of air pockets, foreign embedded matter, ridges, and sags, and without getting sealant on adjacent surfaces.
- E. Do not install sealant when ambient temperature is outside manufacturer's recommended temperature range, or will be outside that range during the entire curing period, unless manufacturer's approval is obtained and instructions are followed.
- F. Nonsag Sealants: Tool surface concave, unless otherwise indicated; remove masking tape immediately after tooling sealant surface.

3.04 FIELD QUALITY CONTROL

- A. Perform field quality control inspection/testing as specified in PART 1 under QUALITY ASSURANCE article.
- B. Remove and replace failed portions of sealants using same materials and procedures as indicated for original installation.

END OF SECTION

SECTION 08 11 13
HOLLOW METAL DOORS AND FRAMES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Interior non-fire-rated steel doors and frames.
- B. Exterior steel doors.

1.02 RELATED REQUIREMENTS

- A. Section 08 71 00 - Door Hardware.
- B. Section 09 91 13 - Exterior Painting: Field painting.

1.03 REFERENCE STANDARDS

- A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- B. ANSI/SDI A250.3 - Test Procedure and Acceptance Criteria for Factory Applied Finish Coatings for Steel Doors and Frames; 2007 (R2011).
- C. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames and Frame Anchors; 2011.
- D. ANSI/SDI A250.8 - Specifications for Standard Steel Doors and Frames (SDI-100); 2014.
- E. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames; 2011.
- F. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.
- G. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable; 2015.
- H. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength; 2014.
- I. BHMA A156.115 - American National Standard for Hardware Preparation in Steel Doors and Steel Frames; 2014.
- J. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2009.
- K. NAAMM HMMA 830 - Hardware Selection for Hollow Metal Doors and Frames; 2002.
- L. NAAMM HMMA 831 - Hardware Locations for Hollow Metal Doors and Frames; 2011.
- M. NAAMM HMMA 840 - Guide Specifications for Installation and Storage of Hollow Metal Doors and Frames; 2007.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Materials and details of design and construction, hardware locations, reinforcement type and locations, anchorage and fastening methods, and finishes; and one copy of referenced standards/guidelines.
- C. Shop Drawings: Details of each opening, showing elevations, glazing, frame profiles, and any indicated finish requirements.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Comply with NAAMM HMMA 840 or ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.
- B. Protect with resilient packaging; avoid humidity build-up under coverings; prevent corrosion and adverse effects on factory applied painted finish.

PART 2 PRODUCTS**2.01 MANUFACTURERS**

- A. Hollow Metal Doors and Frames:
 - 1. Curries, an Assa Abloy Group company: www.assaabloydss.com/#sle.
 - 2. Steelcraft, an Allegion brand: www.allegion.com/#sle.
 - 3. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 PERFORMANCE REQUIREMENTS

- A. Requirements for Hollow Metal Doors and Frames:
 - 1. Steel Sheet: Comply with one or more of the following requirements; galvanized steel complying with ASTM A653/A653M, cold-rolled steel complying with ASTM A1008/A1008M, or hot-rolled pickled and oiled (HRPO) steel complying with ASTM A1011/A1011M, commercial steel (CS) Type B, for each.
 - 2. Accessibility: Comply with ICC A117.1 and ADA Standards.
 - 3. Exterior Door Top Closures: Flush end closure channel, with top and door faces aligned.
 - 4. Typical Door Face Sheets: Flush.
 - 5. Hardware Preparations, Selections and Locations: Comply with NAAMM HMMA 830 and NAAMM HMMA 831 or BHMA A156.115 and ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.
- B. Combined Requirements: If a particular door and frame unit is indicated to comply with more than one type of requirement, comply with the specified requirements for each type; for instance, an exterior door that is also indicated as being sound-rated must comply with the requirements specified for exterior doors and for sound-rated doors; where two requirements conflict, comply with the most stringent.

2.03 HOLLOW METAL DOORS

- A. Exterior Doors: Thermally insulated.
 - 1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
 - a. Level 1 - Standard-duty.
 - b. Physical Performance Level C, 250,000 cycles; in accordance with ANSI/SDI A250.4.
 - c. Model 1 - Full Flush.
 - d. Door Face Metal Thickness: 20 gage, 0.032 inch, minimum.
 - 2. Grade: ANSI A250.8 Level 3, physical performance Level A, Model 2, seamless.
 - 3. Door Thermal Resistance: R-Value of 6.0 minimum, for installed thickness of polystyrene.
 - 4. Door Thickness: 1-3/4 inch, nominal.
 - 5. Weatherstripping: Refer to Section 08 71 00.
- B. Interior Doors, Non-Fire-Rated:
 - 1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
 - a. Level 1 - Standard-duty.
 - b. Physical Performance Level C, 250,000 cycles; in accordance with ANSI/SDI A250.4.
 - c. Model 1 - Full Flush.
 - d. Door Face Metal Thickness: 20 gage, 0.032 inch, minimum.

2. Grade: ANSI A250.8 Level 2, physical performance Level B, Model 1, full flush.
3. Door Thickness: 1-3/4 inch, nominal.

2.04 HOLLOW METAL FRAMES

- A. Comply with standards and/or custom guidelines as indicated for corresponding door in accordance with applicable door frame requirements.
- B. Frame Finish: Factory finished.
- C. Exterior Door Frames: Full profile/continuously welded type.
 1. Frame Metal Thickness: 18 gage, 0.042 inch, minimum.
 2. Galvanizing: All components hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A 653/A 653M, with manufacturer's standard coating thickness.
 3. Weatherstripping: Separate, see Section 08 71 00.
- D. Interior Door Frames, Non-Fire Rated: Full profile/continuously welded type.
 1. Frame Metal Thickness: 18 gage, 0.042 inch, minimum.

2.05 FINISHES

- A. Primer: Rust-inhibiting, complying with ANSI/SDI A250.10, door manufacturer's standard.
- B. Factory Finish: Complying with ANSI/SDI A250.3, manufacturer's standard coating.
 1. Color: As selected by Architect from manufacturer's standard range.

2.06 ACCESSORIES

- A. Grout for Frames: Portland cement grout with maximum 4 inch slump for hand troweling; thinner pumpable grout is prohibited.
- B. Silencers: Resilient rubber, fitted into drilled hole; provide three on strike side of single door, three on center mullion of pairs, and two on head of pairs without center mullions.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that opening sizes and tolerances are acceptable.
- C. Verify that finished walls are in plane to ensure proper door alignment.

3.02 PREPARATION

- A. Coat inside of frames to be installed in masonry or to be grouted, with bituminous coating, prior to installation.

3.03 INSTALLATION

- A. Install doors and frames in accordance with manufacturer's instructions and related requirements of specified door and frame standards or custom guidelines indicated.
- B. Coordinate frame anchor placement with wall construction.
- C. Grout frames in masonry construction, using hand trowel methods; brace frames so that pressure of grout before setting will not deform frames.
- D. Install door hardware as specified in Section 08 71 00.
- E. Touch up damaged factory finishes.

3.04 TOLERANCES

- A. Maximum Diagonal Distortion: 1/16 inch measured with straight edge, corner to corner.

3.05 ADJUSTING

- A. Adjust for smooth and balanced door movement.

3.06 SCHEDULE

- A. Refer to Door and Frame Schedule on the drawings.

END OF SECTION

SECTION 08 33 23
OVERHEAD COILING DOORS

PART 1 GENERAL**1.01 SECTION INCLUDES**

- A. Overhead coiling doors, operating hardware, non-fire-rated and exterior; manually operated.

1.02 RELATED REQUIREMENTS

- A. Section 07 92 00 - Joint Sealants: Sealing joints between frames and adjacent construction.
- B. Section 08 71 00 - Door Hardware: Cylinder cores and keys.
- C. Section 09 91 13 - Exterior Painting: Field paint finish.

1.03 REFERENCE STANDARDS

- A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.
- B. UL 1784 - Standard for Air Leakage Tests of Door Assemblies; Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide general construction and component connections and details.
- C. Shop Drawings: Indicate pertinent dimensioning, anchorage methods, hardware locations, and installation details.
- D. Manufacturer's Installation Instructions: Indicate installation sequence and procedures, adjustment and alignment procedures.

1.05 QUALITY ASSURANCE**1.06 WARRANTY**

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

PART 2 PRODUCTS**2.01 MANUFACTURERS**

- A. Overhead Coiling Doors:
 - 1. Cornell Iron Works, Inc; Thermiser: www.cornelliron.com/#sle.
 - 2. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 COILING DOORS

- A. Exterior Coiling Doors: Steel slat curtain.
 - 1. Capable of withstanding positive and negative wind loads of 20 psf, without undue deflection or damage to components.
 - 2. Sandwich slat construction with insulated core of foamed-in-place polyurethane insulation; minimum R-value of 8.1.
 - 3. Finish: Factory painted, color as selected by architect from standard range.
 - 4. Guides, Formed Sheet Metal: Galvanized steel.
 - 5. Hood Enclosure: Manufacturer's standard; primed steel.

6. Manual hand chain lift operation.
7. Mounting: As indicated on drawings.
8. Locking Devices: Slide bolt on inside.

2.03 MATERIALS AND COMPONENTS

- A. Curtain Construction: Interlocking slats.
 1. Slat Ends: Alternate slats fitted with end locks to act as wearing surface in guides and to prevent lateral movement.
 2. Curtain Bottom: Fitted with angles to provide reinforcement and positive contact in closed position.
 3. Weatherstripping: Moisture and rot proof, resilient type, located at jamb edges, bottom of curtain, and where curtain enters hood enclosure of exterior doors.
 4. Smoke Seals: Provide brush or gasket type weatherstripping seals to prevent passage of smoke and hot gases in compliance with UL 1784 testing requirements.
 5. Steel Slats: Minimum thickness, 18 gage, 1/20 inch; ASTM A653/A653M galvanized steel sheet.
- B. Guide Construction: Continuous, of profile to retain door in place with snap-on trim, mounting brackets of same metal.
- C. Guides - Structural Steel: Suitable to support the weight of the door.
 1. Hot-Dip Galvanizing: Minimum G90 coating, in compliance with ASTM A653/A653M.
 2. Powdercoated to match curtain.
- D. Hood Enclosure and Trim: Internally reinforced to maintain rigidity and shape.
 1. Galvanized to match color of curtain.
- E. Lock Hardware:
 1. Slide Bolt: Provide on single-jamb side, extending into slot in guides, with padlock on one side.
 2. Manual Chain Lift: Provide padlockable chain keeper on guide.
- F. Roller Shaft Counterbalance: Steel pipe and helical steel spring system, capable of producing torque sufficient to ensure smooth operation of curtain from any position and capable of holding position at mid-travel; with adjustable spring tension; requiring 25 lb nominal force to operate.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that opening sizes, tolerances and conditions are acceptable.

3.02 INSTALLATION

- A. Install units in accordance with manufacturer's instructions.
- B. Use anchorage devices to securely fasten assembly to wall construction and building framing without distortion or stress.
- C. Securely and rigidly brace components suspended from structure. Secure guides to structural members only.
- D. Fit and align assembly including hardware; level and plumb, to provide smooth operation.
- E. Install enclosure and perimeter trim.

3.03 TOLERANCES

- A. Maintain dimensional tolerances and alignment with adjacent work.
- B. Maximum Variation From Plumb: 1/16 inch.
- C. Maximum Variation From Level: 1/16 inch.

- D. Longitudinal or Diagonal Warp: Plus or minus 1/8 inch per 10 ft straight edge.

3.04 ADJUSTING

- A. Adjust operating assemblies for smooth and noiseless operation.

3.05 CLEANING

- A. Clean installed components.
- B. Remove labels and visible markings.

END OF SECTION

SECTION 08 51 13
ALUMINUM WINDOWS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Extruded aluminum windows with fixed sash.
- B. Factory glazing.

1.02 RELATED REQUIREMENTS

- A. Section 07 92 00 - Joint Sealants: Sealing joints between window frames and adjacent construction.

1.03 REFERENCE STANDARDS

- A. AAMA/WDMA/CSA 101/I.S.2/A440 - North American Fenestration Standard/Specification for windows, doors, and skylights; 2011.
- B. AAMA CW-10 - Care and Handling of Architectural Aluminum From Shop to Site; 2015.
- C. AAMA 502 - Voluntary Specification for Field Testing of Newly Installed Fenestration Products; 2012.
- D. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2014.
- E. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes [Metric]; 2013.
- F. ASTM E283 - Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 2004 (Reapproved 2012).
- G. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference; 2000 (Reapproved 2009).
- H. ASTM E783 - Standard Test Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors; 2002 (Reapproved 2010).
- I. ASTM E1105 - Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls, by Uniform or Cyclic Static Air Pressure Difference; 2015.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide component dimensions, information on glass and glazing, internal drainage details, and descriptions of hardware and accessories.
- C. Shop Drawings: Indicate opening dimensions, elevations of different types, framed opening tolerances, method for achieving air and vapor barrier seal to adjacent construction, anchorage locations, and installation requirements.
- D. Grade Substantiation: Prior to submitting shop drawings or starting fabrication, submit one of the following showing compliance with specified grade:
 - 1. Evidence of AAMA Certification.
 - 2. Evidence of WDMA Certification.
 - 3. Evidence of CSA Certification.
 - 4. Test report(s) by independent testing agency itemizing compliance and acceptable to authorities having jurisdiction.

- E. Test Reports: Prior to submitting shop drawings or starting fabrication, submit test report(s) by independent testing agency showing compliance with performance requirements in excess of those prescribed by specified grade.
- F. Manufacturer's Installation Instructions: Include complete preparation, installation, and cleaning requirements.
- G. Field Quality Control Submittals: Report of field testing for water penetration and air leakage.
- H. Manufacturer's Qualification Statement.
- I. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum three years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Comply with requirements of AAMA CW-10.
- B. Protect finished surfaces with wrapping paper or strippable coating during installation. Do not use adhesive papers or sprayed coatings that bond to substrate when exposed to sunlight or weather.

1.07 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Aluminum Windows Manufacturers:
 - 1. Arcadia, Inc: www.arcadiainc.com/#sle.
 - 2. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 BASIS OF DESIGN - CW PERFORMANCE CLASS WINDOWS

- A. Grade: AAMA/WDMA/CSA 101/I.S.2/A440 having Performance Class of CW, and Performance Grade at least as high as specified design pressure.
- B. Other Manufacturers: Provide either the product identified as "Basis of Design" or an equivalent product of one of the manufacturers listed below:
 - 1. Arcadia, Inc: www.arcadiainc.com/#sle.
- C. Substitutions: See Section 01 60 00 - Product Requirements.
 - 1. For any product not identified as "Basis of Design", submit information as specified for substitutions.

2.03 WINDOWS

- A. Aluminum Windows: Extruded aluminum frame and sash, factory fabricated, factory finished, with operating hardware, related flashings, and anchorage and attachment devices.
 - 1. Provide units factory glazed.
 - 2. Fabrication: Joints and corners flush, hairline, and weatherproof, accurately fitted and secured; prepared to receive anchors; fasteners and attachments concealed from view; reinforced as required for operating hardware and imposed loads.
 - 3. Perimeter Clearance: Minimize space between framing members and adjacent construction while allowing expected movement.

4. Movement: Accommodate movement between window and perimeter framing and deflection of lintel, without damage to components or deterioration of seals.
 5. System Internal Drainage: Drain to the exterior by means of a weep drainage network any water entering joints, condensation occurring in glazing channel, and migrating moisture occurring within system.
 6. Thermal Movement: Design to accommodate thermal movement caused by 180 degrees F surface temperature without buckling stress on glass, joint seal failure, damaging loads on structural elements, damaging loads on fasteners, reduction in performance or other detrimental effects.
- B. Fixed, Non-Operable Type:
1. Construction: Thermally broken.
 2. Glazing: Double; clear; low-e.

2.04 PERFORMANCE REQUIREMENTS

- A. Grade: AAMA/WDMA/CSA 101/I.S.2/A440 requirements for specific window type:
 1. Performance Class (PC): CW.
- B. Design Pressure (DP): In accordance with applicable codes.
- C. Member Deflection: Limit member deflection to flexure limit of glass in any direction, with full recovery of glazing materials.
- D. Water Leakage: No uncontrolled leakage on interior face when tested in accordance with ASTM E331 at differential pressure of 12.11 psf.
- E. Air Leakage: Maximum of 0.1 cu ft/min sq ft per unit area of outside frame dimension, with 6.27 psf differential pressure when tested in accordance with ASTM E283.
- F. Overall Thermal Transmittance (U-value): 0.35, maximum, including glazing, measured on window sizes required for this project.

2.05 COMPONENTS

- A. Frames: ____ inch wide by ____ inch deep profile, of ____ inch thick section; thermally broken with interior portion of frame insulated from exterior portion; flush glass stops of snap-on type.
- B. Glazing: As specified in Section 08 80 00.
- C. Sills: ____ inch thick, brake formed aluminum; sloped for positive wash; fit under sash leg to 1/2 inch beyond wall face; one piece full width of opening; jamb angles to terminate sill end.
- D. Sealant for Setting Sills and Sill Flashing: Non-curing butyl type.

2.06 MATERIALS

- A. Extruded Aluminum: ASTM B221 (ASTM B221M), 6063 alloy, T6 temper.

2.07 FINISHES

- A. Finish Color: As selected by Architect from manufacturer's standard range.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that wall openings and adjoining air and vapor seal materials are ready to receive aluminum windows.

3.02 INSTALLATION

- A. Install windows in accordance with manufacturer's instructions.
- B. Attach window frame and shims to perimeter opening to accommodate construction tolerances and other irregularities.
- C. Align window plumb and level, free of warp or twist. Maintain dimensional tolerances and alignment with adjacent work.
- D. Install sill and sill end angles.
- E. Set sill members and sill flashing in continuous bead of sealant.
- F. Provide thermal isolation where components penetrate or disrupt building insulation. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.

3.03 TOLERANCES

- A. Maximum Variation from Level or Plumb: 1/16 inches every 3 ft non-cumulative or 1/8 inches per 10 ft, whichever is less.

3.04 FIELD QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements, for independent field testing and inspection requirements, and requirements for monitoring quality of specified product installations.
- B. Provide field testing of installed aluminum windows by independent laboratory in accordance with AAMA 502 and AAMA/WDMA/CSA 101/1.S.2/A440 during construction process and before installation of interior finishes.
 - 1. Field test for water penetration in accordance with ASTM E1105 using Procedure B - cyclic static air pressure difference; test pressure shall not be less than 1.9 psf.
 - 2. Field test for air leakage in accordance with ASTM E783 with uniform static air pressure difference of 1.57 psf.
- C. Repair or replace fenestration components that have failed designated field testing, and retest to verify performance complies with specified requirements.

3.05 CLEANING

- A. Remove protective material from factory finished aluminum surfaces.
- B. Wash surfaces by method recommended and acceptable to window manufacturer; rinse and wipe surfaces clean.

END OF SECTION

SECTION 08 62 00**UNIT SKYLIGHTS****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Skylights with integral frame.

1.02 REFERENCE STANDARDS

- A. AAMA/WDMA/CSA 101/I.S.2/A440 - North American Fenestration Standard/Specification for windows, doors, and skylights; 2011.
- B. ASHRAE Std 90.1 I-P - Energy Standard for Buildings Except Low-Rise Residential Buildings; 2013, Including All Amendments and Errata.
- C. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2014.
- D. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes [Metric]; 2013.
- E. ICC (IBC) - International Building Code; 2015.

1.03 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide structural, thermal, and daylighting performance values.
- C. Shop Drawings: Indicate configurations, dimensions, locations, fastening methods, and installation details.
- D. Grade Substantiation: Prior to submitting shop drawings or starting fabrication, submit one of the following showing compliance with specified grade:
 - 1. Evidence of AAMA Certification.
 - 2. Evidence of WDMA Certification.
 - 3. Evidence of CSA Certification.
 - 4. Test report(s) by independent testing agency itemizing compliance and acceptable to authorities having jurisdiction.
- E. Manufacturer's Installation Instructions: Indicate special procedures.

1.04 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years documented experience.

1.05 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

PART 2 PRODUCTS**2.01 MANUFACTURERS**

- A. Unit Skylights:
 - 1. Velux America, Inc; VELUX Dynamic Dome: www.veluxusa.com/#sle.
 - 2. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 SKYLIGHTS

- A. Skylights: Factory-assembled glazing in aluminum frame, free of visual distortion, and weathertight.
 - 1. Shape: Square dome.
 - 2. Glazing: Double.
 - 3. Operation: None; fixed.
 - 4. Roof Slope: As indicated on drawings.
 - 5. Nominal Size: 36 by 36 inch.

2.03 PERFORMANCE REQUIREMENTS

- A. Provide unit skylights that comply with the following:
 - 1. Grade: AAMA/WDMA/CSA 101/I.S.2/A440 requirements for specific skylight type:
 - 2. Allow for expansion and contraction within system components caused by a cycling surface temperature range of 170 degrees F without causing detrimental effects to system or components.
 - 3. Energy Code Compliance: Comply with ICC (IBC), ASHRAE Std 90.1 I-P, or the authorities having jurisdiction as required for unit skylights.

2.04 COMPONENTS

- A. Double Glazing: Acrylic plastic; factory sealed.
 - 1. Outer Glazing: Clear transparent.
 - 2. Inner Glazing: Clear transparent.
- B. Frames: ASTM B221 (ASTM B221M) Extruded aluminum thermally broken, reinforced and welded corner joints, integral curb frame mounting flange and counterflashing to receive roofing flashing system, with integral condensation collection gutter, glazing retainer; clear anodized finish.

2.05 ACCESSORIES

- A. Anchorage Devices: Type recommended by manufacturer, exposed to view.
- B. Counterflashings: Same metal type and finish as skylight frame.
- C. Protective Back Coating: Zinc molybdate alkyd.
- D. Sealant: Elastomeric, silicone or polyurethane, compatible with material being sealed .

PART 3 EXECUTION**3.01 EXAMINATION**

- A. Verify existing conditions before starting work.
- B. Verify that openings and substrate conditions are ready to receive work of this section.

3.02 PREPARATION

- A. Apply protective back coating on aluminum surfaces of skylight units that will be in contact with cementitious materials or dissimilar metals.

3.03 INSTALLATION

- A. Install skylight units and mount securely to curb assembly; install counterflashing as required.
- B. Apply sealant to achieve watertight assembly.

3.04 CLEANING

- A. Remove protective material from prefinished aluminum surfaces.

- B. Wash down exposed surfaces; wipe surfaces clean.
- C. Remove excess sealant.

END OF SECTION

SECTION 08 71 10**BASIS OF DESIGN DOOR HARDWARE - HAGER****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Product requirements for certain door hardware, supplementing specifications in Section 08 71 00.

1.02 RELATED REQUIREMENTS

- A. Section 08 71 00 - Door Hardware: General administrative and installation requirements applicable to this Section.

1.03 REFERENCE STANDARDS

- A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- B. ANSI A250.13 - Testing and Rating of Severe Windstorm Resistant Components for Swinging Door Assemblies; 2008.
- C. BHMA A156.1 - American National Standard for Butts and Hinges; 2013.
- D. BHMA A156.2 - American National Standard for Bored and Preassembled Locks & Latches; 2011.
- E. BHMA A156.3 - American National Standard for Exit Devices; 2014.
- F. BHMA A156.4 - American National Standard for Door Controls - Closers; 2013.
- G. BHMA A156.7 - American National Standard for Template Hinge Dimensions; 2014.
- H. BHMA A156.8 - American National Standard for Door Controls - Overhead Stops and Holders; 2010.
- I. BHMA A156.16 - American National Standard for Auxiliary Hardware; 2013.
- J. BHMA A156.21 - American National Standard for Thresholds; 2014.
- K. BHMA A156.31 - American National Standard for Electric Strikes and Frame Mounted Actuators; 2013.
- L. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2009.
- M. UL (DIR) - Online Certifications Directory; current listings at database.ul.com.
- N. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies; Current Edition, Including All Revisions.
- O. UL 1034 - Standard for Burglary-Resistant Electric Locking Mechanisms; 2015.

PART 2 PRODUCTS**2.01 HINGES**

- A. Butt Hinges: Complying with BHMA A156.1 and BHMA A156.7; square corner five-knuckle design; flat button tips and ball bearings.
 - 1. Width of Leaves: 4-1/2 inch high, minimum, and as required to clear surrounding trim.
 - 2. Thickness:
 - a. Doors up to 36 inch wide and up to 1-3/4 inch thick; 0.134 inch thick, minimum.
 - b. Doors 37 inch to 48 inch wide and 1-3/4 inch thick, and hinges 0.180 inch thick, minimum.
 - c. Doors greater than 1-3/4 inch thick: Hinge material 0.180 inch thick, minimum.
 - 3. Base Material:
 - a. Exterior Doors: Stainless steel, Type 304.
 - b. Interior Doors: Steel.
 - c. Fire Rated Doors: Steel.
 - 4. Quantity of Hinges Per Door:

- a. Doors From 60 inches High up to 90 inches High: Three hinges.
 - b. Doors 90 inches High up to 120 inches High: Four hinges.
 5. Shimming: Where required to correct frame or door irregularities, provide metal shims only.
 6. Manufacturers:
- B. Power Transfer Hinges: Where indicated as Electric Through Wire (ETW), provide hinges certified to handle an amperage rating of 3.5 A continuous duty with 16.0 A intermittent duty; with appropriate number of wires to transfer power through door frame to door and then to electrified door hardware.

2.02 FLUSH BOLTS AND COORDINATORS

- A. Provide products complying with BHMA A156.16 and made by a single manufacturer.
1. Non-Fire-Rated Pairs: Provide top and bottom flush bolts on inactive leaf, with centerline of top bolt face not more than 78 inches above floor.
 2. Coordinators: Provide on pairs having automatic flushbolts and on pairs with mortise type vertical rod exit devices; provide filler piece to extend full width of stop on frame, mounting brackets for closers, and preparation for latches as required.
 3. Dust Proof Strikes: Provide for bottom bolts.

2.03 CYLINDERS AND KEYING

- A. Provide products made by a single manufacturer.
- B. Confirm and coordinate with owner's keying system

2.04 LOCKS AND LATCHES

- A. Provide cylindrical locksets, Grade 1 wherever locksets are called for, unless otherwise indicated.
- B. Locksets - General:
1. Doors: Comply with ADA Standards and ICC A117.1.
 2. Lock and Latch Chassis: Zinc dichromate.
 3. Latch Bolts: Stainless steel; 1/2 inch minimum throw and deadlocking.
 - a. Standard Backset: 2-3/4 inches.
 - b. Faceplate: Adjustable for square door edge or 1/8 inch beveled door edge.
 4. Keyed Functions: Freewheeling, vandal-resistant.
 5. Handing: Non-handed, field reversible.
 6. Mounting: Through-bolted with no exposed screws.
- C. Trim:
1. Levers: Cast zinc; plated to match finish designation specified in Section 08 71 00.
- D. Strikes: 1-1/4 inches by 4-7/8 inches; select lip length to protect surrounding trim.
- E. Electric Locks:
1. Fail Secure, Electrically Unlocked (EU): Outside trim locked when power is switched off or fails.
 2. Continuous duty solenoids.
 3. 24VDC, 24VAC, 150ma.

2.05 CYLINDRICAL LOCKSETS

- A. Cylindrical Locksets: Complying with BHMA A156.2, Series 4000, certified to Grade 1; requirements specified above; and as follows:
1. Single-Swing, Out-Swinging Doors: Provide products tested to ANSI A250.13:
 - a. Door Assembly Impact Load: 1150 pounds.
 - b. Door Assembly Design Load:
 - 1) 36 inches wide by 84 inches high: 100 pounds per square foot.
 - 2) 48 inches wide by 84 inches high: 70 psf.

- B. Manufacturers:
 - 1. Hager Companies: 3400 Series, with Apollo trim.

2.06 EXIT DEVICES

- A. Exit Devices: Touch-pad type; complying with BHMA A156.3 Grade 1; UL (DIR) labeled for fire and panic; finished to match balance of hardware.
 - 1. Width: One-half door width, minimum.
 - 2. Covers and Caps: Stainless steel.
 - 3. Chassis: Aluminum.
 - 4. Keyed Functions: Freewheeling, vandal resistant; lever style and design to match other locksets in project.
 - 5. Fasteners: Wood screws, machine screws and through bolts.
 - 6. Mounting: Flush with door; minimum door stile width:
 - a. Pair with Surface Vertical Rod Devices: 5 inches.
 - b. Single: 5-3/8 inches.
 - c. Pair with Rim Devices and Removable Mullion: 5 inches.
 - d. Pair with Rim Devices and Fixed Frame Mullion: 5-3/4 inches.
 - 7. Manufacturers:
 - a. Hager Companies: 4500 Series.
 - b. Von Duprin, an Allegion brand: 99 Series.

2.07 AUXILIARY ELECTRICAL ACCESS CONTROL DEVICES

- A. Electric Strikes:
 - 1. Comply with BHMA A156.31, Grade 1.
 - 2. UL (DIR) tested for 1500 lbf static strength.
 - 3. UL (DIR) listed for fire doors and frames where applicable.
 - 4. UL 1034 listed for burglary resistance.
 - 5. UL (DIR) listed under UL 10C for fire rated 4 by 8 foot door.
 - 6. To fit up to 3/4 inch latch bolt and 1 inch deadbolt.
 - 7. Field reversible, Fail Safe or Fail Secure.
 - 8. Dual voltage, 12/24 VDC.
 - 9. Tamper resistant, stainless steel corrosion resistance parts, and cast body and keeper.
 - 10. Power Supply: UL (DIR) listed, filtered and regulated 24V with 2 amp capacity; protection for overload, over voltage, and short circuits; surge suppression on Fail Safe and Fail Secure outputs; 120 VAC and 240 VAC.
 - 11. Manufacturers:
 - a. Hager Companies: 2930 series.
- B. Proximity / Pin Reader: Standalone reader; HID compatible; wall mounted.
 - 1. Provide access up to 650 card users.
 - 2. Weather resistant two-piece enclosure.
 - 3. Access mode selectable for proximity card only, proximity card plus pin number, or key in card number only.
 - 4. Key pad programmable without software or computer.
 - 5. Key pad lockout and flashing red LED activated when wrong password is entered more than five times.
 - 6. Lock and alarm outputs relays programmable to 1 to 99 seconds or on-off latching.
 - 7. Power Supply: UL (DIR) listed, filtered and regulated 24V with 1 amp capacity; protection for overload, over voltage, and short circuits; surge suppression on Fail Safe and Fail Secure outputs; for 120 VAC or 240 VAC in same unit.
 - 8. Manufacturers:

- a. Hager Companies: 2920.

2.08 CLOSERS

- A. Surface-Mounted, Door-Mounted Closers: Non-handed, comply with BHMA A156.4, Grade 1, with aluminum body and full plastic covers.
 1. Comply with Following:
 - a. ICC A117.1 and ADA Standards.
 2. Springs: Double heat-treated, tempered steel.
 3. Piston: Precision-machined, heat-treated steel.
 4. Spindle: Triple heat-treated steel.
 5. Operation: Full rack and pinion.
 6. Adjustment: Separate, staked, adjustable valve screws for latch speed, sweep speed, and backcheck.
 7. Arms and Brackets:
 - a. Arm Type: Manufacturer's standard.
 - b. Mounting Types: Manufacturer's standard "Tri-Pack" of regular arm, top jamb arm and parallel arm.
 8. Size: Comply with referenced standard for accessibility, including following maximum opening force requirements.
 - a. Interior hinged openings: 5.0 pounds.
 - b. Exterior hinged openings: 8.5 pounds.
 9. Fasteners: Provide self-reaming and self-tapping wood and machine screws and sex nuts and bolts for each closer.
 - B. Manufacturers: Aluminum Body.
 1. Hager Companies: 5200/5300 Series.

2.09 STOPS AND HOLDERS

- A. Provide products complying with BHMA A156.8, Grade 1.
 1. Provide wall stop/holder unless otherwise indicated.
 2. Provide overhead stop/holder where neither wall or floor type would be appropriate, including where doors open against equipment, casework, sidelights, and other objects.

2.10 SILENCERS

- A. Silencers: Gray rubber, shaped for specific door type and application.
 1. Silencers: Three silencers per single door frame, two per double door frame and four per Dutch door frame where smoke, light, weather or acoustical seals not otherwise required.

2.11 GASKETING AND THRESHOLDS

- A. Weatherstripping Gaskets:
 1. Hager Companies: 881SN.
- B. Door Bottom Sweeps:
 1. Hager Companies: 759SV.
- C. Thresholds: Comply with BHMA A156.21.
 1. Hager Companies: 413S/520S.
 2. Pemko: 271/2005.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with Hardware Schedule and manufacturer's written instructions.
- B. See Section 08 71 00 for additional requirements.

END OF SECTION

SECTION 08 91 00**LOUVERS****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Louvers, frames, and accessories.

1.02 RELATED REQUIREMENTS

- A. Section 07 62 00 - Sheet Metal Flashing and Trim.

1.03 REFERENCE STANDARDS

- A. AMCA 511 - Certified Ratings Program for Air Control Devices; 2010.
- B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data describing design characteristics, maximum recommended air velocity, design free area, materials and finishes.
- C. Shop Drawings: Indicate louver layout plan and elevations, opening and clearance dimensions, tolerances; head, jamb and sill details; blade configuration, screens, blankout areas required, and frames.
- D. Test Reports: Independent agency reports showing compliance with specified performance criteria.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products of the type specified in this section, with minimum three years of documented experience.

1.06 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

PART 2 PRODUCTS**2.01 MANUFACTURERS**

- A. Louvers:
 - 1. Construction Specialties, Inc; Drainable Louver: www.c-sgroup.com/#sle.
 - 2. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 LOUVERS

- A. Louvers: Factory fabricated and assembled, complete with frame, mullions, and accessories; AMCA Certified in accordance with AMCA 511.
 - 1. Wind Load Resistance: Design to resist positive and negative wind load as required by code without damage or permanent deformation.
 - 2. Drainable Blades: Continuous rain stop at front or rear of blade aligned with vertical gutter recessed into both jambs of frame.
 - 3. Screens: Provide insect screens at intake louvers and bird screens at exhaust louvers.

- B. Stationary Louvers: Horizontal blade, formed galvanized steel sheet construction, with intermediate mullions matching frame.
 - 1. Free Area: 50 percent, minimum.
 - 2. Blades: Drainable.
 - 3. Frame: 4 inches deep, channel profile; corner joints mitered and, with continuous recessed caulking channel each side.
 - 4. Steel Thickness, Galvanized: Frame 16 gage, 0.0598 inch minimum base metal; blades 16 gage, 0.0598 inch minimum base metal.
 - 5. Steel Finish: Superior performing organic coating, finished after fabrication.

2.03 MATERIALS

- A. Extruded Aluminum: ASTM B221 (ASTM B221M).
- B. Steel Sheet: Hot-dipped galvanized steel sheet, ASTM A653/A653M, with G90/Z275 coating.
- C. Primer: Zinc chromate, alkyd type.

2.04 FINISHES

- A. Color: As indicated on drawings.

2.05 ACCESSORIES

- A. Blank-Off Panels: Same material as louver, painted black on exterior side; provide where duct connected to louver is smaller than louver frame, sealing off louver area outside duct.
- B. Screens: Frame of same material as louver, with reinforced corners; removable, screw attached; installed on inside face of louver frame.
- C. Fasteners and Anchors: Galvanized steel.
- D. Head and Sill Flashings: See Section 07 62 00.
- E. Sealant for Setting Sills and Sill Flashing: Non-curing butyl type.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that prepared openings and flashings are ready to receive this work and opening dimensions are as indicated on shop drawings.
- B. Verify that field measurements are as indicated.

3.02 INSTALLATION

- A. Install louver assembly in accordance with manufacturer's instructions.
- B. Install louvers level and plumb.
- C. Install flashings and align louver assembly to ensure moisture shed from flashings and diversion of moisture to exterior.
- D. Secure louver frames in openings with concealed fasteners.
- E. Coordinate with installation of mechanical ductwork.

3.03 CLEANING

- A. Strip protective finish coverings.
- B. Clean surfaces and components.

END OF SECTION

SECTION 09 21 16
GYP SUM BOARD ASSEMBLIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Metal stud wall framing.
- B. Gypsum sheathing.
- C. Gypsum wallboard.
- D. Joint treatment and accessories.
- E. Textured finish system.

1.02 RELATED REQUIREMENTS

- A. Section 07 21 00 - Thermal Insulation: Acoustic insulation.
- B. Section 07 25 00 - Weather Barriers: Water-resistive barrier over sheathing.
- C. Section 07 92 00 - Joint Sealants: Sealing acoustical gaps in construction other than gypsum board or plaster work.
- D. Section 09 22 16 - Non-Structural Metal Framing.

1.03 REFERENCE STANDARDS

- A. AISI S100-12 - North American Specification for the Design of Cold-Formed Steel Structural Members; American Iron and Steel Institute; 2012.
- B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.
- C. ASTM C475/C475M - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board; 2015.
- D. ASTM C557 - Standard Specification for Adhesives for Fastening Gypsum Wallboard to Wood Framing; 2003 (Reapproved 2009).
- E. ASTM C645 - Standard Specification for Nonstructural Steel Framing Members; 2014.
- F. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products; 2015.
- G. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board; 2013.
- H. ASTM C954 - Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs From 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness; 2015.
- I. ASTM C1002 - Standard Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs; 2014.
- J. ASTM C1177/C1177M - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing; 2013.
- K. ASTM C1280 - Standard Specification for Application of Gypsum Sheathing Board; 2013.
- L. ASTM C1396/C1396M - Standard Specification for Gypsum Board; 2014.
- M. GA-216 - Application and Finishing of Gypsum Board; 2013.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on metal framing, gypsum board, accessories, and joint finishing system.
- C. Product Data: Provide manufacturer's data on partition head to structure connectors, showing compliance with requirements.
- D. Test Reports: For stud framing products that do not comply with ASTM C645 or ASTM C754, provide independent laboratory reports showing maximum stud heights at required spacings and deflections.
- E. Indicate profile and material for wall and ceiling trim accessories.
- F. Submit Underwriters Laboratories, Inc. design numbers and CABO NER reports for fire-rated wall and ceiling assemblies as required by local building officials.
- G. Field Samples:
 - 1. Provide 100 square feet minimum sized field samples of wall and ceiling panel joint and fastener treatment.
 - 2. Acceptable field samples may be incorporated in the work.

1.05 QUALITY ASSURANCE

- A. Perform in accordance with ASTM C 840. Comply with requirements of GA-600 for fire-rated assemblies.
- B. Apprentice workers may be employed only under constant supervision from experienced installers or applicators.

1.06 REGULATORY REQUIREMENTS

- A. Conform to applicable code for fire rated assemblies as indicated on drawings.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Storage and Protection
 - 1. Store materials in dry, ventilated space, under cover and 4 inches above concrete floor slabs.
 - 2. Protect members from excessive stress during erection.
 - 3. Distribute gypsum panels throughout the building to prevent overstressing the floor structural systems during construction.
 - 4. Store gypsum panels on flat surface and protect panels from warp and edge damage.

1.08 SITE CONDITIONS

- A. Temperature and Humidity Requirements:
 - 1. Maintain ambient air temperature above 55 degrees F.
 - 2. Maintain 70 percent maximum relative humidity.
 - 3. Maintain air temperature and humidity within the above limits in each work area for 48 hours prior to, during, and after installation of gypsum board systems.
- B. Sequencing:
 - 1. Install complete piping, ducting, and heating and cooling systems above ceiling, and operate systems prior to installing ceiling panels.
 - 2. Install power and communications conduit above ceiling, prior to installing ceiling panels.
 - 3. Install fire protection system and test the system prior to installing ceiling panels.

PART 2 PRODUCTS**2.01 GYPSUM BOARD ASSEMBLIES**

- A. Provide completed assemblies complying with ASTM C840 and GA-216.

2.02 METAL FRAMING MATERIALS

- A. Manufacturers - Metal Framing, Connectors, and Accessories:
 - 1. ClarkDietrich: www.clarkdietrich.com/#sle.
 - 2. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Metal Framing Connectors and Accessories:
 - 1. Same manufacturer as framing.
 - 2. Simpson Strong-Tie Company, Inc.: www.strongtie.com
- C. Non-Loadbearing Framing System Components: ASTM C645; galvanized sheet steel, of size and properties necessary to comply with ASTM C754 for the spacing indicated, with maximum deflection of wall framing of L/120 at 5 psf.
 - 1. Exception: The minimum metal thickness and section properties requirements of ASTM C 645 are waived provided steel of 40 ksi minimum yield strength is used, the metal is continuously dimpled, the effective thickness is at least twice the base metal thickness, and maximum stud heights are determined by testing in accordance with ASTM E 72 using assemblies specified by ASTM C 754.
 - 2. Studs: "C" shaped with flat or formed webs with knurled faces.
 - 3. Runners: U shaped, sized to match studs.
 - 4. Furring: Hat-shaped sections, minimum depth of 7/8 inch.
- D. Partition Head to Structure Connections: Provide mechanical anchorage devices that accommodate deflection using slotted holes, screws and anti-friction bushings, preventing rotation of studs while maintaining structural performance of partition.
 - 1. Structural Performance: Maintain lateral load resistance and vertical movement capacity required by applicable code, when evaluated in accordance with AISI S100-12.
 - 2. Material: ASTM A653/A653M steel sheet, SS Grade 50/340, with G60/Z180 hot dipped galvanized coating.
 - 3. Provide top track preassembled with connection devices spaced to fit stud spacing indicated on drawings; minimum track length of 12 feet.

2.03 BOARD MATERIALS

- A. Manufacturers - Gypsum-Based Board:
 - 1. CertainTeed Corporation; ____: www.certainteed.com/#sle.
 - 2. Georgia-Pacific Gypsum; ____: www.gpgypsum.com/#sle.
 - 3. USG Corporation; ____: www.usg.com/#sle.
- B. Gypsum Wallboard: Paper-faced gypsum panels as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
 - 1. Application: Use for vertical surfaces, unless otherwise indicated.
 - 2. Thickness:
 - a. Vertical Surfaces: 5/8 inch.
- C. Exterior Sheathing Board: Sizes to minimize joints in place; ends square cut.
 - 1. Application: Exterior sheathing, unless otherwise indicated.
 - 2. Glass Mat Faced Sheathing: Glass mat faced gypsum substrate as defined in ASTM C1177/C1177M.
 - 3. Core Type: Regular, as indicated.
 - 4. Regular Board Thickness: 5/8 inch.
 - 5. Edges: Square.

6. Glass Mat Faced Products:
 - a. CertainTeed Corporation; GlasRoc Brand.
 - b. Georgia-Pacific Gypsum; DensGlass Sheathing.
 - c. National Gypsum Company; Gold Bond eXP Sheathing.

2.04 GYPSUM WALLBOARD ACCESSORIES

- A. Metal Trim and Framing Accessories:
 1. Square Corner Trim: Galvanized steel, 1-1/4 inch wide.
 2. Edge Trim: Galvanized steel, 7/8 inch exposed face.
 3. Crack Control Joint Trim: One piece zinc, 1-3/4 inch total width, with 1/4 inch open slot covered with plastic tape for removal after finishing.
 4. Shaft Wall Framing Angles: 24 gage corrosion resistant steel and 0.063 inch thick aluminum framing angles furnished or recommended by shaft wall stud manufacturer.
- B. PVC Trim for Exterior Gypsum Soffit Board:
 1. Material: ASTM D 1784.
 2. Profile: Manufacturer's standard profile to match Drawing details for soffit board joints and edges.
- C. Wall and Ceiling Reveal Moldings:
 1. Material: Extruded aluminum.
 2. Factory Finish: Acoustic white baked-on enamel.
 3. Acceptable Angle Molding: WDM-625-75 by Fry Reglet.]*
 4. Acceptable T Molding: TDM-625-1125 by Fry Reglet.]*
 5. Acceptable X Molding: PXM-625-625 and PXM-75-75 by Fry Reglet.]
 6. Acceptable Column Covers for 9 inch Diameter Columns: Series 100, Softforms by Pittcon Industries.
- D. Panel Adhesives and Fasteners:
 1. Panel Adhesives: ASTM C 557.
 2. Screws: ASTM C 1002.
 - 3.
- E. Water-Resistive Barrier: As specified in Section 07 25 00.
- F. Joint Materials: ASTM C475/C475M and as recommended by gypsum board manufacturer for project conditions.
 1. Fiberglass Tape: 2 inch wide, coated glass fiber tape for joints and corners, except as otherwise indicated.
 2. Paper Tape: 2 inch wide, creased paper tape for joints and corners, except as otherwise indicated.
 3. Joint Compound: Setting type, field-mixed.
- G. Glass Mesh Mortar Unit Tape: 2 inches wide, pressure sensitive adhesive, open mesh fiberglass tape.
- H. High Build Drywall Surfacers: Vinyl acrylic latex-based coating for spray application, designed to take the place of skim coating and separate paint primer in achieving Level 5 finish.
- I. Textured Finish Materials: Latex-based compound; plain.
- J. Screws for Fastening of Gypsum Panel Products to Cold-Formed Steel Studs Less than 0.033 inch in Thickness and Wood Members: ASTM C1002; self-piercing tapping screws, corrosion resistant.
- K. Screws for Fastening of Gypsum Panel Products to Steel Members from 0.033 to 0.112 inch in Thickness: ASTM C954; steel drill screws, corrosion resistant.
- L. Screws: ASTM C 1002; self-piercing tapping type; cadmium-plated for exterior locations.
- M. Anchorage to Substrate: Tie wire, nails, screws, and other metal supports, of type and size to suit application; to rigidly secure materials in place.

- N. Adhesive for Attachment to Wood, ASTM C557 and Metal:
- O. Wall and Ceiling Spray Texture: Orange Peel Wall and Ceiling Texture: Orange peel texture finish without aggregate, Gyproc Wall Texture by Domtar, G-P Orange Peel Joint Compound Texture by Georgia-Pacific, Wall Spray-Orange Peel Finish by Gold Bond, USG Texture II by United States Gypsum.

PART 3 EXECUTION

3.01 PERFORMANCE

- A. Verify that project conditions are appropriate for work of this section to commence.
 - 1. Examine structural framing and conditions under which wall and ceiling systems are to be installed.
 - 2. Start of wall and ceiling system Work will indicate acceptance of surfaces and conditions within each area.
- B. Protection: Provide temporary covering to eliminate splattering of joint compound [and spray texture] on adjacent finished surfaces.

3.02 FRAMING INSTALLATION

- A. Metal Framing: Install in accordance with ASTM C754 and manufacturer's instructions.
- B. Studs: Space studs as indicated.
 - 1. Extend partition framing to structure where indicated and to ceiling in other locations.
 - 2. Partitions Terminating at Ceiling: Attach ceiling runner securely to ceiling framing in accordance with details.
- C. Partitions Terminating at Structure: Attach extended leg top runner to structure, maintain clearance between top of studs and structure.
- D. Openings: Reinforce openings as required for weight of doors or operable panels, using not less than double studs at jambs.
- E. Standard Wall Furring: Install at concrete walls scheduled to receive gypsum board, not more than 4 inches from floor and ceiling lines and abutting walls. Secure in place on alternate channel flanges at maximum 24 inches on center.
 - 1. Orientation: Vertical.
- F. Blocking: Install blocking for support of plumbing fixtures. Bolt or screw steel channels to studs.

3.03 BOARD INSTALLATION

- A. Comply with ASTM C840, GA-216, and manufacturer's instructions. Install to minimize butt end joints, especially in highly visible locations.
- B. Exterior Sheathing: Comply with ASTM C1280. Install sheathing vertically, with edges butted tight and ends occurring over firm bearing.
 - 1. Paper-Faced Sheathing: Immediately after installation, protect from weather by application of water-resistive barrier.

3.04 INSTALLATION OF TRIM AND ACCESSORIES

- A. Control Joints: Place control joints consistent with lines of building spaces and as indicated.
- B. Corner Beads: Install at external corners, using longest practical lengths.

3.05 JOINT TREATMENT

- A. Glass Mat Faced Gypsum Board and Exterior Glass Mat Faced Sheathing: Use fiberglass joint tape, embed and finish with setting type joint compound.

- B. Finish gypsum board in accordance with levels defined in ASTM C840, as follows:
 - 1. Level 1: Fire rated wall areas above finished ceilings, whether or not accessible in the completed construction.
- C. Finish gypsum board in scheduled areas in accordance with levels defined in ASTM C 840 and as scheduled below.
- D. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.
 - 1. Feather coats of joint compound so that camber is maximum 1/32 inch.
 - 2. Taping, filling, and sanding is not required at surfaces behind adhesive applied ceramic tile and fixed cabinetry.
 - 3. Taping, filling and sanding is not required at base layer of double layer applications.
- E. Spray apply high build drywall surfacer over entire surface after joints have been properly treated to achieve Level 5 finish in areas indicated.
- F. Fill and finish joints and corners of cementitious backing board as recommended by manufacturer.

3.06 TEXTURE FINISH

- A. Apply finish texture coating by means of spraying apparatus in accordance with manufacturer's instructions and to match approved sample.

3.07 TOLERANCES

- A. Do not exceed 3/16 inch variation in 8'-0" from plumb, level, and true lines.
- B. Do not exceed 1/8 inch variation in 8'-0" from level surface in areas scheduled to receive thin set ceramic tile and fiberglass reinforced polyester resin panels.
- C. Do not exceed 1/16 inch offset at joints between panels within the same plane.

3.08 FINISH LEVEL SCHEDULE

- A. Level 4: Walls and ceilings scheduled to receive flat or eggshell paint finish.

END OF SECTION

SECTION 09 22 16
NON-STRUCTURAL METAL FRAMING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Metal partition framing.
- B. Framing accessories.

1.02 REFERENCE STANDARDS

- A. ASTM C645 - Standard Specification for Nonstructural Steel Framing Members; 2014.
- B. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products; 2015.

1.03 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data describing framing member materials and finish, product criteria, load charts, and limitations.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Metal Framing, Connectors, and Accessories:
 - 1. ClarkDietrich: www.clarkdietrich.com/#sle.
 - 2. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 FRAMING MATERIALS

- A. Non-Loadbearing Framing System Components: ASTM C645; galvanized sheet steel, of size and properties necessary to comply with ASTM C754 for the spacing indicated, with maximum deflection of wall framing of L/240 at 5 psf.
 - 1. Studs: C shaped with flat or formed webs with knurled faces.
 - 2. Runners: U shaped, sized to match studs.

2.03 FABRICATION

- A. Fabricate assemblies of framed sections to sizes and profiles required.
- B. Fit, reinforce, and brace framing members to suit design requirements.
- C. Fit and assemble in largest practical sections for delivery to site, ready for installation.

PART 3 EXECUTION

3.01 INSTALLATION OF STUD FRAMING

- A. Extend partition framing to structure in all locations.
- B. Partitions Terminating at Structure: Attach top runner to structure, maintain clearance between top of studs and structure, and connect studs to track using specified mechanical devices in accordance with manufacturer's instructions; verify free movement of top of stud connections; do not leave studs unattached to track.
- C. Align and secure top and bottom runners at 24 inches on center.
- D. Fit runners under and above openings; secure intermediate studs to same spacing as wall studs.

- E. Align stud web openings horizontally.
- F. Secure studs to tracks using crimping method. Do not weld.
- G. Fabricate corners using a minimum of three studs.
- H. Double stud at wall openings, door and window jambs, not more than 2 inches from each side of openings.
- I. Coordinate installation of bucks, anchors, and blocking with electrical, mechanical, and other work to be placed within or behind stud framing.

3.02 TOLERANCES

- A. Maximum Variation From True Position: 1/8 inch in 10 feet.
- B. Maximum Variation From Plumb: 1/8 inch in 10 feet.

END OF SECTION

SECTION 09 90 00
PAINTING AND COATING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Surface preparation.
- B. Field application of paints, stains, and other coatings.
- C. Surfaces to be finished are indicated in this section and on the Drawings.

1.02 REFERENCE STANDARDS

- A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency; current edition.
- B. GreenSeal GS-11 - Architectural Paints; 1993.
- C. MPI (APL) - Master Painters Institute Approved Products List; Master Painters and Decorators Association; current edition, www.paintinfo.com.
- D. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual; Master Painters and Decorators Association; 2004.

1.03 SUBMITTALS

- A. Product Data: Provide complete list of all products to be used, with the following information for each:
 - 1. Manufacturer's name, product name and/or catalog number, and general product category (e.g. "alkyd enamel").
 - 2. MPI product number (e.g. MPI #47).
 - 3. Cross-reference to specified paint system(s) product is to be used in; include description of each system (copy of relevant MPI Manual page is acceptable).
- B. Certification: By manufacturer that all paints and coatings do not contain any of the prohibited chemicals specified; GreenSeal GS-11 certification is not required but if provided shall constitute acceptable certification.
- C. Samples: Submit three paper "drop" samples, 8-1/2 by 11 inches in size, illustrating range of colors available for each finishing product specified.
 - 1. Where sheen is specified, submit samples in only that sheen.
 - 2. Each drop sample shall have written in the white margin beside the "drop" of color this phrase, "I certify color shown here will come with the sheen shown." Then initialed, signed or stamped by the person or company responsible.
 - 3. Where sheen is not specified, discuss sheen options with Architect before preparing samples, to eliminate sheens definitely not required.
- D. Maintenance Data: Submit data on cleaning, touch-up, and repair of painted and coated surfaces.

1.04 MOCK-UP

- A. See Section 01 40 00 - Quality Requirements, for requirements for mock-up.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.
- B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.

- C. Paint Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

1.06 FIELD CONDITIONS

- A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.
- B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.
- C. Provide lighting level of 80 ft candles measured mid-height at substrate surface.

1.07 EXTRA MATERIALS

- A. See Section 01 60 00 - Product Requirements, for additional provisions.
- B. Supply 1 gallon of each color; store where directed.
- C. Label each container with color in addition to the manufacturer's label.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Paints and Coatings: Any manufacturer listed in MPI Approved Products List (at www.paintinfo.com) under applicable MPI product reference number, unless otherwise indicated.
 - 1. Where sheen options are specified the Architect will select the final sheen and color available within the MPI systems specified. It is the intent of the Architect to work with the paint and coating suppliers in selecting the final color and sheen.
- B. Provide all paint and coating products from the same manufacturer to the greatest extent possible.
- C. In the event that a single manufacturer cannot provide all specified products, minor exceptions will be permitted provided approval by Architect is obtained using the specified procedures for substitutions.
 - 1. Substitution of MPI-approved products by a different manufacturer is preferred over substitution of unapproved products by the same manufacturer.
- D. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 MATERIALS - GENERAL

- A. Volatile Organic Compound (VOC) Content:
 - 1. Provide coatings that comply with the most stringent requirements specified in the following:
 - a. 40 CFR 59, Subpart D--National Volatile Organic Compound Emission Standards for Architectural Coatings.
 - b. Architectural coatings VOC limits of Oregon.
 - 2. Determination of VOC Content: Testing and calculation in accordance with 40 CFR 59, Subpart D (EPA Method 24), exclusive of colorants added to a tint base and water added at project site; or other method acceptable to authorities having jurisdiction.
- B. Paints and Coatings: Provide products listed in Master Painters Institute Approved Product List, current edition available at www.paintinfo.com, for specified MPI Categories, except as otherwise indicated.
 - 1. Provide ready mixed paints and coatings .
 - 2. Provide materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
- C. Accessory Materials: Linseed oil, shellac, turpentine, paint thinners and other materials not specifically indicated but required to achieve the finishes specified; commercial quality.

2.03 PAINT SYSTEMS

- A. Provide Premium Grade systems (2 top coats) as defined in MPI Architectural Painting Specification Manual, except as otherwise indicated.
- B. Where a specified paint system does not have a Premium Grade, provide Custom Grade system.
- C. Where sheen is not specified or more than one sheen is specified, sheen will be selected later by Architect from the manufacturer's full line.
- D. Provide colors as scheduled on Drawings.

2.04 EXTERIOR PAINT SYSTEMS

- A. FiberCementitious Composition Board:
 - 1. EXT 3.3A Latex: Latex MPI #15, low sheen.
- B. Structural Steel and Metal Fabrications:
 - 1. Applications include but are not limited to doors, frames, and eave steel.
 - 2. EXT 5.1B W.B. Light Industrial Coating: Inorganic Zinc MPI #19, W.B. Light Industrial Coating MPI #161, #163, or #164.
- C. Galvanized Metal, Not Chromate Passivated:
 - 1. Applications include doors and frames.
 - 2. Use on doors, frames, and guardrails: EXT 5.3K W.B. Light Industrial Coating (over epoxy): Epoxy Primer MPI #101, W.B. Light Industrial Coating MPI #161, #163, or #164.
 - 3. Use on handrails: EXT 5.3L Pigmented Polyurethane (over epoxy primer) (High Contact/Traffic): Epoxy Primer MPI #101, Polyurethane MPI #72.

2.05 INTERIOR PAINT SYSTEMS

- A. Structural Steel and Metal Fabrications:
 - 1. Use for exposed steel roof structure: INT 5.1C W.B. Dry Fall: Alkyd Metal Primer MPI #76 or 79, W.B. Dry Fall MPI #118.
- B. Galvanized Metal, Not Chromate Passivated:
 - 1. Applications include but are not limited to doors and frames.
- C. Gypsum Board:
 - 1. Applications include but are not limited to walls.
 - 2. INT 9.2A Latex: Latex Primer Sealer MPI #50, Latex #43, 44, 52, 53, 54 or 114.
 - 3. INT 9.2B High Performance Architectural Latex: Latex Primer Sealer MPI #50, HIPAC Latex MPI #138, 139, 140 or 141.
 - 4. INT 9.2C Alkyd: Latex Primer Sealer MPI #50, Alkyd MPI #47, 48, 49 or 51.
 - 5. INT 9.2E Epoxy: Latex Primer Seal MPI #50, Epoxy MPI #77, gloss.
 - 6. INT 9.2L W.B. Light Industrial Coating: Latex Primer Sealer MPI #50, W.B. Light Industrial Coating MPI #151, #153, or #154.

PART 3 EXECUTION**3.01 SCOPE -- SURFACES TO BE FINISHED**

- A. Paint all exposed surfaces except where indicated not to be painted or to remain natural; the term "exposed" includes areas visible through permanent and built-in fixtures when they are in place.
- B. Paint the surfaces described in PART 2, indicated on the Drawings, and as follows:
 - 1. If a surface, material, or item is not specifically mentioned, paint in the same manner as similar surfaces, materials, or items, regardless of whether colors are indicated or not.
 - 2. Paint surfaces behind movable equipment and furnishings the same as similar exposed surfaces.

3. Paint surfaces to be concealed behind permanently installed fixtures, equipment, and furnishings, using primer only, prior to installation of the permanent item.
 4. Paint back sides of access panels and removable and hinged covers to match exposed surfaces.
 5. Paint interior surfaces of air ducts and convactor and baseboard heating cabinets with flat, nonspecular black paint where visible through registers, grilles, or louvers.
 6. Paint dampers exposed behind louvers, grilles, and convactor and baseboard cabinets to match face panels.
- C. Do Not Paint or Finish the Following Items:
1. Items fully factory-finished unless specifically noted; factory-primed items are not considered factory-finished.
 2. Items indicated to receive other finish.
 3. Items indicated to remain naturally finished.
 4. Fire rating labels, equipment serial number and capacity labels, and operating parts of equipment.

3.02 EXAMINATION

- A. Verify that surfaces are ready to receive Work as instructed by the product manufacturer.
- B. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.
- C. Test shop-applied primer for compatibility with subsequent cover materials; report incompatible primer conditions and submit recommended changes for Architect's approval.
- D. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:
 1. Plaster and Gypsum Board: 12 percent.

3.03 PREPARATION

- A. Prepare surfaces as specified in MPI Architectural Painting Specification Manual and as follows for the applicable surface and coating; if multiple preparation treatments are specified, use as many as necessary for best results; where the Manual references external standards for preparation (e.g. SSPC standards), prepare as specified in those standards; comply with coating manufacturer's specific preparation methods or treatments, if any.
- B. Coordinate painting work with cleaning and preparation work so that dust and other contaminants do not fall on newly painted, wet surfaces.
- C. Surface Appurtenances: Prior to preparing surfaces or finishing, remove electrical plates, hardware, light fixtures, light fixture trim, escutcheons, machined surfaces, fittings, and similar items already installed that are not to be painted.
 1. If removal is impractical or impossible because of the size or weight of the item, provide surface-applied protection before preparation and finishing.
 2. After completing painting in each space or area, reinstall items removed using workers skilled in the trades involved.
- D. Surfaces: Correct defects and clean surfaces which affect work of this section. Remove or repair existing coatings that exhibit surface defects.
- E. Marks: Seal with shellac those which may bleed through surface finishes.
- F. Impervious Surfaces: Remove mildew by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.
- G. Gypsum Board Surfaces to be Painted: Fill minor defects with filler compound. Spot prime defects after repair.
- H. Galvanized Surfaces to be Painted: Remove surface contamination and oils and wash with solvent. Apply coat of etching primer.

1. The galvanized metal supplier shall disclose to the general contractor and to the painting contractor any pretreatment (chromate passivated) and temporary coatings, which have been applied. These coatings shall be removed at no extra cost to the painting contractor.
 2. Clean galvanized surfaces with nonpetroleum-based solvents so surface is free of oil and surface contaminants. Remove pretreatment from galvanized sheet metal fabricated from coil stock by mechanical or chemical methods as recommended as best practice by primer manufacturer.
- I. Uncoated Steel and Iron Surfaces to be Painted: Remove grease, mill scale, weld splatter, dirt, and rust. Where heavy coatings of scale are evident, remove by hand wire brushing or sandblasting; clean by washing with solvent. Apply a treatment of phosphoric acid solution, ensuring weld joints, bolts, and nuts are similarly cleaned. Prime paint entire surface; spot prime after repairs.
 - J. Shop-Primed Steel Surfaces to be Finish Painted: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces. Re-prime entire shop-primed item.

3.04 APPLICATION

- A. Apply products in accordance with manufacturer's instructions and as specified or recommended by MPI Manual, using the preparation, products, sheens, textures, and colors as indicated.
 1. Remove, refinish, or repaint work not complying with requirements.
- B. Do not apply finishes over dirt, rust, scale, grease, moisture, scuffed surfaces, or other conditions detrimental to formation of a durable coating film; do not apply finishes to surfaces that are not dry.
- C. Use applicators and methods best suited for substrate and type of material being applied and according to manufacturer's instructions.
 1. Brush Application: Use brushes best suited for the type of material applied; use brush of appropriate size for the surface or item being painted; produce results free of visible brush marks.
 2. Roller Application: Use rollers of carpet, velvet back, or high-pile sheep's wool as recommended by manufacturer for material and texture required.
 3. Spray Application: Use airless spray equipment with orifice size as recommended by manufacturer for material and texture required.
 4. Where application method is listed in the MPI Manual for the paint system that application method is required; otherwise any application method recommended by manufacturer for material used and objects to be painted is acceptable.
- D. Minimum Coating Thickness: Apply paint materials no thinner than manufacturer's recommended spreading rate; provide total dry film thickness of entire system as recommended by manufacturer.
 1. Number of coats and film thickness required are the same regardless of application method.
 2. If undercoats, stains, or other conditions show through final coat of paint, apply additional coats until paint film is of uniform finish, color, and appearance.
 3. Give special attention to ensure edges, corners, crevices, welds, and exposed fasteners receive dry film thickness equivalent to that of flat surfaces.
- E. Apply finish to completely cover surfaces with uniform appearance without brush marks, runs, sags, laps, ropiness, holidays, spotting, cloudiness, or other surface imperfections.
 1. Before applying finish coats, apply a prime coat of material recommended by manufacturer, unless the surface has been prime coated by others; where evidence of suction spots or unsealed areas in first coat appear, recoat primed and sealed surfaces to ensure finish coat with no burn through or other defects due to insufficient sealing.
 2. Apply first coat to surface that has been cleaned, pretreated, or otherwise prepared as soon as practical after preparation and before subsequent surface deterioration.
 3. Do not apply succeeding coats until the previous coat has cured as recommended by manufacturer.

4. Do not recoat until paint has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and application of another coat will not cause the undercoat to lift or lose adhesion.
5. If manufacturer's instructions recommend sanding to produce a smooth, even surface, sand between coats.
6. Before applying next coat vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.

3.05 CLEANING AND PROTECTION

- A. Collect waste material which may constitute a fire hazard, place in closed metal containers, and remove daily from site.
- B. At the end of each workday, remove empty cans, rags, rubbish, and other discarded paint materials from site.
- C. Protect other work, whether being painted or not, against damage by painting. Correct damage by cleaning, repairing or replacing, and repainting as approved by Architect.
- D. Provide "Wet Paint" signs to protect newly painted finishes. Remove temporary protective wrappings provided by others to protect their work after completing painting operations.
- E. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces. Comply with procedures specified in MPI Manual.

END OF SECTION

SECTION 10 44 00
FIRE PROTECTION SPECIALTIES

PART 2 PRODUCTS

1.01 FIRE EXTINGUISHERS

- A. Fire Extinguishers - General: Comply with product requirements of NFPA 10 and applicable codes, whichever is more stringent.

END OF SECTION

SECTION 13 12 50

PERMANENT GRANDSTANDS

PART 1 - GENERAL

1.01 SYSTEM DESCRIPTION

A. Provide labor, material, equipment and supervision necessary to complete installation of permanent steel grandstand, including the following:

1. Steel Substructure
2. Decking System
3. Concrete Foundation
4. Press Box Support Structure
5. Press Box
6. Alternate Items – Cover and Seat Backs

1.02 QUALITY ASSURANCE

A. Manufacturer Qualifications: Manufacturers must have ten years of experience in the manufacture of bleachers and grandstands; manufacturer must exhibit proof of business existence for past five years with documentation; welders must be AWS certified.

B. Installer Qualifications: Experienced in the proper installation of grandstands.

C. Source Quality Control: Mill Test Certification.

1.03 SUBMITTALS

A. Manufacturer's Product Data: Submit manufacturer's descriptive product data for project.

B. Shop Drawings: Manufacturer to submit shop drawings sealed by a registered engineer and shall be of sufficient clarity to indicate the location, nature and extent of the work proposed and show in detail that it will conform to the applicable code and relevant laws.

C. Certificates:

1. Insurance Certificate
2. Bid Bond

1.04 SITE CONDITIONS

A. Field Site:

1. Owner to make site accessible.
2. Owner to verify site locations, benchmarks.

B. Underground Utility Line: Owner to clearly mark all underground utilities and obstructions and Owner to relocate as shown. Contractor to protect those to remain.

C. Soil Test: Furnished by Owner.

1.05 BUILDING CODES

A. Must meet or exceed all State and Local applicable codes and in compliance with the International Building Code adopted by the jurisdiction and CABO/ANSI A117.1 Barrier Free Subcode.

1.06 WARRANTY

A. Permanent Grandstand shall be under warranty for a period of five (5) years beginning at Date of Substantial Completion for Projects installed by Manufacturer. The warranty will provide for repair or replacement of failed components due to defect in materials and workmanship of installation for the specified period. This warranty excludes any other defects resulting from abnormal use in service, vandalism, weathering, oxidation, accidental or intentional damage or any occurrences beyond Manufacturer's control.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Basis of Design: Southern Bleacher Company (800) 433-0912.

Other manufacturers seeking to be approved must submit product literature to the Owner for review and receive approval from Owner three working days prior to bid date.

2.02 PERMANENT STEEL GRANDSTAND

A. Product Description

1. Gross seating capacity as shown per plan.
Press Box approximately 42' x 10' with Support Structure.
2. Vertical columns are placed 12 or 18 feet on center laterally and 13 feet 6 inches feet on center front to back as shown per plan.

3. Horizontal beams are wide flange beams.
4. Traverse bays are free of crossbracing the total length of the grandstand.
5. Stringers are wide flange with steel angle rise and depth fabrication and are placed 6 feet on center.
6. Walkway:
 - a. Clear width 72 inches.
 - b. Elevated approximately 4 feet 8 inches above grade at benchmark.
7. Entry stairs to be firmly anchored to uniformly poured concrete bases.
 - a. Stair rise: per plan and Code, aluminum closure and contrasting aluminum stair nose.
 - b. Stair tread depth: per plan and Code.
 - c. Guardrails: As required by code.
 - d. Stairs to have handrail extension. The handgrip portion of handrails shall not be less than 1 1/2 inches or more than 2 inches in cross-sectional dimension or the shape shall provide an equivalent gripping surface. The handgrip portion of handrails shall have a smooth surface with no sharp corners. The top of handrails and handrail extensions shall be placed not less than 34 inches or more than 38 inches above the nosing of treads and landings. Where handrails are not continuous between flights, the handrails shall extend horizontally at least 12 inches beyond the top riser and continue to slope for the depth of one tread beyond the bottom riser. Ends shall be returned or shall terminate in newel posts or safety terminals.
8. Aisles:
 - a. Aisles with seating on both sides to have discontinuous mid-aisle handrails. The handrails shall be discontinuous with breaks at intervals not to exceed five rows. These breaks shall have a clear width of at least 22 inches and not greater than 36 inches horizontally.
 - b. Anodized aluminum handrails with rounded ends to be provided with an intermediate handrail below the main handrail.
 - c. Aluminum tread nosing of contrasting color on aisle steps.

- d. Halfsteps shall be provided for riser heights above 8 inches.
- e. Halfsteps shall provide equal rise and run throughout aisle. Each shall have aisle nosing with non-skid black powder coated finish or other paint system meeting AAMA 603.8-92 specifications with a hardness rating of 2H and riser closure with clear anodized finish.
- f. Aisles with a riser height of non-uniformity shall be indicated with distinctive markings as required by code.

9. Decking:

- a. Rise and depth per plan and Code.
- b. Each seat 17 inches above its respective tread.
- c. Mill Aluminum Decking Arrangement
 - (1) INTERLOCK Aluminum Decking Systemor
 - (2) Tongue-and-Groove System
- d. Seating Selection
 - (1) Anodized Aluminum Bench Seat
 - (a) 2 x 12 (standard), with height of 1 1/2".

10. Guard railing: To be at all sides of bleacher, entry stairs and ramps, portals, and landings. Railing to be anodized aluminum with end plugs at ends of straight runs and/or elbows at corner. All guardrails shall be secured to angle rail risers by galvanized fasteners. Railing shall be at heights as required by code for its location on the grandstand. Guard railing shall include intermediate railing, or galvanized chain link fencing fastened in place with galvanized fasteners and aluminum ties.

11. Cross Aisles: Clear width per plan and Code.

12. Ramps:

- a. Slope: 1 in 12, with required landings at Code intervals.
- b. Guardrails: As required by code plus toe board.
- c. Handrail: Ramps to have handrail extension. The handgrip portion of handrails shall not be less than 1 1/2 inches or more than 2 inches in cross-sectional dimension or the shape shall provide an equivalent

gripping surface. The handgrip portion of handrails shall have a smooth surface with no sharp corners. The top of handrails and handrail extensions shall be placed not less than 34 inches or more than 38 inches above the ramp surface. Where handrails are not continuous between runs, the handrail shall extend horizontally above the landing 12 inches minimum beyond the top and bottom ramps. Ends shall be returned or shall terminate in newel posts or safety terminals.

13. Handicap provision:

- a. Quantity of wheelchair spaces: 13 per plan, note companion seating.
- b. Riser area adjacent to wheelchair spaces to have intermediate construction so 4 inch sphere cannot pass through opening.

B. Materials/Finishes

1. Substructures:

- a. Structural shapes meet one of the following ASTM specifications: A36, A36/A572 grade 50, A572 grade 50, A529-50, or A500 grade B.
- b. Shop connections are seal welds.
- c. After fabrication, all steel is hot-dipped galvanized to ASTM-A-123 specifications.
- d. Painted steel finish is unacceptable.

2. Extruded Aluminum:

- a. Seat Planks, Backrests, Stanchions, Riser Planks, and Railing are extruded aluminum alloy, 6063-T6.
(1) Clear anodized 204R1, AA-M10C22A31, Class II finish
- b. Tread planks are extruded aluminum alloy 6063-T6 mill finish.
- c. Railing: Extruded aluminum alloy, 6063-T6 clear anodized 204R1, AAM10C22A31, Class II.

3. Accessories:

- a. Channel End Caps: Aluminum alloy 6063-T6, clear anodized 204R1, AA-M10C22A31, Class II.
- b. Cast End Caps: Aluminum 319 alloy, cast finish. (Required for backrest and RS plank only)

c. Hardware:

- (1) Bolts, Nuts: Hot-dipped galvanized or mechanically galvanized.
- (2) Hold-down Clip Assembly: Aluminum alloy 6005A-T6, mill finish.
- (3) Structural Hardware: Equal to or greater than hot-dipped galvanized ASTM-A307. No connections utilizing high strength bolts are classed as slip critical.

d. Aisle Nose and Stair Nose: Aluminum alloy, 6063-T6, non-skid black powder coated finish or other paint system meeting AAMA 603.8-92 specifications with a hardness rating of 2H.

C. Fabrication:

1. Design Load:

- a. Tread and Seat Area: 100 psf uniform live load.
- b. Seat (Vertical): 120 lbs/lf.
- c. Seat (Horizontal Sway): 24 lbs/lf parallel and 10 lbs/lf perpendicular to seat.
- d. Handrail and Guardrail: 50 lbs/lf in any direction, or greater if per State Code.
- e. Handrail and Guardrail: 200 lbs concentrated in any direction, or greater if per State Code.
- f. Snow Loads: As per State adopted code.
- g. Wind Loads: As per State adopted code.
- h. Seismic Loads: As per State adopted code.

2. All manufactured connections to be shop welded.

- a. Manufactured by certified welders conforming to AWS Standards.

2.02A ALTERNATE ITEMS

A. Schedule B – Alternate #1: Provide permanent cover of same material consistency and type, including all structure, supports, and foundation upgrades. Cover to be located over center section of bleachers and be elevated to top elevation of press box plus 10 feet. Cover footprint approximately 53 feet by 27 feet.

B. Schedule B – Alternate #2: Provide seat backs for center section of bleachers. Basis of design: Southern Bleacher Elite Seat II – plastic blow molded, UV protected individual plastic seat. Quantity: approximately 150, color: standard black. Note tread depth required to be 30 inches minimum with Alternate #2 selection.

2.03 METAL STRUCTURE PRESS BOX

A. Product Description: Type II Construction

1. Press Box Support Structure: Independently supported but connected to rear of grandstand.
2. Press Box Dimensions: 10 feet wide x 42 feet long.
3. Filming Area/Observation Deck located on Press Box roof.
4. Press Box to be of open construction, allowing inspection of electrical wiring, switches and other components without destructive disassembly.

B. Materials/Finishes

1. Press Box Support Structure:
 - a. Structural shapes meet one of the following ASTM specifications: A36, A36/A572 grade 50, A572 grade 50, A529-50, or A500 grade B.
 - b. Shop connections are seal welds.
 - c. After fabrication, all steel is hot-dipped galvanized to ASTM-A-123 specifications.
2. Press Box: All materials shall be new and shall comply with ASTM specifications.
 - a. Floor
 - (1) Main support to be a galvanized steel floor frame sized to support structure and metal belly pan for support of insulation.
 - (2) Floor to be INTERLOCK Aluminum Decking System, extruded aluminum alloy 6063-T6, mill finish. Attach Decking System to steel floor frame with mechanical fasteners at end of plank and at intermediate supports.
(Tongue & Groove or Standard extrusion is not acceptable.)
 - (3) Insulation: Poly-encapsulated Formaldehyde-free fiberglass building insulation R-13, 3 1/2 inches thick. Batt or roll as manufactured by Johns Manville, or equal.
 - b. Wall Structure
 - (1) 4 inch x 4 inch x 11 gauge square tubing with maximum span of 14 feet on front wall and maximum span of 6 feet on back wall and 4 inch x 2 1/2 inch x 14 gauge steel "cees" with maximum spacing of 5 feet for all walls with siding. Spans greater than these require engineered calculations for design.

a) Steel framing shapes to meet one of the following ASTM's, A500 Grade A or B 45 ksi, A36 50ksi, A1011 CS Type B.

(2) Insulation: Poly-encapsulated Formaldehyde-free fiberglass building insulation R-13, 3 1/2 inches thick. Batt or roll as manufactured by Johns Manville or equal.

(3) Interior Finish

(a) 1/2 or 5/8 inch vinyl coated gypsum panels (as required), Gold Bond vinyl-surfaced Durasan.

(b) Cove Base: Vinyl 4 inches x .080.

(4) Exterior Finish

(a) 26 gauge prefinished R-Panel paneling as manufactured by MBCI, Signature 200 color series, or equal.

(b) Wall panels are attached with #12 TEK screws - 6" O.C. at the top, midpoint and bottom of the panels.

(c) Lap screws are placed at each end of the panels, at the intermediate supports, and at the mid point between supports (TEK #14).

(d) All fasteners to be painted same color as exterior paneling.

c. Roof Structure

(1) 4 inch x 4 inch x 11 gauge square tubing with maximum spacing of 6 feet on center and 4 inches x 2 1/2 inches x 14 gauge steel "cees" with maximum spacing of 2 feet on center.

(2) Roof: 1/8 inch fourway steel plate roof, continuous welded seams coated with acrylic metal primer as manufactured by Coronado and 36 mils of acrylink roof coating as manufactured by Isothermal Protective Coatings, or equal. Plate is welded on both sides of rafters with 1-1/2 inch long 1/8 inch fillet welds on 12 inch centers.

(3) Insulation: Poly-encapsulated Formaldehyde-free fiberglass building insulation, R-19 (minimum) 6 inches thick. Batt or roll as manufactured by Johns Manville or equal.

(4) Cornice: 26 gauge steel prefinished to match metal siding.

(5) Ceiling: 24 inch x 24 inch x 5/8 inch acoustical lay in ceiling tile with removable tiles, per 2019 OSSC or local code, applicable category per seismic zone.

d. Exterior Door(s)

(1) Full flush steel construction with hollow or polystyrene core. 18 gauge skin sheets. Dimensions: 3 feet 0 inches x 6 feet 8 inches. Color: Coordinated with press box siding color.

(2) Steel door frame (16 gauge) complete with 1/2 inch threshold and weather-stripping.

(3) Exterior Hardware: Yale 546F Exterior Trim, or equal. Handles shall be lever type that allow operation without tight grasping or twisting of the wrist. Keyed alike locks. Coordinate with Owner for standards.

(4) Interior Hardware: Yale 2100 Exit Device, or equal. Handle shall be panic bar that allows for opening without any grasping, twisting or turning. Coordinate with Owner for standards.

e. Interior Door

(1) Interior Hollow Core Birch Unit. Dimensions: 3 feet 0 inches x 6 feet 8 inches.

(2) Hardware: Handles shall be lever type that allow operation without tight grasping or twisting of the wrist.

f. Interior Walls

(1) Framing to be steel galvanized studs (25 gauge) 1 1/4 inch x 3 5/8 inch or 4 inch at maximum 2 feet on center.

(2) Finishes to be consistent with all other interior finishes.

g. Windows

(1) Frame: Extruded aluminum single hung, vertical sliding unit, thermal break.

(2) Sash: Tilt toward inside for easy cleaning.

(3) Glazing: Clear tempered panes.

(4) Dimensions of each unit: Dependent on compartment size. At interior wall locations or structural support locations the dimension between

windows shall be no greater than 6 inches.

(5) Finish: Electrostatically applied acrylic enamel.

h. Work Bench

(1) 1 inch thick x 21 inch wide clear anodized aluminum work bench supported by 4 inch x 2 1/2 inch x 14 gauge steel. Countertops heights shall be constructed to allow wheelchair usage at all locations.

i. Painting: Materials equal to Coronado, or equal.

(1) Surfaces: Exterior Door(s), Door Frame(s)

(a) Primer: Applied by Door Manufacturer.

(b) Finish: 2 coats acrylic latex semi-gloss enamel applied by press box manufacturer.

(2) Surfaces: Interior Doors (if applicable)

(a) Primer: Jones Blair Interior Exterior Oil Primer, or equal.

(b) Finish: 2 coats acrylic latex semi-gloss enamel.

(3) Surfaces: Exterior Siding

(a) Primer: Applied by Siding Manufacturer.

(b) Finish: Applied by Siding Manufacturer.

(c) Touchup: If applicable

(4) Surfaces: Wall and Roof Structure

(a) Primer: Coronado DTM Industrial 180-11 acrylic metal primer applied after welding, or equal.

j. Caulking: Sonneborn NP1 – Polyurethane sealant, All temperature, UV resistant, or equal. Silicone products are not acceptable.

k. Electrical

(1) Submittal drawing shall indicate devices and circuitry.

(2) Fixtures: 2-lamp, 58 or 64 watt fluorescent, 2' x 4' lay-in design as manufactured by Lithonia Lighting, or equal. Fixtures shall be located above countertop and be maximized to full length of compartment space.

(3) Wiring to be in EMT, flexible metal conduit or surface raceway. N.E.C. breaker panel to be 100 amp flush or surface mounted on wall with 1 1/4 inch conduit stubbed out bottom of press box or 2 inch rigid conduit to be

stubbed out at back wall of press box ready for service line to be connected.

(4) Electrical outlet(s) installed per NEC shall be standard duty. All outlets shall be surface or flush mounted.

(5) Sound, Telephone, Clock, Field Communication: Empty single or double outlet boxes (as required) per N.E.C. with 3/4 inch conduit stubbed out bottom of Press Box for use of Owner. Outlet boxes to be flush mounted into wall. Any wiring completed on-site will be responsibility of such contractor for inspections. Quantity. Two will be provided. Owner shall indicate additional boxes needed.

(6) Observation Deck: Weathertight outlet box for cameras. Quantity: As shown.

I. Filming Area/Observation Deck (If applicable)

(1) Access Options

(a) Exterior: Stairs up to roof shall run along side wall of press box with support of same being provided by extended landing platform at bottom and by stub beam attached to press box back wall at top of stairs. No supports from grade are required.

See drawings for preferred location.

(2) Roof guard railing to be 42" above walking surface around perimeter of deck attached to 5/8 inch galvanized studs to be welded to roof support structure. The guard railing to include anodized aluminum with 9 gauge galvanized chain link fencing fastened in place with galvanized fasteners and aluminum ties.

2.04 WARRANTY

A. The Press Box shall be under warranty for a period of five years beginning at Date of Substantial Completion for projects installed by Manufacturer. The Press Box is warranted to be free from defect in materials and workmanship in the course of manufacture. This warranty excludes any other defects resulting from abnormal use in service, accidental or intentional damage or any occurrences beyond manufacturer's control.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. All work performed by technicians experienced in bleacher seating installation.
- B. Project as per approved shop drawings.

3.02 FIELD QUALITY CONTROL

A. Foundation: Footings for the grandstand shall provide sufficient bearing area at bottom to support all loads of the grandstand. Depth and design of footings are described by the structural plans and shall be confirmed by Owner supplied soil test. Hot-dipped galvanized anchor bolts shall be secured in the concrete footings. Concrete shall attain working strength of 3,000 psi.

3.03 CLEAN-UP

- A. Clean up all debris caused by work of this section.
- B. The Owner, Architect and Contractor acknowledge and accept that mill finish aluminum as specified will have water stains present from transportation and storage during installation. Removal of these stains is not part of this contract.
- C. Stand to be broom cleaned at completion.

SECTION 23 00 00

BASIC HVAC REQUIREMENTS

(This section not prepared by Mackenzie. This section is solely the product of System Design Consultants, Inc.)

PART 1 GENERAL

1.01 OTHER REQUIREMENTS

- A. The Bidding, General and Supplementary of this project manual and specific sections as noted apply to the work specified in Mechanical Division 23 which encompasses Sections 23 00 00 through 23 82 39. This Section 23 00 00 applies to all sections of Mechanical Division 23.

1.02 SCOPE

- A. It is the intent of these specifications and the accompanying drawings to describe complete mechanical systems installations for all building areas.
- B. Furnish and install all material, labor, and equipment in accordance with these documents.
 - 1. Include all incidental items and work not specifically shown or specified but required by good practice in a complete system.
 - 2. The drawings and specifications are complementary. What is called for in one shall be called for in both.
 - 3. The drawings are diagrammatic but should be followed as closely as possible. Where required by jobsite conditions, relocate and provide fittings, etc., as required. Provide an allowance in the contract bid to furnish additional pipe and ductwork fittings required for coordination with structure and other construction trades.

1.03 DEFINITIONS

- A. Or approved equal: Requires approval prior to bid date.
- B. Indicated:
 - 1. The term "indicated" is a cross reference to details, notes, or schedules on the drawings, other paragraphs or schedules in the specifications, and similar means of recording requirements in the Contract Documents.
 - 2. Where terms such as "shown," "noted," "scheduled," and "specified" are used instead of "indicated," it is for the purpose of helping the reader locate the cross reference, and no limitation of location is intended except as specifically noted.

- C. Directed, Requested, Etc.: Where not otherwise explained, terms such as "directed," "requested," "authorized," "selected," "approved," "required," "accepted," and "permitted" mean "directed by the Engineer," "requested by the Engineer," etc. However, no such implied meaning will be interpreted to extend the Engineer's responsibility into the Contractor's area of construction supervision.
- D. Site or Project Site: The space available to the Contractor for the performance of the work, either exclusively or in conjunction with others performing the work as part of the project. The extent of the project site is shown on the Mechanical drawings and is not identical with the description of the land upon which the project shall be built.
- E. Approved:
 - 1. Where used in conjunction with the Architect's response to submittals, requests, applications, inquiries, reports, and claims by the Contractor, the meaning of the term "approved" will be held to the limitations of the Architect's responsibilities and duties as specified in the General and Supplementary Conditions.
 - 2. In no case will "approval" by the Architect be interpreted as a release of the Contractor from responsibilities to fulfill requirements of the Contract Documents.
- F. Provide: The term "provide" means to furnish and install, complete and ready for the intended use.

1.04 STANDARDS AND CODES

- A. Provide all equipment and material and perform all work in accordance with all local, state, and national codes and regulations.
- B. For work on this project, comply with the latest editions of appropriate standards published by the following:
 - 1. Air Diffusion Council ADC
 - 2. American Gas Association AGA
 - 3. Air Movement and Control Association AMCA
 - 4. National Environmental Balancing Bureau NEBB
 - 5. National Electrical Manufacturers Association NEMA
 - 6. National Fire Code. NFC
 - 7. National Fire Protection Association NFPA
 - 8. Sheet Metal and Air Conditioning Contractors' National Association SMACNA
 - 9. Underwriters' Laboratories UL
 - 10. Oregon Structural Specialty Code OSSC
 - 11. Oregon Mechanical Specialty Code OMSC
 - 12. Oregon State Energy Efficiency Specialty Code OEESC
 - 13. Oregon Plumbing Specialty Code OPSC

1.05 APPROVAL OF EQUIPMENT AND MATERIALS

- A. Manufacturer's trade names, catalog numbers, and material specifications used in this specification are intended to establish the quality of equipment or materials expected. Materials and manufacturers not listed require approval prior to the bid date.
- B. Approval of substitute equipment or materials will be based upon performance, quality and other factors deemed important by the Architect. The Contractor will be responsible for making all changes in this and other associated work required as a result of the substitution. Additional or modified structural calculations and roof penetrations required to accommodate the substitution will be the responsibility of the contractor.

1.06 SUBMITTALS

- A. Coordinate with the architects requirements for submittal format.
- B. Furnish performance data and technical information on all materials and equipment to be used on the project.
- C. Include shop drawings with the submittals where necessary to determine clearance, where the Contractor proposes alternate equipment or material arrangements, and when requested by the Architect.
- D. Items transmitted for approval must be received in the Architect's office within 45 days of contract award. The Architect prior to installation must approve all material and equipment.
- E. Review of submittals or shop drawings by the Architect does not relieve the Contractor from the requirements of the Contract Documents unless specific approval has been requested for a given deviation.

1.07 QUALITY ASSURANCE

- A. Maintain the highest standards of workmanship throughout the project.
- B. Use the latest editions of applicable and specifically referenced standards.
- C. Inspect all material and equipment upon arrival at the site and return any which is not in new condition.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.01 COORDINATION

- A. Cooperate with other trades to assure that construction proceeds in an orderly and timely manner. Contract cost increases due to improperly sequenced work with other trades will not be allowed.

- B. Study the architectural, structural, electrical, shop and any specialty drawings as appropriate and specifications to determine required coordination.
- C. Prepare detailed shop drawings where necessary to assure proper fit and necessary clearance.
- D. Refer to electrical drawings to verify voltage and phase of mechanical equipment.

3.02 PERMITS, FEES AND INSPECTIONS

- A. Obtain all required permits and pay for all fees and connection charges.
- B. Schedule any required inspections.

3.03 MATERIALS AND WORKMANSHIP

- A. Furnish all materials and equipment in new condition, free from defects and of size, make, type, and quality specified. Installation shall be in a neat and workmanlike manner.
- B. When two or more items of the same kind, type, or class are required, use items of a single manufacturer.

3.04 MEASUREMENTS

- A. Take all measurements from reference datums established by the general contractor.

3.05 DELIVERY, HANDLING AND STORAGE

- A. Receive all material and equipment at the jobsite or shop.
- B. Use proper and sufficient equipment to handle all products employed in the project.
- C. Where storage of material or equipment is necessary, it shall be a clean and weatherproof area. Seal any openings and cover the product to assure that there will be no corrosion or foreign matter introduced. Assure that it will be in new condition when placed in service.

3.06 EQUIPMENT INSTALLATION, BRACING AND SUPPORT

- A. Install all equipment in strict accordance with the manufacturer's instructions unless otherwise indicated.
- B. The drawings in general are based upon one of the specific manufacturers listed for a particular equipment item. The other specified manufacturers and additional approved manufacturers of equipment may require deviations from the drawings to properly install the particular equipment in accordance with the manufacturer's recommendations and to provide the system results required. Provide all work necessary in the base bid price to install this equipment.

- C. Where the installation shown or specified is contrary to the manufacturer's instructions, advise the Architect in writing of the differences before proceeding with the installation.
- D. Anchorage to Floors, Roofs, Etc., Sway Bracing and Seismic Restraints:
 - 1. The contractor is responsible to determine the means and methods of equipment installation and support.
 - 2. Provide supports for all apparatus as specified, detailed, as required by the manufacturers of specific equipment and the project governing code authorities. Anchor all roof and base/floor mounted equipment with size and spacing of anchor bolts or other attachment means as recommended by the respective equipment manufacturer.
 - 3. Provide seismic restraints on all mechanical equipment in conformance with the Oregon Structural Specialty Code, Section 1613 "Earthquake Loads" and ASCE 7. Costs for seismic calculations shall be included in the bid price.
 - 4. Provide deferred submittals directly to the governing code jurisdiction for anchorage to floors, roofs, etc., sway bracing and seismic restraints. Submittals to show locations and sufficient support details as required by the governing code jurisdiction.
 - 5. Provide supplementary drawings and calculations as required by governing code jurisdictions noting seismic support data/calculations as required for permit purposes.
 - 6. Mechanical seismic criteria is as follows:

a.	Risk Category	II
b.	Seismic Design Category	D
c.	Component Importance Factor (Ip)	
	1) Natural gas system / components	1.5
	2) Other HVAC components	1.0
- E. Maintain a copy of the manufacturer's installation instructions at the jobsite for all equipment.

3.07 SLEEVES AND INSERTS

- A. Provide sleeves at all locations where piping and ductwork passes through building construction.
- B. Sleeves for interior walls and floors shall be 22 gauge galvanized or heavier as required. Sleeves for exterior walls shall be cast iron, wall thickness as required.
 - 1. Wall sleeves shall be installed in all exterior walls and all interior masonry or fire-rated walls in a manner that preserves the fire-rated or watertight integrity of the wall.
 - 2. Interior wall sleeves for uninsulated pipe shall allow minimum 1/4 inch clearance all around pipe for pipe movement. Allow 1 inch clearance around pipe at building expansion joints.

3. Interior wall sleeves for insulated piping shall be selected to encompass the pipe and insulation and allow minimum 1/4 inch clearance around insulation for pipe movement. Allow 1 inch clearance around pipe and insulation at building expansion joints.
 4. Floor sleeves shall extend 4 inches above the floor and shall be sealed watertight. Floor sleeves shall be oversized to allow 1/2 inch minimum space all around pipe or pipe and insulation where applicable. Seal space between pipe and sleeve with Dow Corning Fire Stop System, 3M brand CP25 or approved equal. Sealant must be between pipe and sleeve. Sealant between insulation and sleeve is not acceptable. Install firestop materials in complete accordance with the manufacturer's instructions and in compliance to applicable UL listings
- C. Seal space between pipe and sleeve with Dow Corning Fire Stop System, 3M Brand CP25, or approved equal where piping penetrates firewall or floors. Sealant must be between pipe and sleeve; sealant between insulation and sleeve is not acceptable. Install firestop materials in complete accordance with the manufacturer's instructions and in compliance to applicable UL listings.

3.08 FLOOR, WALL AND CEILING PLATES

- A. Provide escutcheon plates where all exposed piping and ductwork passes through finished walls, floors and ceilings, including accessible cabinet spaces.
- B. Floor plates: deep recessed, cast brass, chrome plated.
- C. Wall and ceiling plates: spun aluminum, chrome plated.
- D. Secure plates to pipe or structure. Plates shall not penetrate insulation vapor barriers. Size plates to sufficiently cover pipe sleeves and openings in finish materials.

3.09 PROTECTION

- A. Protect all work, material, and equipment from loss or damage until the Owner accepts the project.
- B. As the work progresses, keep all equipment covered and cap all ducts and piping that may temporarily be left unconnected.
- C. Notify all other trades of any required precautions necessary to protect the work.

3.10 ACCESSIBILITY

- A. Provide convenient access by location or access panel to all equipment requiring periodic service.

3.11 ELECTRICAL WORK

- A. Wherever possible, provide all interconnect wiring within or on a piece of equipment with the equipment unless shown or specified otherwise. An electrician licensed to perform this type of work shall perform all field wiring.

3.12 RELATED WORK

- A. The following work and materials are specified elsewhere:
 - 1. Pipe chases, equipment pads and foundations, trenches, painting, air louvers, louvered penthouse, and access panels except as otherwise specified in this division.
 - 2. Framed openings, wood grounds and nailing strips, masonry, concrete and other architectural and structural elements.

3.13 CLEANING

- A. Maintain premises and public properties free from accumulations of waste, debris and rubbish during construction.
- B. Clean all mechanical equipment of dust, grease, iron cuttings, unnecessary stamps, or shipping labels, etc.
- C. Touch up factory-painted surfaces, as necessary, with paint of matching color.

3.14 RECORD DRAWINGS

- A. Maintain one set of construction drawings at the jobsite for the sole purpose of recording work of the mechanical contract, as actually installed. Upon request, the Architect will make the original tracings available to the mechanical contractor for printing the drawings. The Contractor shall pay the reproduction costs.
- B. Record all piping and ductwork by dimensions from gridlines, below grade, above floor, etc. Show location of all access panels, cleanouts, rough-in for future, etc.
- C. Make record drawings available to the Architect for review or reproduction during construction. The Architect will pay any printing costs.
- D. Deliver record drawings to the Architect promptly upon completion of the project.

3.15 OPERATION AND MAINTENANCE MANUALS:

- A. Coordinate with the architects requirements for submittal format.
- B. Directories:
 - 1. Supplier Directory: Alphabetical list of principal subcontractors and suppliers of equipment giving names, addresses and telephone numbers.

2. Equipment Directory: List of equipment installed such as fans, air supply units, pumps, heating and cooling equipment, plumbing fixtures, etc., giving drawing reference numbers, location, area served, manufacturer with model number and supplier.
- C. Manufacturer's Literature:
1. Show name, address, and phone number of the nearest service facility authorized by the manufacturer.
 2. Include illustrations, diagrams, and instructions for installation, startup, operation, inspections, maintenance, parts list, data sheets, and other necessary materials.
 3. Include complete electrical, schematic, and connection diagrams for each equipment item.
 4. Include the name, address, and phone number of contractor(s) who furnished and who installed equipment and systems.
 5. Where the literature covers more than one model, check off neatly in ink correct model number and data for the model number including all specified options.
 6. In those instances where the equipment, its mode of control, or both, is job assembled for special functions, then provide written operating and maintenance instructions prepared by the assembler on 8-1/2 inch x 11 inch sheets.
- D. Maintenance Instructions:
1. Where instructions for maintenance are not included in the manufacturer's literature, provide supplemental data to enable proper maintenance of the equipment installed.
 2. Include specific lubrication methods and recommended frequencies along with procedures and precautions for inspection and routine service.
- E. Copy of Written Guarantee.
- F. Recommended Spare Parts Stock.

3.16 HVAC SYSTEMS TRAINING

- A. Training must be on fully operational system, or the training must be repeated when the system is fully operational at no additional cost to the Owner. Training must be scheduled through the owner's representative at a time that is convenient to their maintenance personnel. The owner's representative must be notified of any changes, re-scheduling or modifications to the training schedule
1. Maintain a start-up log notebook in the job trailer containing signed copies of the manufacturer's start-up sheets for all equipment.

2. Training walk-throughs shall be performed by a contractor field project manager or technician who is fully knowledgeable with the project specifics and has had continuous involvement during the course of the project. The individual shall be knowledgeable in the specific installation details and maintenance of the project equipment.
- B. Maintenance Training: The instructor will walk through the building identifying the location of the equipment installed and specific function(s) related to the overall mechanical systems. The training shall include answering maintenance personnel questions, troubleshooting and diagnostics procedures, repair instructions and preventive maintenance.
- C. Provide a written agenda to the attendees outlining the general scope of the training session and the building equipment involved.

3.17 CUTTING AND PATCHING

- A. Cut work as required for installation and patch to match original conditions as directed and approved by Architect. Do not cut structural portion without Architect's approval.
- B. When masonry construction must be penetrated, provide a steel pipe sleeve in opening and grout in place in a neat manner. Leave grout surface to match existing finish.
- C. Prior to cutting any existing work, locate all concealed utilities to eliminate any possible service interruption or damage.

3.18 FIRESTOPPING PENETRATIONS IN FIRE-RATED WALL/FLOOR ASSEMBLIES

- A. Contractors shall provide proper sizing when providing sleeves or core-drilled holes to accommodate the through penetrating items. All voids between sleeve or core-drilled hole and pipe passing through, shall be firestopped to meet the requirements of ASTM E-814.
- B. Fire stop penetrations in accordance with the UL listed assemblies provided by the manufacturers of the products used.

3.19 CHANGE ORDERS

- A. All supplemental cost proposals by the Contractor shall be accompanied with a complete itemized breakdown of labor and materials cost without exception.
- B. Contractor's estimating sheets for the supplemental cost proposals shall be made available to the Architect. Labor must be separated and allocated for each item of work.

3.20 VERIFICATION OF EXISTING CONDITIONS

- A. Verify field conditions and measurements prior to the manufacture of shop fabricated materials and equipment.

- B. Produce shop drawings with details as required verifying proper installation of materials and equipment in conformance with applicable codes and the manufacturer's requirements.

3.21 SYSTEMS WIRING

	ITEM	FURNISHED BY	INSTALL BY	POWER WIRING	CONTROL WIRING
1.	Division 23 Equipment Motors	Div. 23	Div. 23	Div. 26	Div. 23
2.	Remote Motor Starters, Contactors and Overload Heaters – Integral	Div. 23	Div. 26	Div. 26	Div. 23
4.	Fused & Unfused Disconnect Switches	Div. 26	Div. 26	Div. 26	-----
5.	Manual Operation Switches	Div. 26	Div. 26	Div. 26	Div. 26
6.	Control Relays & Transformers	Div. 23	Div. 23	Div. 23	Div. 23

END OF SECTION

SECTION 23 05 29

HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

(This section not prepared by Mackenzie. This section is solely the product of System Design Consultants, Inc.)

PART 1 GENERAL

1.01 SUMMARY

- A. Work included: Providing of all required hangers and supports for piping, ductwork and equipment

1.02 SUBMITTALS

- A. Provide submittals in accordance with Section 23 00 00.
- B. Submittals shall include:
 - 1. Manufacturer's technical literature for all products used indicating service for each type of hanger.
 - 2. Include proposed pre-manufactured piping and duct vibration isolation products.
 - 3. Submit literature or describe duct-supporting method.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Pentair, Eaton, or Super Strut. Pentair used as a basis for selection.

2.02 DESCRIPTION

- A. Pipe Attachments:
 - 1. Non-insulated ferrous pipe (1/2 to 1-1/2 inch): model 115.
 - 2. Non-insulated ferrous pipe (2 inch and larger): model 400.
 - 3. Insulated pipe: models 103 and 403.
 - 4. Riser clamp, ferrous pipe: Figure 510.
- B. Upper Attachments: Attachment to wood structures where weights permit shall be models 325 or 328.
- C. Structural Attachments: Provide all necessary structural attachments such as concrete anchors, beam clamps, hanger flanges and brackets. Hangers shall not be suspended from other piping, equipment, etc.
- D. Miscellaneous items such as hanger rod, rod couplings, turnbuckles, etc. shall be standard model numbers of the same manufacturer as the attachments.
- E. All-thread rod used for pipe supports shall be no less than 3/8 inch diameter.

- F. Support of piping or HVAC related conduit on roof surfaces to be C-Port system manufactured by B-line or approved equal.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Provide hangers and supports in accordance with the instructions furnished by the manufacturers of these devices. Support ductwork as required by the OMSC and per SMACNA recommendations.
- B. Provide additional structural members where required to support piping or ductwork.
- C. Provide hangers and support devices in accordance with the equipment manufacturer's instructions for all equipment.
- D. Anchorage to Floors, Roofs, Etc., Sway Bracing and Seismic Restraints:
 - 1. The contractor is responsible to determine the means and methods of equipment installation and support.
 - 2. Provide supports for all apparatus as specified, detailed, as required by the manufacturers of specific equipment and the project governing code authorities. Anchor all roof and base/floor mounted equipment with size and spacing of anchor bolts or other attachment means as recommended by the respective equipment manufacturer.
 - 3. Provide seismic restraints on all mechanical equipment in conformance with the Oregon Structural Specialty Code, Section 1613 "Earthquake Loads" and ASCE 7. Costs for seismic calculations shall be included in the bid price.
 - 4. Provide deferred submittals directly to the governing code jurisdiction for anchorage to floors, roofs, etc., sway bracing and seismic restraints. Submittals shall show locations and sufficient support details as required by the governing code jurisdiction.
 - 5. Provide supplementary drawings and calculations as required by governing code jurisdictions noting seismic support data/calculations as required for permit purposes.

END OF SECTION

SECTION 23 05 53

IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

(This section not prepared by Mackenzie. This section is solely the product of System Design Consultants, Inc.)

PART 1 GENERAL

1.01 SUMMARY

- A. Work included: Providing of all required identification systems for HVAC equipment and piping.

1.02 SUBMITTALS

- A. Provide submittals in accordance with Section 23 00 00.
- B. Submittals shall include a list of proposed equipment.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. W. H. Brady Co. or Seton.

2.02 DESCRIPTION

- A. Equipment Identification: Equipment identification tags shall be three-ply, black face, white center, black back phenolic plastic plates with minimum 3/16 inch high letters.
- B. Provide self-adhesive tape markers for space temperature sensors indicating corresponding HVAC system / unit.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Provide each piece of equipment with a manufacturer's standard nameplate indicating manufacturer's name, model number, capacities and characteristics.
- B. In addition, provide each piece of equipment with a plastic tag indicating its designation on this project (such as HVU-1, EF-1) and the area served. Mount this tag with screws, where possible, in a clearly visible location.
- C. Attach labels to building sensors.

END OF SECTION

SECTION 23 07 00

HVAC INSULATION

(This section not prepared by Mackenzie. This section is solely the product of System Design Consultants, Inc.)

PART 1 GENERAL

1.01 SUMMARY

- A. Work included: Providing of all required insulation for piping, valves, equipment, and ductwork.

1.02 SUBMITTALS

- A. Provide submittals in accordance with Section 23 00 00.
- B. Submittals shall include:
 - 1. Data shall show compliance with flame and smoke rating.
 - 2. Manufacturer's catalog or technical data showing performance, dimensions, materials of construction, and recommended methods of installation.

1.03 QUALITY ASSURANCE

- A. Insulation materials and accessories such as adhesives, cement, etc. shall have composite fire and smoke hazard ratings, as tested by procedures indicated in NFPA 255 and U.L. 723, not to exceed a flame spread index of 25 and a smoke developed index of 50. Products or their shipping cartons shall have identification of the flame spread and smoke developed index.
- B. No product containing the following is allowed to be installed on the project:

Pentabrominated diphenyl ether	CAS#32534-81-9
Octabrominated diphenyl ether	CAS#32536-52-0
Decabrominated diphenyl ether	CAS#1163-19-5

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Duct lining: Johns-Manville, Knauf, Owens-Corning, Certain-teed, or approved equal. Johns-Manville used as basis of selection.
- B. Elastomeric Insulation Products: Armacell or approved equal.

2.02 DESCRIPTION

- A. Duct lining: Manville Linacoustic RC made of glass fibers bonded with a thermosetting resin.

- B. Minimum installed R-values:
 - 1. General service (within insulated building envelope): R-5.
 - 2. Unconditioned spaces and warehouse (freeze protected areas): R-8.
 - 3. Outside Building / Outside Air: R-12.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Ductwork
 - 1. General requirements: Apply internal insulation in accordance with manufacturer's recommendations and SMACNA "Duct Liner Application Standard." Apply internal insulation to flat sheet metal with continuous coverage of adhesive. Use adhesive on all butt edges. Install weld pins and clips on internal insulation 15 inches on center and no more than 2 inch maximum from any cut or exposed edge.
 - 2. Application:
 - a. All supply air and relief ductwork and plenums – Internally lined.
 - b. Note supply air ductwork within freeze protected warehouse areas requires R-8 insulation value.
 - 3. Duct dimensions shown are net inside dimension.
 - 4. Coat all raw duct liner edges within the ductwork. No uncoated fiberglass is allowed within the ductwork.

END OF SECTION

SECTION 23 31 00

HVAC DUCTS AND CASINGS

(This section not prepared by Mackenzie. This section is solely the product of System Design Consultants, Inc.)

PART 1 GENERAL

1.01 SUMMARY

- A. Work included: Providing of all required sheet metal ductwork specified or shown on the drawings.

1.02 SUBMITTALS

- A. Submittals shall include Shop Drawings of any proposed revisions to the ductwork as shown on the drawings.

PART 2 PRODUCTS

2.01 DESCRIPTION

- A. Provide galvanized sheet metal ductwork for supply and return air systems except as specified or shown on the drawings. Provide minimum gauge and reinforcing in accordance with the latest edition of the "HVAC Duct Construction Standards" published by SMACNA, the "Duct Construction" Chapter 19 of the ASHRAE Handbook "HVAC Systems and Equipment," and the appropriate chapters of the latest edition of the Oregon Mechanical Specialty Code.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Construct and assemble all supply, return, outside air and general exhaust duct systems in accordance with the latest edition of the "HVAC Duct Construction Standards" published by SMACNA, the "Duct Construction" Chapter 19 of the ASHRAE Handbook "HVAC Systems and Equipment," and the appropriate chapters of the latest edition of the Oregon Mechanical Specialty Code.
- B. Cover ductwork openings during construction, after delivery to the field, prior to, and after installation. Seal ends, protect from moisture and running water, and adequately support to keep level and at least four inches off the ground. Store in clean dry space or if stored outdoors cover and protect from the elements.
- C. Cross brace and reinforce ductwork and plenums with structural steel members to prevent breathing or ballooning.
- D. All joints in the air distribution system shall be sealed airtight with Hardcast CCWI-181 or similar LEED^R Compliant sealant.

- E. Provide acoustical lining where specified in Section 23 07 00, HVAC Insulation. All dimensions are inside net.
- F. Duct construction pressure classification (SMACNA):
 - 1. +1 inches for all supply and ventilation air ductwork.
 - 2. -1 inch for all for return and relief air ductwork.

END OF SECTION

SECTION 23 82 39

ELECTRIC HEATING DEVICES

(This section not prepared by Mackenzie. This section is solely the product of System Design Consultants, Inc.)

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Provide required electric heating devices as specified herein.

1.02 SUBMITTALS

- A. Provide submittals in accordance with Section 23 00 00.
- B. Submittals shall include manufacturer's catalog or technical data showing performance, dimensions, materials of construction, installation requirements, and control diagrams.

1.03 OPERATION AND MAINTENANCE DATA

- A. Provide O&M data in accordance with Section 23 00 00.
- B. O&M data shall include manufacturer's literature and maintenance instructions.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Electric Heaters: Qmark, Berko, Markel, Dimplex, or approved equal.

2.02 DESCRIPTION

- A. Wall Heaters: Refer to Electric Heaters schedule on mechanical drawings.
- B. Unit Heater: Berko "Type MUH" UL listed fan forced electric heaters with individually adjustable louvers and heavy-gauge, die-formed steel housing with Integral thermostat, wall mounting bracket with necessary accessories. Unit shall have automatic reset linear thermal cutout, control transformer, and fan delay. 3KW, 208V, single phase. Manufacturers' standard color.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Coordinate with the electrical contractor for installation of the electric heaters in accordance with the manufacturer's installation instructions. Coordinate mounting height as required with the architectural elevations of the spaces served.

END OF SECTION

SECTION 26 00 00

GENERAL PROVISIONS

(This section not prepared by Mackenzie. This section is solely the product of System Design Consultants, Inc.)

PART 1 GENERAL

1.01 DESCRIPTION

- A. The General and Supplemental Conditions apply to this Division, including but not limited to:
 - 1. Drawings and Specifications.
 - 2. Public ordinances, permits. Including but not limited to electrical and fire alarm permits.
 - 3. Payments and fees required by governing authorities for work included in this Division.
 - 4. Change orders.

- B. Division 1, General Requirements apply to this Division, including but not limited to:
 - 1. Summary of Work, Section 01010.
 - 2. Coordination, Section 01040.
 - 3. Cutting and Patching, Section 01045.
 - 4. Alternates, Section 01100.
 - 5. Submittals, including Shop Drawings, Product Data and Samples, Section 01300.
 - 6. Construction facilities and Temporary Controls, Section 01500.
 - 7. Materials and Equipment, Section 01600: Substitution and Product Options.
 - 8. Contract Closeout, Section 01700:
 - a. Project Record Documents.
 - b. Operating and Maintenance Data.
 - c. Systems Demonstrations.

1.02 MECHANICAL WIRING

- A. The following schedule is intended to summarize the division of work and responsibilities between Division 23 (formerly Division 15) and Division 26 (formerly Division 16.)

ITEM	FURNISHED BY	INSTALL BY	POWER WIRING	CONTROL WIRING
1. Division 23 Equipment Motors	Div. 23	Div. 23	Div. 26	Div. 23
2. Motor Starters, Contactors and Overload Heaters – Integral	Div. 23	Div. 26	Div. 26	Div. 23
3. Variable Frequency Drives (VFD's)	Div. 23	Div. 26	Div. 26	Div. 23
4. Motor Control Centers	Div. 26	Div. 26	Div. 26	Div. 23
5. Fused & Unfused Disconnect Switches	Div. 26	Div. 26	Div. 26	-----
6. Manual Operation Switches	Div. 26	Div. 26	Div. 26	Div. 26
7. Control Relays & Transformers	Div. 23	Div. 23	Div. 23	Div. 23
8. Energy Management Control Panels	Div. 23	Div. 23	Div. 26	Div. 23
9. Motorized Solenoid Valves	Div. 23	Div. 23	Div. 23	Div. 23
10. Duct Mounted smoke Detectors	Div. 23	Div. 23	Div. 26	Div. 23 – Equipment Shutdown Div. 28 – Fire Alarm
11. Fire/Smoke and Smoke Dampers	Div. 23	Div. 23	Div. 26	Div. 26 Div. 28 – Fire Alarm

1.03 CONTRACT DOCUMENTS

- A. The Electrical Drawings and Specifications are complementary and what is called for by one shall be as binding as if called for by both. Items shown on the Drawings are not necessarily included in the Specifications. All directives and instructions to furnish, provide, install, complete, test and methods described in these Specifications and Drawings shall be interpreted as directives to the Electrical Contractor unless clearly specified otherwise. It is the intent of these specifications and the accompanying drawings to describe complete and functional electrical systems. If errors or discrepancies are discovered, notify the Architect immediately.

1.04 SITE VISITATION

- A. The contractor shall visit the site prior to bidding to familiarize himself with existing conditions and all other factors which may affect the execution of the work.

1.05 CODES, ORDINANCES AND REGULATIONS

- A. The completed installation shall conform to all applicable Federal, State and Local Codes, Ordinances and Regulations.
- B. Obtain all necessary permits and inspections required by the governing authorities having jurisdiction over this work.
- C. Furnish to the Architect a certificate of approval from the inspection authority at the completion of the work, prior to the application for final payment.

1.06 SCOPE OF WORK

- A. The work covered by this Specification shall include furnishing all labor, materials, permits, equipment and services to construct and install the complete electrical system as shown on the Drawings and specified herein. Verify all conditions on the job site and lay out work accordingly.
- B. The work shall include, but is not necessarily limited to, the following systems:
 - 1. Secondary service and distribution systems.
 - 2. Complete lighting and power systems.
 - 3. Grounding continuity.
 - 4. Connection of electrical equipment furnished under other Divisions of work.
 - 5. Telecommunication provisions
 - 6. Conduit pathways as shown on drawings for telecommunication, A/V and audio systems. Coordinate with owner final locations prior to rough-in
 - 7. Demolition as required

- C. The following equipment and work will be furnished under other Divisions of Work:
 - 1. Telephone, data and television wiring and equipment. (Note: coordinate with above scope.)
 - 2. Mechanical equipment motors and heaters, unless otherwise noted on drawings.
 - 3. Equipment control wiring beyond the provisions shown on the Electrical Drawings.

1.07 WARRANTY

- A. Provide a written one-year warranty covering the work done under this Division as required by the General Conditions. Incandescent lamps will be excluded from this warranty.
- B. Systems and Apparatus:
 - 1. Free of defects of material and workmanship and in accord with the Contract Documents.
 - 2. Built and installed to deliver its full rated capacity at the efficiency for which it was designed.
 - 3. Operate at full capacity without objectionable noise or vibration.

1.08 SUBMITTALS

- A. Refer to Division 1 requirements.
- B. Submit all electrical data in 3-point covered binders, indexed by section number, covering all items of equipment and systems. Submit all electrical items at one time.
- C. The installation and Record Drawings called for under submittals shall show all outlets, devices, terminal cabinets, conduits, wiring and connections required for the complete system described. Drawings will be at the same sheet size and scale as the construction documents. Prints of these drawings shall be submitted prior to starting installation. The Contractor submitted drawings, when approved, will then form the basis for installation.
- D. Submittals will not be reviewed unless equipment is specifically indicated.

PART 2 PRODUCTS

2.01 APPROVALS AND SUBSTITUTIONS

- A. The use of manufacturer's names, models and numbers in this Specification is intended to establish style, quality, appearance and usefulness. Items noted "or equal" do not require prior approval. Items noted "approved equivalent" or "approved substitute" require prior approval.

- B. Submit for the Architect's approval, manufacturer's detailed specifications and data sheets for all proposed substitutions. Submittals shall consist of a single sheet, or sheets, if required, for each piece of equipment and shall give the specific data needed for consideration of approval. All pertinent data listed in the Specifications and in Schedules shall be furnished, including all special features. See that all submittals are in proper order, and that all equipment will fit in the space provided.
- C. The Architect reserves the right to require the submission of an actual sample before the acceptance of any product as an equal to that specified.

2.02 MATERIAL APPROVALS AND SHOP DRAWINGS

- A. Submit all electrical data PDF format, indexed by Section number, covering all items of equipment and systems. Including wiring diagrams where called for.
- B. Review and recommendations by the Architect or Engineer are not to be construed as change authorizations. If discrepancies between the shop drawings submitted and the Contract Documents are discovered either prior to or after the data is processed, the Contract Documents will govern. Shop drawing review will not occur without contract cost data as outline below.

PART 3 EXECUTION

3.01 CONTRACT COST DATA

- A. Furnish to the Architect a cost breakdown of the Electrical Contract.
- B. The cost breakdown shall include separate amounts for material and labor for each category listed below. Include costs data with the shop drawings submittal.
 - 1. Secondary panels
 - 2. Feeders
 - 3. Disconnects, starters and equipment connections
 - 4. Branch circuit wiring and devices
 - 5. Telecommunication provisions
 - 6. Television provisions
 - 7. Lighting controls, luminaires and lamps

3.02 CHANGE ORDERS

- A. All supplemental cost proposals by the Contractor shall be accompanied with a complete itemized breakdown of labor and materials cost without exception. Contractor's estimating sheets for the supplemental cost proposals shall be included. Labor must be separated and allocated for each item of work. Material cost, as used in this section, to be Contractor's actual "invoice" cost. All discounts shall be detailed and shown on the invoice. Labor cost shall be the actual cost per manhour including all taxes and fees. The total estimated cost for any change will be considered a not-to-exceed price. The supplemental cost

approval will be based on this estimate but actual change order request for payment will be based on the contractor's actual cost to perform this work and shall be accompanied with a complete itemized breakdown of labor and materials cost with backup invoices, without exception.

3.03 OPERATING AND MAINTENANCE DATA

- A. The Contractor shall provide operating instructions and maintenance data, in 3-point covered binders, for all equipment and materials called for under this Division.
- B. Submit in PDF format and one (1) copy of the Operating and Maintenance data books for review at least four weeks before final review of the Project. Assemble all data in a completely indexed volume or volumes and identify the size, model, and features indicated for each item.
- C. Maintenance instruction manuals shall include complete cleaning and servicing data compiled in clearly and easily understandable form. Data shall show serial numbers of each piece of equipment and complete lists of replacement parts.

3.04 ELECTRONIC INFORMATION

- A. Electronic record information in AutoCAD format will be provided to the electrical contractor upon request. A drawing release form will be sent to the contractor and upon its return a compact disk will be made available to be picked up at System Design Consultants, Inc office. One (1) copy of the base project construction document files will be made available to the contractor at no charge, each additional request will be provided at a cost of \$250 per request.
- B. All contractors and sub contractors requiring electrical plans will make their request for the construction documents through the electrical contractor.

3.05 RECORD INFORMATION

- A. Maintain one set of construction documents marked up (red-lined) on a daily basis as the work progresses, showing all changes, deviations, change orders, omissions, or other variations from the contract drawings.
- B. Record all conduits, stubups and equipment by dimensions from gridlines, below grade, above floor, etc. Show location of all access panels, rough-in for future, etc.
- C. Make record documents available to the Architect for review or printing during construction.
- D. On acceptance of the contractor record drawings by the Architect, the contractor will transfer the record information in "AutoCAD" format to the electronic "AutoCAD" drawing files. Refer to 26 00 00-3.4(A) for obtaining documents and applicable charges.

- E. Deliver record drawings files to the Architect promptly upon completion of the project. Record information added to the "AutoCAD" drawing files is to have compatible format, linework and lettering as the original files. All new work done by the contractor on the original drawing files is to be on a single layer noted in the revised drawing file as "RECORD".

3.06 ALTERNATES

- A. Refer to Division 1.
- B. Refer to Electrical Drawings for detailed information relating to the appropriate alternates.

3.07 PROTECTION OF WORK

- A. Protect all electrical work and equipment installed under this Division against damage by other trades, weather conditions or any other causes. Equipment found damaged or in other than new condition will be rejected as defective.
- B. Switchgear, transformers, panels, light fixtures and all electrical equipment shall be kept covered or closed to exclude dust, dirt and splashes of plaster, cement or paint and shall be free of all such contamination before acceptance. Enclosures and trims shall be in new condition, free of rust, scratches and other finish defects. Properly refinish in a manner acceptable to the Architect, if damaged.

3.08 MAINTENANCE OF SERVICE

- A. Electrical service shall be maintained to all functioning portions of the building throughout construction, except as noted below, during all normal working hours of the building occupants. Outages to occupied areas shall be kept to a minimum and be prearranged with the Architect or Owner's Representative. This Contractor will be liable for any damages resulting from unscheduled outages or for those not confined to the pre-arranged times.
- B. Signal and communication systems and equipment shall be kept in operation wherever these serve occupied or functional portions of the building. Outages of these facilities shall be treated the same as electrical power outages.
- C. Telephone services where required during the construction work will be maintained by the telephone company. This work shall be coordinated with the telephone company in such a manner that service, as required by the building occupants, can be readily installed and maintained.

- D. Include all costs for temporary facilities, overtime labor and necessary provisions to maintain electrical services in the initial bid proposal. Temporary wiring and facilities, if used, shall be removed and the site left clean before final acceptance.

END OF SECTION

SECTION 26 05 00

BASIC MATERIALS AND METHODS

(This section not prepared by Mackenzie. This section is solely the product of System Design Consultants, Inc.)

PART 1 GENERAL

1.01 DESCRIPTION

- A. Conditions of the Contract and Section 26 00 00 apply to this Section.

1.02 COORDINATION OF WORK

- A. Conduct work in a manner to cooperate with all other trades for proper installation of all items of equipment. Consult the Drawings of all other trades or crafts to avoid conflicts with cabinets, counters, equipment, structural members, etc. In general, the architectural drawings govern but conflicts shall be resolved with the Architect prior to rough-in.
- B. Verify the physical dimension of each item of electrical equipment to fit the available space. Coordination of the equipment to fit into the available space and the access routes through the construction shall be the Contractor's responsibility.
- C. Coordinate rough-in and wiring requirements for all mechanical equipment with mechanical contractor and equipment supplier. Make installation in accordance with rough-in and wiring diagrams provided by equipment supplier for Contractor's use. Report immediately to architect any deviation between contract documents and actual equipment requirements.
- D. Coordinate all aspects of the electrical, telephone and other utility services with the appropriate serving utility. No additional compensation will be allowed the Contractor for connection fees or additional work or equipment not covered in the Drawings or Specifications which are a result of policies of the serving utility.
- E. Coordinate underground work with other contractors working on the site. Particular coordination shall be performed with contractors installing storm sewer, sanitary sewer, water and irrigation lines, to avoid conflicts. Common trenches may be used with other trades, providing clearances required by codes and ordinances are maintained.

1.03 ELECTRICAL DRAWINGS

- A. The Electrical Drawings accompanying these Specifications are design drawings and generally are diagrammatic indicating approximate locations of outlets and wiring. They do not show every offset, bend, junction box, etc., which may be required for installation to complete the system. Minor deviations in methods, circuiting and branch circuit distribution or arrangements to suit construction conditions are permissible.
- B. The intent of the branch circuiting and control shown shall not be changed nor homeruns combined without the approval of the Architect. Feeder runs shall not be combined or changed.
- C. Cross or hash marks on conduit runs indicate quantity of No. 12 copper branch circuit conductors, in addition to a grounding conductor, unless otherwise noted. Where such marks do not appear, provide minimum of two conductors with ground, minimum No. 12, size as required for loads and/or equipment being served. **Contractor is responsible to assure that the limiting branch circuit voltage drop to 3% and to 2% on feeders at design loads as required by CEC.** The contractor shall review panel schedule to verify wire/conduit size required.
- D. Conduit sizes shown or listed on the drawings are for reference only. It is the responsibility of the contractor to provide and install conduit sized per current NEC requirements, $\frac{3}{4}$ " C minimum.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Electrical products installed in this project shall be listed by a recognized testing laboratory or approved in writing by the local inspection authority as required by governing codes and ordinances.
- B. Materials shall be new, of the best quality. The materials shall be manufactured in accordance with NEMA, ANSI, UL or other applicable standards.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Provide a completely properly operating system for each item of equipment called for under this work. Installations shall be in accord with the equipment manufacturer's instructions, the best industry practices and the contract documents. Where a conflict in these guides appear, the Architect shall be requested to provide proper clarification before work is roughed in and his decision will be final. Work installed without such clarification shall be removed and corrected by the Contractor at no cost to the Owner.

- B. Make installation in a neat, finished and safe manner, according to the latest published NECA Standard of Installation under competent supervision.

3.02 EXCAVATION AND BACKFILL

- A. Perform all necessary excavation and backfill for the installation of electrical work in compliance with Section 02220.
- B. For direct burial cable or non-metallic conduit, a minimum 3-inch cover of sand or clean earth fill shall be placed all around the cable or conduit on a leveled trench bottom. Lay all steel conduit on a smooth level trench bottom, so that contact is made for its entire length. Water shall not be present in the trench when electrical conduit is being laid.
- C. Place backfill in layers not exceeding 8-inches deep and compact to 95% of maximum density at optimum moisture to preclude settlement.
 - 1. Interior: Bank sand or pea gravel.
 - 2. Exterior: Excavated material with final 8-inches clean soil.
- D. Following backfilling, grade all trenches to the level of surrounding soil. All excess soil shall be disposed of at the site as directed.
- E. Provide 6-inch wide vinyl tape marked "ELECTRICAL" in backfill, 12-inches below finished grade, above all conduit runs.
- F. Coordinate patching of all asphalt or concrete surfaces disturbed by this work with General Contractor.

3.03 NOISE CONTROL

- A. Outlet boxes at opposite sides of partitions shall not be placed back-to-back nor straight through boxes be employed, except where specifically permitted on the Drawings by note, to minimize transmission of noise between occupied spaces.
- B. Contactors, transformers, starters and similar noise producing devices shall not be placed on walls which are common to occupied spaces unless specifically called for on the Drawings. Where such devices must be mounted on walls, common to occupied spaces, they shall be shock mounted or isolated in such a manner as to effectively prevent the transmission of their inherent noise to the occupied space.
- C. Ballasts, contactors, starters, transformers and like equipment which are found to be noticeably noisier than other similar equipment on the project will be deemed defective and shall be replaced.

3.04 EQUIPMENT CONNECTIONS

- A. Provide complete electrical connections for all items of equipment requiring such connections, including incidental wiring, materials, devices and labor necessary for a finished working installation.

- B. Verify the location and method for connecting to each item of equipment prior to roughing-in. Check the voltage and phase of each item of equipment before connecting.
- C. Make motor connections for the proper direction of rotation. Minimum size flex for mechanical equipment shall be 1/2-inch except at small control devices where 3/8-inch may be used. Exposed motor wiring shall be jacketed metallic flex with 6-inches minimum slack loop. Pump motors shall not be test run until liquid is in the system.
- D. Control devices and wiring relating to the HVAC systems will be furnished and installed under Division 15 except for provisions or items specifically shown on the Electrical Drawings or specified herein.
- E. Furnish all code required disconnects under this work, whether specifically shown or not.

3.05 EQUIPMENT SUPPORT

- A. Anchoring and bracing to the building structural elements in accord with all codes and regulations regarding seismic design conditions. The contractor is responsible to determine the means and methods of equipment installation and support. Seismic restraints for electrical and communication equipment shall bear the seal and signature of a structural engineer registered in the state of the project, and shall be submitted to the Architect prior to fabrication. Calculations are to be included for all connections to the structure, considering localized effects.
- B. Each fastening device and support for electrical equipment, fixtures, panels, outlets and cabinets shall be capable of supporting not less than four times the ultimate weight of the object or objects fastened or suspended from the building structure.
- C. Properly and adequately support fixtures installed under this work from the building structure. Supports shall provide proper alignment and leveling of fixtures. Flexible connections where permitted to exposed fixtures shall be neat and straight, without excess slack, attached to the support device.
- D. Support all junction boxes, pull boxes or other conduit terminating housings located above the suspended ceiling from the floor above, roof or penthouse floor structure to prevent sagging or swaying.
- E. Conduits:
 - 1. Support suspended conduits 1-inch and larger from the overhead structural system with metal ring or trapeze hangers with threaded steel rod having a safety factor of 4.
 - 2. Conduit installed in poured concrete shall be anchored to the reinforcing steel with No. 14 black iron wire.

3.06 ALIGNMENT

- A. Install panels, cabinets and equipment level and plumb, parallel with structural building lines. Switchgear panels and all electrical enclosures shall fit neatly without gaps, openings or distortion. Properly and neatly close all unused openings with approved devices.
- B. Fit surface panels, devices and outlets with neat, appropriate trims, plates or covers, without overhanging edges, protruding corners or raw edges, to leave a finished appearance.

3.07 CUTTING AND PATCHING

- A. Include cutting, patching and restoration of finishes necessary for this work. Surfaces damaged by this work and spaces around conduits passing through floors and walls shall be neatly patched and finished to match the adjacent construction, including painting or other finishes. Clean up and remove all dirt and debris. This work shall all be performed to the satisfaction of the Architect. Refer to Section 01045.

3.08 FIRESTOPPING PENETRATIONS IN FIRE-RATED WALL/FLOOR ASSEMBLIES

- A. Contractors shall provide proper sizing when providing sleeves or core-drilled holes to accommodate their through penetrating items. All voids between sleeve or core-drilled hole and pipe passing through, shall be firestopped to meet the requirements of ASTM E-814, in accordance with Section 07270 - Firestopping.
- B. Provide properly sized expansion fittings for all conduits crossing over building expansion joints.

END OF SECTION

SECTION 26 05 19

CONDUCTORS AND CONNECTORS

(This section not prepared by Mackenzie. This section is solely the product of System Design Consultants, Inc.)

PART 1 GENERAL

1.01 DESCRIPTION

- A. Work Included:
 - 1. Deliver conductors to the job site in cartons, protective covers or on reels.
 - 2. Conductors for special systems shall be as recommended by the equipment manufacturer except as noted.

1.02 RELATED WORK

- A. Section 26 00 00: General Provisions
- B. Section 26 05 00: Basic Materials and Methods.

1.03 SUBMITTALS

- A. Shop Drawings
- B. Product Data
- C. Operational Instructions and Maintenance Data

PART 2 PRODUCTS

2.01 CONDUCTORS - 600 V

- A. Type:
 - 1. No. 12 AWG minimum size unless noted otherwise.
 - 2. No. 8 and larger, stranded, Class B.
- B. Stranding: Copper, concentric or compressed
- C. Insulation: THHN, THWN, XHHW unless noted or specified otherwise.
- D. Through wiring in fluorescent fixtures shall be rated for 90 degree C.
- E. Manufacturers: G.E., Hatfield, Anaconda, Rome or equal.

2.02 CORD DROPS AND PORTABLE CORDS

- A. Copper type "S" or "SO" heavy duty, rubber insulated unless otherwise noted.

2.03 CONNECTORS

- A. Branch Circuit Conductor Splices: Live spring type, Scotch-Lok, Ideal Wing Nut or self-stripping type, 3M Series 560.
- B. Cable Splices: Compression tool applied sleeves, Kearney, Burndy or equal with 600V heat shrink insulation.
- C. Lugs: Conductors no. 6 and larger, except on molded case circuit breakers, two hole, long barrel pressure tool set Thomas & Betts No. 54,000 series, Burndy "Hydent", Anderson Electric VCEL, or approved.

PART 3 EXECUTION

3.01 CONDUCTORS

- A. Pulling compounds may be used with the residue cleaned from the conductors and raceway entrances after the pull is made.
- B. Pulleys or blocks shall be used for alignment of the conductors when pulling. Pulling shall be in accordance with manufacturer's specifications regarding pulling tensions, bending radii of the cable and compounds.
- C. Conductors entering terminal or junction boxes mounted on hermetically sealed refrigeration compressor motors shall be copper.
- D. Make up and insulate wiring promptly after installation of conductors. Wire shall not be pulled in until all bushings are installed and raceways terminations are completed. Wire shall not be pulled into conduit embedded in concrete until after the concrete is poured and forms are stripped.
- E. Conductor sizes shown on the Drawings are for copper only.

3.02 CONNECTORS

- A. Control and special systems wires shall be terminated with a tool applied spade flared lug when terminating at a screw connection.
- B. All screw and bolt type connectors shall be made up tight and retightened after an eight-hour period.
- C. All tool-applied compression connectors shall be applied per manufacturer's recommendations and physically checked for tightness.

3.03 COLOR CODING

- A. Phase color code to be consistent at all feeder terminations, A-B-C left-to-right or A-B-C top-to-bottom.
- B. Switchlegs, travelers, etc. to be consistent with the phases to which connected or a color distinctive from that listed.

- C. Under 250 Volts Phase-to-Phase:
1. Phase A – Black Neutral - White
 2. Phase B - Red Ground - Green
 3. Phase C - Blue
- D. Over 250 Volts Phase-to-Phase:
1. Phase A – Brown Neutral – White with tracer
 2. Phase B - Orange Ground - Green
 3. Phase C - Yellow

END OF SECTION

SECTION 26 05 26

GROUNDING AND BONDING

(This section not prepared by Mackenzie. This section is solely the product of System Design Consultants, Inc.)

PART 1 GENERAL

1.01 DESCRIPTION

- A. Work Included:
 - 1. Provide complete building grounding system.
 - 2. Provide ground bus bar at each telephone demarcation and data distribution location.

1.02 RELATED WORK

- A. Section 26 00 00: General Provisions,
- B. Section 26 05 00: Basic Materials and Methods,
- C. Section 26 05 19: Conductors and Connectors

1.03 SUBMITTALS

- A. Shop Drawings
- B. Product Data
- C. Operation & Maintenance Manuals

PART 2 PRODUCTS

2.01 GROUND CONDUCTORS

- A. Bare or green insulated copper.

2.02 GROUND ROD CONNECTORS

- A. Cast, set screw or bolted type.

2.03 ELECTRODES

- A. Copper clad steel minimum 3/4-inch diameter by 8 feet long.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Grounding system will consist of the following:
 - 1. Minimum of 20' bare no. 4 copper concrete-encase grounding conductor.
 - 2. Provide bond to building steel.

3. Provide bond to cold water piping within 5' of building entry.
 4. Provide bond to minimum of 2 ground rods.
- B. Establish a ground for each separately derived system, e.g., transformers and generators, per NEC 250-30.
 - C. All grounding conductors shall be sized in accord with the National Electrical Code.
 - D. Grounding conductor connectors shall be made up tight and located for future servicing and to ensure low impedance.
 - E. Ground the electrical system, the cold-water service, structural steel, and transformers to the building ground grid.
 - F. All feeder and service raceways shall be grounded.
 - G. All plug-in receptacles shall be bonded to the boxes, raceways and grounding conductor.
 - H. Provide equipment-grounding conductor in all branch circuit, feeder and service raceways.
 - I. Provide insulated grounding conductor in all branch circuit wiring serving Classrooms, Administration offices and all data locations.
 - J. Provide bonding jumper between ground and neutral bus at main service.

3.02 GROUND BUS BAR (TELEPHONE DEMARCATION AND DATA DISTRIBUTION)

- A. Provide & install copper ground bus bar on isolators, 6" x 2" minimum. Install 1 - #6 insulated conductor to the building grounding connection at the main distribution panel.

END OF SECTION

SECTION 26 05 33

CONDUITS, RACEWAYS, BOXES AND FITTINGS

(This section not prepared by Mackenzie. This section is solely the product of System Design Consultants, Inc.)

PART 1 GENERAL

1.01 DESCRIPTION

- A. Work Included:
 - 1. Provide raceways and conduits of specified types for all electrical systems wiring, except where clearly shown or specified otherwise. All fittings, boxes, hangers and appurtenances shall be included.
 - 2. Size raceways and conduits as indicated on the Drawings. Where no size is indicated, conduit may be the minimum code permitted size for the quantity of type THW conductors installed. Minimum size is 3/4".

1.02 RELATED WORK

- A. Section 26 00 00: General Provisions
- B. Section 26 05 00: Basic Materials and Methods

1.03 SUBMITTALS

- A. Shop Drawings.
- B. Product Data.
- C. Operational Instructions and Maintenance Data.

PART 2 PRODUCTS

2.01 METALLIC CONDUITS

- A. GRC: Threaded rigid heavy wall galvanized steel.
- B. IMC: Threaded intermediate galvanized steel.
- C. EMT: Zinc coated steel electrical metallic tubing.
- D. ARC: Threaded rigid heavy wall aluminum.
- E. Flex: Flexible metal with and without polyvinyl chloride jacket.
- F. Liquidtight flexible conduit: Zinc steel core with smooth gray abrasion-resistant, liquid-tight PVC cover with integral ground wire wound in steel core.

2.02 NON-METALLIC CONDUITS

- A. Rigid non-metallic conduit: Type II PVC schedule 40, suitable for use with 90 degrees C rated wire. Conduit shall conform to UL Standard 651 and carry appropriate UL listing for above and below ground use.

2.03 SURFACE RACEWAYS

- A. Acceptable manufacturer(s): Wiremold, Panduit or as noted on drawings.
- B. Type, size with quantity and spacing of outlets as shown on drawings. Provide with snap-on cover, connectors, fittings and incidental items required for a complete installation. Raceway shall be in continuous length as indicated on drawings.

2.04 WIREWAYS

- A. Troughs: Steel, painted, square in cross section, preformed knock-outs on standard spacing, hinged cover.
- B. Fittings: Tees, elbows, couplings as required for configuration shown on the Drawings.
- C. Supports: U-shaped, 1/4-inch by 1-1/2-inch steel strap, bent and prime painted.

2.05 FITTINGS

- A. GRC, IMC AND ARC:
 - 1. The conduit itself must be threaded, threaded couplings attached by any means are not allowed.
 - 2. Threaded locknuts.
 - 3. Threaded bushings: 1-1/4 inch and larger shall be of the insulated, grounding type as required under Section 26 05 26.
 - 4. Expansion fittings: O-Z/Gedney Electrical Mfg. Co. type E expansion coupling with bonding jumper for up to four inches of movement.
- B. EMT:
 - 1. Connectors: Steel set screw or compression ring type for conduit termination, with insulated throat, suitable for conditions used.
 - 2. Couplings: Steel set screw or compression ring type, concrete tight.
- C. Weatherproof Connectors: Threaded pipe connections with waterproofing compound.

2.06 METALLIC BOXES

- A. Flush and Concealed Outlet Boxes: Galvanized stamped steel with screw ears, knock-out plugs, mounting holes, fixture studs if required, RACO or equal.
- B. Surface Outlet Boxes: Galvanized stamped steel same as above for use on ceilings; cast steel or aluminum with threaded hubs for use on walls.

- C. Large Boxes: Boxes exceeding 4-11/16 inches square when required shall be welded steel construction with screw cover and painted, steel gauge as required by physical size, Hoffman, Circle AW or equal.

2.07 NON-METALLIC BOXES

- A. PVC, molded enclosures, threaded hubs.

2.08 OTHERS

- A. Any conduits, fittings, etc. specifically not mentioned above are not approved for use.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Conceal all conduits in finished spaces and elsewhere so far as practicable. Concealed conduits shall run in a direct line with long sweep bends and offsets. GRC and IMC embedded in concrete below grade or in damp locations shall be made water-tight by painting the entire male thread with Rustoleum metal primer, or equal, before assembly.
- B. Route exposed conduit parallel or at right angles to structural building lines, and neatly offset into boxes. Conduits attached directly to building surfaces shall closely follow the surfaces. Conduit fittings shall be used to "saddle" under beams.
- C. Conduits, whether exposed or concealed, shall be securely supported and fastened at intervals of nominally every 8 feet and within 18 inches of each outlet, ell, fitting, panel, etc.
- D. Keep conduit and raceways closed with suitable plugs or caps during construction to prevent entrance of dirt, moisture, concrete or foreign objects. Raceways shall be clean and dry before installation of wire and at the time of acceptance.
- E. Pack spaces around conduits with oakum and seal to prevent entrance of moisture where conduits are installed in sleeves or block-outs penetrating moisture barriers.
- F. Where conduits penetrate fire rated concrete walls or floors, provide non-combustible caulking or putty 3M-fire barrier material of thickness required to equal or exceed the fire rating of wall or floor.

3.02 CONDUIT

- A. Install GRC or IMC galvanized steel conduits for wiring underground, in-cast-concrete construction, in damp locations, in hazardous areas and where subject to mechanical injury, with threaded fittings made up tight.

- B. EMT may be employed in all other dry protected locations.
- C. ARC may be used wherever EMT is acceptable, with no restriction on size.
- D. Flex is required where flexibility is necessary as at motors, transformers and recessed lighting fixtures, etc. Flex shall be jacketed type, except where concealed in dry locations and spaces such as ceiling cavities.
- E. PVC may be used underground, under interior slabs or where scheduled or noted on the Drawings. Make connections with waterproof solvent cement. Provide GRC at 60 degree and larger bends and where penetrating slabs or elling up above grade in exterior locations. PVC conduit shall not be installed less than 30" under roadways or areas subject to heavy traffic. Provide a ground wire sized per code in all PVC conduits. Conductor quantities indicated in conduits do not include ground wires unless otherwise noted.
- F. Conduit stubbed from a concrete slab or wall to serve an outlet under a table or to supply a machine shall have a rigid conduit coupling flush with the surface of the slab. Provide plug where conduit is to be used in future.
- G. Conduits in above-grade slabs shall be located in the middle of the slab. The maximum size, spacing, and location of conduits in post-tensioned slabs shall be subject to approval by the structural engineer Conduits larger than one inch shall not be run in slabs.
- H. MC cable is not approved for use on this project.

3.03 RACEWAYS

- A. Surface metal raceway with snap-in cover may be used in finished spaces only as specified, or shown on Drawings.
- B. Surface metal wireways may be installed at locations to serve motor starters or other control devices where required by a multitude of wiring interconnections or physical layout.
- C. Expansion Joints:
 - 1. All conduits crossing expansion joints where cast in concrete shall be provided with expansion-deflection fittings, equivalent to OZ/Gedney AXDX, installed per manufacturers recommendations.
 - 2. All conduits three inches and larger where not cast in concrete shall be rigidly secured to the building structure on opposite sides of a building expansion joint with an expansion-deflection fitting across the joint, equivalent to OZ/Gedney AXDX, installed per manufacturer's recommendations.

3. All conduits less than three inches where not cast in concrete shall be provided with junction boxes securely fastened on both sides of the expansion joint, connected together with 15 inches of slack (a minimum of 15 inches longer than the straight line length) flexible conduit with copper green ground bonding jumper. In lieu of this flexible conduit, an expansion-deflection fitting, as indicated for conduits three inch and larger, may be installed.
- D. Seismic Joints
1. No conduits cast in concrete shall be allowed to cross a seismic joint.
 2. All conduits shall be provided with junction boxes securely fastened on both sides of the expansion joint, connected together with 15 inches of slack (a minimum of 15 inches longer than the straight line length) flexible conduit with copper green ground bonding jumper. Prior to installation, verify with Architect that the 15 inches is adequate for the designed movement, and if not, increase this length as required.

3.04 SURFACE RACEWAYS

- A. The raceway system shall provide a complete enclosure that protects the wires installed therein against damage.
- B. There shall not be any openings that exceed 1/16 inch (1.59 mm) in width on surfaces that are accessible following installation of the system.

3.05 FITTINGS

- A. Metallic raceways and conduits shall be assembled continuous and secured to boxes, panels, etc., with appropriate fittings to maintain electrical continuity. All conduit joints shall be cut square, reamed smooth with all fittings drawn up tight.

3.06 BOXES

- A. Outlet boxes shall be of code required size to accommodate all wires, fittings and devices. Provide multi-gang boxes as required to accept devices installed with no more than one device per gang. Equip all metallic boxes with grounding provisions.
- B. Flush wall switch and receptacle outlets used with conduit systems shall be 4 inches square, 1-1/2 inches or more deep, with one or two-gang plaster ring mounted vertically. Where three or more devices are at one location, use one piece multiple gang tile box or gang box with suitable device ring.

- C. Wall bracket and ceiling surface mounted lighting fixture outlets shall be 4-inch octagon, 1-1/2-inches deep with 3/8-inch fixture stud where required. Wall bracket outlets to have single gang opening where required to accommodate fixture canopy. Provide larger boxes or extension rings where quantity of wires installed requires more cubic capacity.
- D. Boxes for the special systems shall be suitable for the equipment installed. Coordinate size and type with the system supplier.
- E. Provide pull boxes where shown, or in conduit runs greater than 100 feet, or where required to limit the number of bends in any conduit to not more than three 90 degree bends or equivalent. Use galvanized boxes of code-required size with removable covers installed so that covers will be accessible after work is completed. Do not locate pull boxes or junction boxes in finished areas unless specifically shown or special permission is obtained from Architect.
- F. Boxes shall be flush with finished surfaces or not more than 1/8-inch below surface and be level and plumb. Long screws with spacers or shims for mounting devices will not be acceptable. No combustible material shall be exposed to wiring at outlets.

END OF SECTION

SECTION 26 05 53

IDENTIFICATION

(This section not prepared by Mackenzie. This section is solely the product of System Design Consultants, Inc.)

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Clearly and properly identify the complete electrical system to indicate the loads served or the function of each item of equipment connected under this work.

PART 2 PRODUCTS

2.01 LABELS

- A. Panels: Typed or pre-printed white permanent materials labels with adhesive backing, Specified Products, Inc. or equal.
- B. Switchgear, Panelboards and Transformers: "Lamicoid", 3-ply laminated plastic, black with white letters, Minimum ¼" letters.
 - 1. Provide label on MDP to read:

THIS INSTALLATION DESIGNED BY SYSTEM DESIGN CONSULTANTS, INC. PORTLAND, OR 503-248-0227 <i>(year installed)</i>

- C. Equipment: Dymo-Tape, plastic tape with adhesive backing, field printed with proper tool.

PART 3 EXECUTION

3.01 SWITCHGEAR

- A. Label the main and feeder protective devices in all distribution panels with laminated plastic labels indicating the function or the load served.
- B. Provide labels for all bussed spaces indicating size of future breaker or switch that may be installed in the space reserved.

3.02 BRANCH CIRCUIT PANELBOARDS

- A. Indicate panel number with laminated plastic labels. Indicate voltage phase and feeder source, feeder wire size, and feeder breaker or fuse size with white permanent labels on the inside of the panel door.

- B. Provide machine-printed panel directories with protective, clear transparent covers, accurately accounting for every breaker installed, including spares. Schedules shall use the actual room designations assigned by name or number near completion of the work and not the space designation on the Construction Drawings.

3.03 EQUIPMENT

- A. Label all disconnect switches, motor starters, relays, contactors, time switches indicating voltage, amperage, circuit number and equipment served with white permanent labels.
- B. Label all transformers and busways with black and yellow 4-1/2 inch high pre-printed adhesive backed materials.

3.04 SYSTEMS

- A. Complex control circuits may utilize any combination of colors with each conductor identified throughout, using wraparound numbers or letters. Use the number or letters shown where the Drawings or operation and maintenance data indicate wiring identification.
- B. Label the fire alarm and communication equipment zones, controls, indicators, etc. with machine printed labels or indicators appropriate for the equipment installed, as supplied or recommended by the equipment manufacturer.

END OF SECTION

SECTION 26 09 44

NETWORK LIGHTING CONTROLS

(This section not prepared by Mackenzie. This section is solely the product of System Design Consultants, Inc.)

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes a networked lighting control system comprised of the following components:
 - 1. System Software Interfaces
 - a. Visualization Interface
 - 2. Wired Networked Devices
 - a. Wall Stations
 - b. Occupancy and Photocell Sensors
 - c. Power Packs and Secondary Packs
 - d. Networked Luminaires
- B. The networked lighting control system shall meet all the characteristics and performance requirements specified herein.
- C. The contractor shall provide, install and verify proper operation of all equipment necessary for proper operation of the system as specified herein and as shown on applicable drawings.

1.02 RELATED DOCUMENTS

- A. Section 26 27 26 Wiring Devices
- B. Section 26 09 23 Lighting Control Devices
- C. Section 26 09 43.13 Digital-Network Lighting Controls
- D. Section 26 09 43.16 Addressable Fixture Lighting Control
- E. Section 26 09 43.19 Wireless Network Lighting Controls
- F. Section 26 51 13 Interior Lighting Fixtures

1.03 SUBMITTALS

- A. Submittal shall be provided including the following items.
 - 1. Bill of Materials necessary to install the networked lighting control system.
 - 2. Product Specification Sheets indicating general device descriptions, dimensions, electrical specifications, wiring details, and nomenclature.

3. Riser Diagrams showing device wiring connections of system backbone and typical per room/area type.
4. Information Technology (IT) connection information pertaining to interconnection with facility IT networking equipment and third-party systems.
5. Other Diagrams and Operational Descriptions – as needed to indicate system operation or interaction with other system(s).
6. Contractor Startup/Commissioning Worksheet (must be completed prior to factory start-up).
7. Service Specification Sheets indicating general service descriptions, including startup, training, post-startup support, and service contract terms.
8. Hardware and Software Operation Manuals.

1.04 APPROVALS

- A. Prior approval from owner's representative is required for products or systems manufactured by companies not specified in the Network Lighting Controls section of this specification.
- B. Any alternate product or system that has not received prior approval from the owner's representative at least 10 days prior to submission of a proposal package shall be rejected.
- C. Alternate products or systems require submission of catalog datasheets, system overview documents and installation manuals to owner's representative.
- D. For any alternate system that does not support any form of wireless communication to networked luminaires, networked control devices, networked sensors, or networked input devices, bidders shall provide a total installed cost including itemized labor costs for installing network wiring to luminaires, control devices, sensors, input devices and other required system peripherals.

1.05 QUALITY ASSURANCE

- A. Product Qualifications
 1. System electrical components shall be listed or recognized by a nationally recognized testing laboratory (e.g., UL, ETL, or CSA) and shall be labeled with required markings as applicable.
 2. System shall be listed as qualified under DesignLights Consortium Networked Lighting Control System Specification V2.0.
 3. System luminaires and controls are certified by manufacturer to have been designed, manufactured and tested for interoperability.
 4. All components shall be subjected to 100% end of line testing prior to shipment to the project site to ensure proper device operation.
 5. All components and the manufacturing facility where product is manufactured must be RoHS compliant.

- B. Installation and Startup Qualifications
 - 1. System startup shall be performed by qualified personnel approved or certified by the manufacturer.
- C. Service and Support Requirements
 - 1. Phone Support: Toll free technical support shall be available.
 - 2. Remote Support: The bidder shall offer a remote support capability.
 - 3. Onsite Support: The bidder shall offer onsite support that is billable at whole day rates.
 - 4. Service Contract: The bidder shall offer a Service Contract that packages phone, remote, and onsite support calls for the project. Response times for each type of support call shall be indicated in the terms of the service contract included in the bid package.

1.06 PROJECT CONDITIONS

- A. Only install indoor equipment after the following site conditions are maintained:
 - 1. Ambient Temperature: 14 to 105 degrees F (-10 to 40 degrees C)
 - 2. Relative Humidity: less than 90% non-condensing
- B. Equipment shall not be subjected to dust, debris, moisture, or temperature and humidity conditions exceeding the requirements indicated above or as marked on the product, at any point prior to installation.
- C. Only properly rated equipment and enclosures, installed per the manufacturer's instructions, may be subjected to dust and moisture following installation.

1.07 WARRANTY

- A. The manufacturer shall provide a minimum five-year warranty on all hardware devices supplied and installed. Warranty coverage shall begin on the date of shipment.
- B. The hardware warranty shall cover repair or replacement any defective products within the warranty period.

1.08 MAINTENANCE & SUSTAINABILITY

- A. The manufacturer shall make available to the owner new parts, upgrades, and/or replacements available for a minimum of 5 years following installation.

PART 2 EQUIPMENT

2.01 MANUFACTURERS

- A. Acceptable Manufacturers
 - 1. Acuity Brands Lighting, Inc. or approved equivalent
- B. Basis of Design System: **Acuity Controls nLight**

2.02 SYSTEM COMPLIANCE

- A. System components shall comply with UL 916 and UL 924 standards where applicable.
- B. System components shall comply with CFR Title 47, Part 15 standards where applicable.
- C. System components shall comply with ISED Canada RSS-247 standards where applicable.
- D. All equipment shall be installed and connected in compliance with NFPA 70.

2.03 SYSTEM PERFORMANCE REQUIREMENTS

- A. System Architecture
 - 1. System shall have an architecture that is based upon three main concepts: (1) networkable intelligent lighting control devices, (2) standalone lighting control zones using distributed intelligence, (3) optional system backbone for remote, time based and global operation.
 - 2. Intelligent lighting control devices shall have individually addressable network communication capability and consist of one or more basic lighting control components: occupancy sensor, photocell sensor, relay, dimming output, contact closure input, analog 0-10V input, and manual wall station capable of indicating switching, dimming, and/or scene control. Combining one or more of these components into a single device enclosure shall be permissible so as to minimize overall device count of system.
 - 3. System must be capable of interfacing directly with networked luminaires such that either low voltage network cabling or wireless RF communication is used to interconnect networked luminaires with control components such as sensors, switches and system backbone (see *Control Zone Characteristics* sections for each type of network connection, wired or wireless).
 - 4. Networked luminaires and intelligent lighting control devices shall support individual (unique) configuration of device settings and properties, with such configuration residing within the networked luminaires and intelligent control devices.
 - 5. Lighting control zones consisting of one or more networked luminaires and intelligent lighting control devices and shall be capable of providing automatic control from sensors (occupancy and/or photocell) and manual control from local wall stations without requiring connection to a higher-level system backbone; this capability is referred to as “distributed intelligence.”
 - a. Lighting control zones (wired and wireless) of at least 128 devices per zone shall be supported.

6. Networked luminaires and intelligent lighting control devices shall have distributed intelligence programming stored in non-volatile memory, such that following any loss of power the lighting control zones shall operate according to their defined default settings and sequence of operations.
 7. Lighting control zones shall be capable of being networked with a higher-level system backbone to provide time based control, remote control from inputs and/or systems external to the control zone, and remote configuration and monitoring through a software interface.
 8. The system may include one or more system controllers that provide time-based control. The system controller also provides a means of connecting the lighting control system to a system software interface and building management systems via BACnet/IP or BACnet MS/TP protocol.
 9. All system devices shall support firmware update, either remotely or from within the applications space, for purposes of upgrading functionality at a later date.
- B. Wired Networked Control Zone Characteristics
1. Connections to devices within a wired networked lighting control zone and to backbone components shall be with a single type of low voltage network cable, which shall be compliant with CAT5e specifications or higher. To prevent wiring errors and provide cost savings, the use of mixed types of low voltage network cables shall not be permitted.
 2. Devices in an area shall be connected via a “daisy-chain” topology; requiring all individual networked devices to be connected back to a central component in a “hub-and-spoke” topology shall not be permitted, so as to reduce the total amount of network cable required for each control zone.
 3. System shall provide the option of having pre-terminated plenum rated low voltage network cabling supplied with hardware so as to reduce the opportunity for improper wiring and communication errors during system installation.
 4. Following proper installation and provision of power, all networked devices connected together with low voltage network cable shall automatically form a functional lighting control zone without requiring any type of programming, regardless of the programming mechanism (e.g. software application, handheld remote, pushbutton). The “out of box” default sequence of operation is intended to provide typical sequence of operation so as to minimize the system startup and programming requirements and to also have functional lighting control operation prior to system startup and programming.

5. Once software is installed, system shall be able to automatically discover all connected devices without requiring any provisioning of system or zone addresses.
6. All networked devices shall have the ability to detect improper communication wiring and blink its LED in a specific cadence as to alert installation/startup personnel.
7. Networked control devices intended for control of egress and/or emergency light sources shall not require the use of additional, externally mounted UL924 shunting and/or 0-10V disconnect devices, so as to provide a compliant sequence of operation while reducing the overall installation and wiring costs of the system. The following types of wired networked control devices shall be provided for egress and/or emergency light fixtures:
 - a. Low-Voltage power sensing: These devices shall automatically provide 100% light level upon detection of loss of power sensed via the low voltage network cable connection.
 - b. UL924 Listed Line-Voltage power sensing: These devices shall be listed as emergency relays under the UL924 standard, and shall automatically close the load control relay and provide 100% light output upon detection of loss of power sensed via line voltage connection to normal power.
8. Networked luminaires and intelligent lighting control devices located in different areas shall be able to transmit and track information within at least 128 system-wide control zones to support required sequences of operation that may span across multiple areas. Occupancy and photocell commands shall be available across a single controller, and switch commands shall be available across single or multiple controllers. These shall also be referred to as global control zones.
9. Wired networked Wall stations shall provide the follow Scene Control Capabilities:
 - a. Preset Scenes that can activate a specific combination of light levels across multiple local and global channels, as required.

- b. Profile Scenes that can modify the sequence of operation for the devices in the area (group) in response to a button press. This capability is defined as supporting “Local Profiles” and is used to dynamically optimize the occupant experience and lighting energy usage. Wall stations shall be able to manually start and stop Local Profiles, or the local profile shall be capable of ending after a specific duration of time between 5 minutes and 12 hours. Parameters that shall be configurable and assigned to a Local Profile shall include, but not be limited to, fixture light level, occupancy time delay, response to occupancy sensors (including enabling/disabling response), response to daylight sensors (including enabling/disabling response), and enabling/disabling of wall stations.
 - c. 3-way / multi-way control: multiple wall stations shall be capable of controlling the same local and global control zones, so as to support “multi-way” preset scene and profile scene control.
- C. System Integration Capabilities
- 1. The system shall interface with third party building management systems (BMS) to support two-way communication using the industry standard BACnet/IP or BACnet MS/TP protocols. The following system integration capabilities shall be available via BACnet/IP and BACnet MS/TP protocols:
 - a. The system shall support control of individual devices, including, but not limited to, control of relay and dimming output.
 - b. The system shall support reading of individual device status information. The available status will depend on the individual device type and capabilities, which may include but not be limited to, relay state, dimming output, power measurement, occupancy sensor status, and photocell sensor states or readings. All system devices shall be available for polling for devices status.
 - c. The system shall support activation of pre-defined system Global Profiles (see Supported Sequence of Operations for further definition of Global Profile capabilities).
 - 2. The system shall support activation of Global Profiles from third party systems by receiving dry contact closure output signals or digital commands via RS-232/RS-485. (See *Supported Sequence of Operations for further definition of Profile and Scene Preset capabilities.*)
 - 3. The system shall support activation of demand response levels from Demand Response Automation Servers (DRAS) via the OpenADR 2.0a protocol.
- D. Supported Sequence of Operations
- 1. Control Zones

- a. Networked luminaires and intelligent lighting control devices installed in an area (also referred to as a group of devices) shall be capable of transmitting and tracking occupancy sensor, photocell sensor, and manual switch information within at least 48 unique control zones to support different and reconfigurable sequences of operation within the area. These shall also be referred to as local control zones.
2. Wall station Capabilities
 - a. Wall stations shall be provided to support the following capabilities:
 - 1) On/Off of a local control zone.
 - 2) Continuous dimming control of light level of a local control zone.
 - b. 3-way / multi-way control: multiple wall stations shall be capable of controlling the same local control zones, so as to support “multi-way” switching and/or dimming control.
3. Occupancy Sensing Capabilities
 - a. Occupancy sensors shall be configurable to control a local zone.
 - b. Multiple occupancy sensors shall be capable of controlling the same local zones. This capability combines occupancy sensing coverage from multiple sensors without consuming multiple control zones.
 - c. System shall support the following types of occupancy sensing sequence of operations:
 - 1) On/Off Occupancy Sensing
 - 2) Partial-On Occupancy Sensing
 - 3) Partial-Off Occupancy Sensing
 - 4) Vacancy Sensing (Manual-On / Automatic-Off)
 - d. On/Off, Partial-On, and Partial-Off Occupancy Sensing modes shall function according to the following sequence of operation:
 - 1) Occupancy sensors shall automatically turn lights on to a designated level when occupancy is detected. To support fine tuning of Partial-On sequences the designated occupied light level shall support at least 100 dimming levels.
 - 2) Occupancy sensors shall automatically turn lights off or to a dimmed state (Partial-Off) when vacancy occurs or if sufficient daylight is detected. To support fine tuning of Partial-Off sequences the designated unoccupied dim level shall support at least 100 dimming levels.

- 3) To provide additional energy savings the system shall also be capable of combining Partial-Off and Full-Off operation by dimming the lights to a designated level when vacant and then turning the lights off completely after an additional amount of time.
 - 4) Photocell readings, if enabled in the Occupancy Sensing control zone, shall be capable of automatically adjusting the light level during occupied or unoccupied conditions as necessary to further reduce energy usage. Additional requirements and details for photocell sensing capabilities are indicated under *Photocell Sensing Capabilities*.
 - 5) The use of a wall station shall change the dimming level or turn lights off as selected by the occupant. The lights shall optionally remain in this manually-specified light level until the zone becomes vacant; upon vacancy the normal sequence of operation, as defined above, shall proceed.
- e. Vacancy Sensing mode (also referred to as Manual-On / Automatic-Off) shall function according to the following sequence of operation:
- 1) The use of a wall station is required turn lights on. The system shall be capable of programming the zone to turn on to either to a designated light level or the previous user light level. Initially occupying the space without using a wall station shall not result in lights turning on.
 - 2) Occupancy sensors shall automatically turn lights off or to a dimmed state (Partial-Off) when vacancy occurs or if sufficient daylight is detected. To support fine tuning of Partial-Off sequences the designated unoccupied dim level shall support at least 100 dimming levels.
 - 3) To provide additional energy savings and an enhanced occupant experience, the system shall also be capable of dimming the lights when vacant and then turning the lights off completely after an additional amount of time.
 - 4) To minimize occupant impact in case the area or zone is still physically occupied following dimming or shutoff of the lights due to detection of vacancy, the system shall support an “automatic grace period” immediately following detection of vacancy, during which time any detected occupancy shall result in the lights reverting to the previous level. After the grace period has expired, the use of a wall station is required to turn lights on.

- 5) Photocell readings, if enabled in the Occupancy Sensing control zone, shall be capable of automatically adjusting the light level during occupied or unoccupied conditions as necessary to further reduce energy usage. Additional requirements and details for photocell sensing capabilities are indicated under *Photocell Sensing Capabilities*.
- 6) At any time, the use of a wall station shall change the dimming level or turn lights off as selected by the occupant. The lights shall optionally remain in this manually-specified light level until the zone becomes vacant; upon vacancy the normal sequence of operation, as defined above, shall proceed.
- f. To accommodate diverse types of environments, occupancy time delays before dimming or shutting off lights shall be specifiable for control zones between 15 seconds to 2 hours.
4. Photocell Sensing Capabilities (Automatic Daylight Sensing)
 - a. Photocell sensing devices shall be configurable to control a local zone.
 - b. The system shall support the following type of photocell-based control:
 - 1) Continuous Dimming: The control zone automatically adjusts its dimming output in response to photocell readings, such that a minimum light level consisting of both electric light and daylight sources is maintained at the task. The photocell response shall be configurable to adjust the photocell setpoint and dimming rates.
5. Global Profile Capabilities
 - a. The system shall be capable of automatically modifying the sequence of operation for selected devices in response to any of the following: a time-of-day schedule, contact closure input state, manually triggered wired wall station input, RS-232/RS-485 command to wired input device, and BACnet input command. This capability is defined as supporting “Global Profiles” and is used to dynamically optimize the occupant experience and lighting energy usage.
 - b. Global profiles may be scheduled with the following capabilities:
 - 1) Global Profiles shall be stored within and executed from the system controller (via internal timeclock) such that a dedicated software host or server is not required to be online to support automatic scheduling and/or operation of Global Profiles.

- 2) Global Profile time-of-day schedules shall be capable of being given the following recurrence settings: daily, specific days of week, every “n” number of days, weekly, monthly, and yearly. Lighting control profile schedules shall support definition of start date, end date, end after “n” recurrences, or never ending. Daylight savings time adjustments shall be capable of being performed automatically, if desired.
 - 3) Global Profile Holiday Schedules should follow recurrent settings for specific US holiday dates regardless if they always occur on a specific date or are determined by the day/week of the month.
 - 4) Global Profiles shall be capable of being scheduled to run according to timed offsets relative to sunrise or sunset. Sunrise/sunset times shall be automatically derived from location information using an astronomical clock.
 - 5) Software management interface shall be capable of displaying a graphic calendar view of profile schedules for each control zone.
- c. System Global Profiles shall have the following additional capabilities:
- 1) Global Profiles shall be capable of being manually activated directly from the system controller, specially programmed wired input devices, scene capable wired wall stations, and the software management interface.
 - 2) Global Profiles shall be selectable to apply to a single device, zone of devices, or customized group of devices.
 - 3) Parameters that shall be configurable and assigned to a Global Profile shall include, but not be limited to, fixture light level, occupancy time delay, response to occupancy sensors (including enabling/disabling response), response to daylight sensors (including enabling/disabling response), and enabling/disabling of wall stations.
- d. A backup of Local and Global Profiles shall be stored on the software’s host server such that the Profile backup can be applied to a replacement system controller or wired wall station.

2.04 SYSTEM SOFTWARE INTERFACES

- A. Visualization and Programming Interfaces
1. System shall provide an optional web-based visualization interface that displays graphical floorplan.
 2. Graphical floorplan shall offer the following types of system visualization:

- a. Full Device Option - A master graphic of the entire building, by floor, showing each control device installed in the project with zones outlined. This shall include, but not be limited to, the following:
 - 1) Controls embedded light fixtures
 - 2) Controls devices not embedded in light fixtures
 - 3) Daylight Sensors
 - 4) Occupancy Sensors
 - 5) Wall Switches and Dimmers
 - 6) Scene Controllers
 - 7) Networked Relays
 - 8) Wired Bridges
 - 9) System Controllers
 - 10) Wired Relay Panels
 - 11) Group outlines
- b. Group Only Option - A master graphic of the entire building, by floor, showing only control groups outlined.
- c. Allow for pan and zoom commands so smaller areas can be displayed on a larger scale simply by panning and zooming each floor's master graphic.
- d. A mouse click on any control device shall display the following information (as applicable):
 - 1) The device catalog number.
 - 2) The device name and custom label.
 - 3) Device diagnostic information.
 - 4) Information about the device status or current configuration is available with an additional mouse click.

2.05 WIRED NETWORKED DEVICES

- A. Wired Networked Wall Switches, Dimmers, Scene Controllers
 1. Product Series: nPODM, nPODM xS, nPODM xL, nPODMA, nPODMA xS, nPODMA xL.
 2. Devices shall recess into single-gang switch box and fit a standard GFI opening.
 3. Communication and low voltage power shall be delivered to each device via standard low voltage network cabling with RJ-45 connectors.
 4. All switches shall have the ability to detect when it is not receiving valid communication and blink its LED in a pattern to visually indicate a potential wiring issue.
 5. Devices with mechanical push-buttons shall provide tactile and LED user feedback.
 6. Devices with mechanical push-buttons shall be made available with custom button labeling.

7. Wall switches & dimmers shall support the following device options:
 - a. Number of control zones: 1, 2 or 4
 - b. Control Types Supported:
 - 1) On/Off
 - 2) On/Off/Dimming
 - 3) On/Off/Dimming/Correlated Color Temperature Control for specific luminaire types
 - c. Colors: Ivory, White, Light Almond, Gray, Black, Red
 8. Scene controllers shall support the following device options:
 - a. Number of scenes: 1, 2 or 4
 - b. Control Types Supported:
 - 1) On/Off
 - 2) On/Off/Dimming
 - 3) Preset Level Scene Type
 - 4) On/Off/Dimming/Preset Level for Correlated Color Temperature
 - 5) Reprogramming of other devices within daisy-chained zone so as to implement user selected lighting scene. This shall support manual start/stop from the scene controller, or optionally programmed to automatically end after a user selectable duration between 5 minutes and 12 hours.
 - 6) Selecting a lighting profile to be run by the system's upstream controller so as to implement a selected lighting profile across multiple zones. This shall support manual start/stop from the scene controller, or optionally programmed to automatically end after a user selectable duration between 5 minutes and 12 hours.
 - c. Colors: Ivory, White, Light Almond, Gray, Black, Red
- B. Wired Networked Occupancy and Photosensors
1. Product Series: nCM, nCMB, nRM, nWV, nHW
 2. Occupancy sensors shall sense the presence of human activity within the desired space and fully control the on/off function of the lights.
 3. Sensors shall utilize passive infrared (PIR) technology, which detects occupant motion, to initially turn lights on from an off state, thus preventing false on conditions. Ultrasonic or Microwave based sensing technologies shall not be accepted.
 4. For applications where a second method of sensing is necessary to adequately detect maintained occupancy (such as in rooms with obstructions), a sensor with an additional "dual" technology shall be used.

5. Dual technology sensors shall have one of its two technologies not require motion to detect occupancy. Acceptable dual technology includes PIR/Microphonics (also known as Passive Dual Technology or PDT) which both looks for occupant motion and listens for sounds indicating occupants. Sensors where both technologies detect motion (PIR/Ultrasonic) shall not be acceptable.
6. All sensing technologies shall be acoustically passive, meaning they do not transmit sounds waves of any frequency (for example in the Ultrasonic range), as these technologies have the potential for interference with other electronic devices within the space (such as electronic white board readers). Acceptable detection technologies include Passive Infrared (PIR), and/or Microphonics technology. Ultrasonic or Microwave based sensing technologies shall not be accepted.
7. System shall have ceiling, fixture, recessed & corner mounted sensors available, with multiple lens options available customized for specific applications.
8. Communication and low voltage power shall be delivered to each device via standard low voltage network cabling with RJ-45 connectors.
9. All sensors shall have the ability to detect when it is not receiving valid communication and blink its LED in a pattern to visually indicate a potential wiring issue.
10. Sensor programming parameter shall be available and configurable remotely from the software and locally via the device push-button.
11. Ceiling mount occupancy sensors shall be available with zero or one integrated dry contact switching relays, capable of switching 1 amp at 24 VAC/VDC (resistive only).
12. Sensors shall be available with one or two occupancy “poles”, each of which provides a programmable time delay.
13. Sensors shall have optional features for photosensor/daylight override, automatic dimming control, and low temperature/high humidity operation.
14. Photosensor shall provide for an on/off set-point, and a dead band to prevent the artificial light from cycling. Delay shall be incorporated into the photocell to prevent rapid response to passing clouds.
15. Photosensor and dimming sensor’s set-point and dead band shall be automatically calibrated through the sensor’s microprocessor by initiating an “Automatic Set-point Programming” procedure. Min and max dim settings as well as set-point may be manually entered.
16. Dead band setting shall be verified and modified by the sensor automatically every time the lights cycle to accommodate physical changes in the space (i.e., furniture layouts, lamp depreciation, or lamp outages).

17. A dual zone option shall be available for On/Off Photocell, Automatic Dimming Control Photocell, or Combination units. The secondary daylight zone shall be capable of being controlled as an “offset” from the primary zone.
- C. Wired Networked Power Packs and Secondary Packs
1. Product Series: nPP16, nPP16-ER, nPP20-PL, nSP16, nSP5-PCD, nSP5-2P-LVR, nSHADE, nAR40, nEPS-60, nPS-80
 2. Power Packs shall incorporate one optional Class 1 relay, optional 0-10 VDC dimming output, and contribute low voltage Class 2 power to the rest of the system.
 3. Power Packs shall accept 120 or 277 VAC (or optionally 347 VAC) and carry a plenum rating.
 4. Secondary Packs shall incorporate the relay and 0-10 VDC or line voltage dimming output, but shall not be required to contribute system power.
 5. Power Supplies shall provide system power only, but are not required to switch line voltage circuit.
 6. Auxiliary Relay Packs shall switch low voltage circuits only, capable of switching 1 amp at 40 VAC/VDC (resistive only).
 7. Communication shall be delivered to each device via standard low voltage network cabling with RJ-45 connectors. Secondary packs shall receive low voltage power via standard low voltage network cable.
 8. Power Pack programming parameters shall be available and configurable remotely from the software and locally via the device push-button.
 9. Power Pack shall securely mount through a threaded ½ inch chase nipple or be capable of being secured within a luminaire ballast/driver channel. Plastic clips into junction box shall not be accepted. All Class 1 wiring shall pass through chase nipple into adjacent junction box without any exposure of wire leads. Note: UL Listing under Energy Management or Industrial Control Equipment automatically meets this requirement, whereas Appliance Control Listing does not meet this safety requirement.
 10. When required by local code, Power Pack must install inside standard electrical enclosure and provide UL recognized support to junction box. All Class 1 wiring is to pass through chase nipple into adjacent junction box without any exposure of wire leads.
 11. Power/Secondary Packs shall be available with the following options:
 - a. Power Pack capable of full 16-Amp switching of all normal power lighting load types, with optional 0-10V dimming output capable of up to 100mA of sink current.
 - b. Secondary Pack with UL924 listing for switching of full 16-Amp Emergency Power circuits, with optional 0-10V dimming output capable of up to 100mA of sink current.

- c. Power and Secondary Packs capable of full 20-Amp switching of general purpose receptacle (plug-load) control.
- d. Secondary Pack capable of full 16-Amp switching of all normal power lighting load types.
- e. Secondary Pack capable of 5-Amps switching and dimming 120 VAC incandescent lighting loads or 120/277 VAC line voltage dimmable fluorescent ballasts (2-wire and 3-wire versions).
- f. Secondary Pack capable of 5-Amps switching and dimming of 120/277 VAC magnetic low voltage transformers.
- g. Secondary Pack capable of 4-Amps switching and dimming of 120 VAC electronic low voltage transformers.
- h. Secondary Pack capable of louver/damper motor control for skylights.
- i. Secondary Pack capable of providing a pulse on/pulse off signal for purposes of controlling shade systems via relay inputs.
- j. Secondary Pack capable of switching 1 amp at 40 VAC/VDC (resistive only) with the intent to provide relay signal to auxiliary system (e.g. BMS).
- k. Power Supply capable of providing auxiliary bus power (no switched or dimmed load).

D. Wired Networked Luminaires

- 1. Product Series: Networked Luminaires shall be of the following Acuity Brands LED fixtures, which come factory enabled with embedded networking capability:

- a. Lithonia model families:
 - BLT(R/X)
 - RTL(R/X)
 - VTL(R/X)
 - TL(X)
 - FSL(X)
 - ACL(X)
 - ALL(S)
 - AVL
 - BZL
 - GTL
 - SBS
 - IBL/IBH
 - PTN
 - LDN
 - DOM
 - WL
 - STL

- b. Gotham model families:
 - EVO
 - Incito
 - c. Mark model families:
 - Slot 2/4/6
 - Fin
 - Veil
 - Whisper
 - Nol
 - SPR
 - RUBIK
 - d. Peerless model families:
 - Vellum
 - Mino
 - Round 2/4
 - Square
 - Origami
 - Bruno
 - Staple
 - Lightline
 - Lightedge
 - Icetray
 - Cerra
 - Prima
 - Naro
 - Tulip
 - Envision
 - Aero
 - Enzo
2. Networked luminaire shall have a mechanically integrated control device.
 3. Networked LED luminaire shall have two RJ-45 ports available (via control device directly or incorporated RJ-45 splitter).
 4. Networked LED luminaire shall be able to digitally network directly to other network control devices (sensors, photocells, switches, dimmers).
 5. Networked LED luminaire shall provide low voltage power to other networked control devices (excluding EMG and CCT capable versions).
 6. System shall be able to turn on/off specific LED luminaires without using a relay, if LED driver supports "sleep mode."
 7. System shall be able to maintain constant lumen output over the specified life of the LED luminaire (also called lumen compensation) by automatically varying the dimming control signal to account for lumen depreciation.

- a. System shall indicate (via a blink warning) when the LED luminaire is no longer able to compensate for lumen depreciation.
8. System shall be able to provide control of network luminaire intensity, in addition to correlated color temperature of specific LED luminaires.
9. System shall be able to provide control of network luminaire intensity, in addition to dynamic features, such as grayscale and color accent of specific LED luminaires.

PART 3 EXECUTION

3.01 INSTALLATION REQUIREMENTS

- A. Installation Procedures and Verification
 1. The successful bidder shall review all required installation and pre-startup procedures with the manufacturer's representative through pre-construction meetings.
 2. The successful bidder shall install and connect the networked lighting control system components according to the manufacturer's installation instructions, wiring diagrams, the project submittals and plans specifications.
 3. The successful bidder shall be responsible for testing of all low voltage network cable included in the bid. Bidder is responsible for verification of the following minimum parameters:
 - a. Wire Map (continuity, pin termination, shorts and open connections, etc.)
 - b. Length
 - c. Insertion Loss
- B. Coordination with Owner's IT Network Infrastructure
 1. The successful bidder is required to coordinate with the owner's representative to secure all required network connections to the owner's IT network infrastructure.
 - a. The bidder shall provide to the owner's representative all network infrastructure requirements of the networked lighting control system.
 - b. The bidder shall provide to the manufacturer's representative all necessary contacts pertaining to the owner's IT infrastructure, to ensure that the system is properly connected and started up.
- C. Documentation and Deliverables
 1. The installing contractor shall be responsible for documenting installed location of all networked devices, including networked luminaires. This includes responsibility to provide as-built plan drawing showing device address barcodes corresponding to locations of installed equipment.

2. The installing contractor is also responsible for the following additional documentation to the manufacturer's representative if visualization / graphical floorplan software is provided as part of bid package:
 - a. As-Built floor plan drawings showing device address locations required above. All documentation shall remain legible when reproducing\scanning drawing files for electronic submission.
 - b. As-Built electrical lighting drawings (reflected ceiling plan) in PDF and CAD format. Architectural floor plans shall be based on as-built conditions.
 - 1) CAD files shall have layers already turned on/off as desired to be shown in the graphical floorplan background images. The following CAD elements are recommended to be hidden to produce an ideal background graphical image:
 - Titleblock
 - Text- Inclusive of room names and numbers, fixture tags and drawings notes
 - Fixture wiring and homeruns
 - Control devices
 - Hatching or poché of light fixtures or architectural elements
 - 2) CAD files shall be of AutoCAD 2013 or earlier. Revit file overall floor plan views shall be exported to AutoCAD 2013.

3.02 SYSTEM STARTUP

- A. Upon completion of installation by the installer, including completion of all required verification and documentation required by the manufacturer, the system shall be started up and programmed.
 1. For CAT5 wired devices, low voltage network cable testing shall be performed prior to system startup.
- B. System start-up and programming shall include:
 1. Verifying operational communication to all system devices.
 2. Programming the network devices into functional control zones to meet the required sequence of operation.
 3. Programming and verifying all sequence of operations.
- C. Initial start-up and programming is to occur on-site.

3.03 PROJECT TURNOVER

- A. System Documentation
 1. Submit software database file with desired device labels and notes completed. Changes to this file will not be made by the factory.

2. Installing contractor to grant access to the owner for the programming database, if requested.
- B. Owner Training
1. Provisions for onsite training for owner and designated attendees to be included in submittal package.

END OF SECTION

SECTION 26 22 00

DRY TYPE TRANSFORMERS

(This section not prepared by Mackenzie. This section is solely the product of System Design Consultants, Inc.)

PART 1 GENERAL

1.01 DESCRIPTION

- A. Furnish and install all dry type transformers to provide 208Y/120V power from the 480Y/277V system.

1.02 QUALITY ASSURANCE

- A. Case to be totally enclosed with louvers to prevent entry of foreign objects into the interior, manufacture in accordance with all NEMA and UL approval standards.
- B. Manufacturers: Match distribution equipment, or approved equal.

1.03 RELATED WORK

- A. Section 26 00 00: General Provisions
- B. Section 26 05 00: Basic Materials and Methods
- C. Section 26 20 00: Electrical Distribution System.

1.04 SUBMITTALS

- A. Shop Drawings with nameplate data
- B. Product data

PART 2 PRODUCTS

2.01 INDOOR LOW VOLTAGE TRANSFORMERS

- A. Enclosed and ventilated, air cooled type, Class H insulation, designed for 115 degrees C. temperature rise above 40 degrees C. ambient temperature at full load continuous operation. Equip with two 2-1/2% ANFC taps and four 2-1/2% BNFC taps. Maximum sound level shall be NEMA standard with isolation dampers between the core and coil assembly and case.

- B. All distribution transformers shall meet the minimum efficiency levels specified in current state energy codes and DOE CFR title 10 Chapter II Part 431 (DOE 2016 Efficiency levels)

NEMA CLASS 1 EFFICIENCY LEVELS FOR DRY-TYPE DISTRIBUTION TRANSFORMERS^{1,2}

SINGLE PHASE EFFICIENCY			THREE PHASE EFFICIENCY		
kVa	Low Voltage	Medium Voltage	kVa	Low Voltage ²	Medium Voltage
15	97.7%	97.6%	15	97.89%	96.8%
25	98.0%	97.9%	30	98.23%	97.3%
37.5	98.2%	98.1%	45	98.40%	97.6%
50	98.3%	98.2%	75	98.60%	97.9%
75	98.5%	98.4%	112.5	98.74%	98.1%
100	98.6%	98.5%	150	98.83%	98.2%
167	98.7%	98.7%	225	98.94%	98.4%
250	98.8%	98.8%	300	99.02%	98.5%
333	98.9%	98.9%	500	99.14%	98.7%
500	-	99.0%	750	99.23%	98.8%
667	-	99.0%	1,000	99.28%	98.9%
833	-	99.1%	1,500	-	99.0%
			2,000	-	99.0%
			2,500	-	99.1%

¹ Efficiency is calculated per conditions stated in NEMA Standard TP 1

² Efficiency is calculated per conditions stated in DOE CFR Title 10 Chapter 11 Part 431.

2.02 DRY TYPE TRANSFORMERS: 30 KVA AND LARGER

- A. Provide dry type, enclosed and ventilated transformers as indicated herein.
- B. Transformers shall be designed, constructed and rated in accordance with UL, CSA, NEMA, ANSI, IEEE, and OSHA standards.

- C. Enclosed and ventilated, air cooled type, Class H insulation, designed for 115 degrees C. temperature rise above 40 degrees C. ambient temperature at full load continuous operation. Equip with two 2-1/2% ANFC taps and four 2-1/2% BNFC taps. Maximum sound level shall be NEMA standard with isolation dampers between the core and coil assembly and case.
- D. Transformer enclosure finish must be ASA 61 gray powder polyurethane paint. Transformer enclosure temperature shall not exceed 50 degrees C plus the ambient under any condition of loading at any specified temperature rise at or below 150 degrees C.
- E. Transformer enclosure shall be UL/NEMA Type 2 and UL 3R Listed with the addition of a weather shield and shall be so marked on the transformer.
- F. Transformer shall incorporate an electrostatic shield for the attenuation of voltage spikes, line noise, and transients.
- G. Single-phase transformers up to 100 KVA and three phase transformers up to 112.5 KVA shall terminate in copper bus bar.
- H. Transformer coils must be wound with aluminum strip conductors for increased insulation life, cooler operation, and lower losses.
- I. Transformers must operate at audible sound levels below NEMA Standard ST-20. Sound levels will not exceed the following:

<u>KVA Range</u>	<u>Maximum Sound Level</u>
up to 9 KVA	40 dB
10 to 50 KVA	45 dB
51 to 150 KVA	50 dB
151 to 300 KVA	55 dB
301 to 500 KVA	60 dB
- J. Transformers must incorporate vibration isolation pads in their construction located between the transformer core and coil assembly and the transformer case. External vibration isolation pads will not be used as they tend to increase audible noise. Transformers shall be floor mounted on a concrete pad. All connections to the transformer will be made by means of flexible metallic conduit.
- K. Transformer enclosure shall be grounded per the National Electric Code.
- L. Transformers shall be 60 Hz, 208, 240, 480 or 600 volts delta primary; 208Y/120, 240 delta or 480Y/277 secondary. KVA rating as indicated. Contractor to provide all necessary lugs for all transformers.
- M. Complete shop drawings must be submitted for approval on all dry type transformers.

- N. Typical performance data must be submitted for approval on all transformers. Factory tests must be made in accordance with the latest revisions of ANSI Test Code C57.12.91 for Dry Type Transformers. Performance data provided must contain but not be limited to:
1. No load losses.
 2. Full load losses.
 3. Polarity and phase rotation.
 4. Impedance at reference temperature.
 5. Efficiencies at 25, 50, 75, and 100% load.
 6. Regulation at 100% and 80% power factor.
 7. Audible sound level.
 8. Dimensions and weight.
 9. Applied potential test.
 10. Induced potential test.
 11. Excitation current.
 12. IP, IX, and IZ percentages.
 13. Reference and ambient temperature.
- O. Warranty: Transformers must be warranted against defects in materials, workmanship, and performance for ten years from date of manufacture.

2.03 NON-LINEAR DRY TYPE TRANSFORMERS. IN ADDITION TO THE REQUIREMENTS SPECIFIED FOR DRY TYPE TRANSFORMERS, THE FOLLOWING REQUIREMENTS APPLY TO NON-LINEAR DRY TYPE TRANSFORMERS:

- A. Provide dry type, enclosed, and ventilated transformers as indicated and specified herein. Transformers must be UL listed for non-sinusoidal current loads of a specified K Factor (UL Standard 1561), CSA certified and labeled as such.
- B. Transformers must be designed to handle non-linear loads and the adverse effects of harmonics. Transformer coils will be wound with foil to minimize the heating effects caused by harmonic currents.
- C. Transformers must be able to power non-linear loads with a K-Factor as high as 20.
- D. Transformers shall incorporate a neutral conductor sized at 2 times rated phase current. Transformer cases shall be grounded per the National Electric Code.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install the indoor low voltage transformer with flexible conduit connections to housing. Make all cable and ground wire connections.

- B. In general, transformers will be floor mounted. When necessary to wall mount, securely anchor to wall structure using a safety factor of 4.

END OF SECTION

SECTION 26 24 00

SWITCHBOARDS AND PANELBOARDS

(This section not prepared by Mackenzie. This section is solely the product of System Design Consultants, Inc.)

PART 1 GENERAL

1.01 DESCRIPTION

- A. Work Included: Provide branch panels as shown.

1.02 RELATED WORK

- A. Section 26 00 00: General Provisions
- B. Section 26 05 00: Basic Materials and Methods
- C. Section 26 20 00: Electrical Distribution System
- D. Section 26 28 00: Circuit Protective Devices

1.03 SUBMITTALS

- A. Shop Drawings.
- B. Product Data.
- C. Operation Instruction and Maintenance Data.

PART 2 PRODUCTS

2.01 BRANCH PANELBOARDS

- A. Branch circuit panels shall be bolt-in circuit breaker type with aluminum or copper bussing. Panels shall be fitted with flush lift latches and locks keyed alike. Deliver all panel keys to the Owner at completion of the project.
- B. Panelboard bussing and breakers shall be rated to withstand available fault current.
- C. Provide full size ground bus in all panelboards.
- D. Lugs: Conductors no. 6 and larger, except on molded case circuit breakers, two hole, long barrel pressure tool set Thomas & Betts No. 54,000 series, Burndy "Hydent", Anderson Electric VCEL, or approved equivalent
- E. Wiring gutters shall be a minimum of 4 inches wide except where feeder conductors enter where a minimum of 6 inches clear shall be provided. Feeder conductors to enter directly in line with lug terminals wherever practicable. Provide separate feeder lugs and studs for each feeder conductor.

- F. Branch circuit breakers shall be identified with individual circuit numbers adjacent to each breaker with a typewritten card to identify the load controlled by that breaker. Circuit breakers shall be nominally one inch on centers to allow for easy operation of the handles. Arrange breakers in the panels as scheduled on the Drawings. Where no schedule is listed, arrange with the one-pole breakers at the top of the panel, followed by the two-pole and three-pole breakers with blank spaces at the bottom.
- G. Surface panels shall have metal face trims with no sharp edges or corners. Finish surface panel tubs to match face trim. Access panel on front may be screw type for access to interior.
- H. Flush panels shall have flush doors with concealed hinges and mounting clamps equal to Square D Mono Flat, or ITE Decor trim.
- I. Acceptable manufacturers: Panelboards shall match Secondary Distribution Equipment, see section 26 20 00.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install panelboards plumb and level, located as shown on the Drawings.
- B. Arrange loads from served by the panel to balance the load currents as equally as possible between the phases.

3.02 SPARE CONDUITS

- A. Install a spare 3/4-inch conduit from flush panels for each three single pole breakers or spaces provided, minimum three conduits per panel. Terminate conduits above an accessible ceiling or as directed.

END OF SECTION

SECTION 26 27 26

WIRING DEVICES AND PLATES

(This section not prepared by Mackenzie. This section is solely the product of System Design Consultants, Inc.)

PART 1 GENERAL

1.01 DESCRIPTION

- A. Work Included: Provide wiring devices and plates or blank plates only for all outlet boxes shown.

1.02 RELATED WORK

- A. Section 26 00 00: General Provisions
- B. Section 26 05 00: Basic Materials and Methods

1.03 SUBMITTALS

- A. Shop Drawings.
- B. Product Data.
- C. Operation Instructions and Maintenance Data.
- D. Warranty.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Wiring devices shall be specification grade with special devices as noted on the Drawings. Should the Drawings indicate a device other than those listed herein without reference to catalog number, such device shall be of same grade and manufacture as specified below. Furnish a matching cap for all special purpose devices that do not have the common 120-volt NEMA 5-15R or 5-20R configuration.
- B. Comparable grade devices to those listed as manufactured by Leviton and Pass & Seymour, are approved. All lighting switches and duplex receptacles installed shall be by the same manufacturer and have identical appearance characteristics, unless noted otherwise.

2.02 WALL SWITCHES

- A. Line voltage switches, 20 ampere, 120 volt, quiet type, Hubbell 1221 series, and white exposed finish.

- B. Switch with pilot, lighted clear toggle, Hubbell 1221-PL.
- C. Keyed security switches: Pass & Seymour 20AC1-KL

2.03 WALL BOX DIMMERS:

- A. White finish, size for loads.
- B. Incandescent:
 - 1. Modular full wave solid-state unit with integral quiet on-off switch and audible and electromagnetic noise filters.
 - 2. Thin profile white finish.
 - 3. 1,000 watt (unless noted otherwise)
 - 4. 120/277 volt rated.
 - 5. Lutron Nova T (NT-1000), Lutron Vareo (V-1000) or approved.
- C. Fluorescent:
 - 1. Modular full wave solid-state unit with integral quiet on-off switch and audible and electromagnetic noise filters.
 - 2. Thin profile with white finish.
 - 3. 1,000 watt (unless noted otherwise)
 - 4. 120/277 volt rated.
 - 5. Lutron Nova T, Lutron Vareo or approved. Verify compatibility of dimmer switch with ballast being served.

2.04 EMERGENCY LIGHTING SWITCHING BYPASS

- A. Provide and install Emergency Shunt Relay (NC contact) where indicated on drawing or herein. Emergency shunt relays are to be UL 924 listed devices.
- B. Products: (or approved substitute)
 - 1. Lighting Control & Design, Inc. part number GR2001ES-120-3
 - 2. Nine 24, Inc. part number BTLC-R
 - 3. Bodine part number GTD20A
- C. Operation: Upon loss of Normal (non-emergency) power, the contactor will close, bypassing the room lighting switch and illuminating the luminaire.

2.05 RECEPTACLES

- A. Duplex, 20 ampere, 3-wire, 2-pole grounding, NEMA 5-20R, Hubbell 5352 series, white exposed finish.
- B. Ground Fault Circuit Interrupting (GFCI/GFI): 20 ampere, 3-wire, 2-pole grounding, NEMA 5-20R, white exposed finish, Hubbell GF5352 series or approved substitute.
- C. Tamperproof Duplex, 20 ampere, 3-wire, 2-pole grounding, NEMA 5-20R, Hubbell HBL8300SGGY series, white exposed finish.

- D. Clock outlets, Hubbell No. 5235, gray receptacle, plate with clock hanger.
- E. Special purpose receptacles as noted on Drawings.

2.06 PLATES AND COVERS

- A. Flush Finish Plates: .040-inch thick, type 302, stainless steel, brush finish, Leviton or Pass & Seymour.
- B. Surface Covers: Galvanized or cadmium plated steel, 1/2-inch raised industrial type with openings appropriate for device installed.
- C. Weatherproof:
 - 1. Damp locations: Hubbell HBL5205WO cover mounted horizontally with hinges up.
 - 2. Wet locations: Hubbell WP26M, Thomas & Betts Red-Dot series CKNM

PART 3 EXECUTION

3.01 INSTALLATION

- A. Devices and finish plates to be installed plumb with building lines.
- B. Finish plates and devices not to be installed until final painting is complete. Scratched or splattered finish plates and devices will not be accepted.
- C. Wall-mounted receptacles shall be installed vertically at centerline height shown on the Drawings.
- D. Receptacles shall be tested for line to neutral, line to ground and neutral to ground faults. Correct any defective wiring.
- E. All special plugs provided with the receptacles shall be given to the Owner in their cartons and a letter stating the date and the Owner's representative that received the materials.

END OF SECTION

SECTION 26 28 00

CIRCUIT PROTECTIVE DEVICES (OVERCURRENT DEVICES)

(This section not prepared by Mackenzie. This section is solely the product of System Design Consultants, Inc.)

PART 1 GENERAL

1.01 DESCRIPTION

- A. Work Included:
 - 1. Provide overcurrent protective devices of the proper characteristics for the load served.
 - 2. Coordinate fuse size and circuit breaker combinations for selective tripping with minimum interruption of service.
 - 3. Provide fuses as indicated on the drawings, sized per NEC and appropriate for the load served as required for a fully operational system.
 - 4. All fuses shall be furnished of the same manufacturer.
 - 5. All circuit breakers shall be furnished of the same manufacture as the distribution panel and branch panelboards.
 - 6. All fuses shall be installed by the electrical contractor at job-site and only when equipment is to be energized. Fuses shall not be installed during shipment.

1.02 RELATED WORK

- A. Section 26 00 00: General Provisions,
- B. Section 26 05 00: Basic Materials and Methods,
- C. Section 26 20 00: Electrical Distribution System
- D. Section 26 24 00: Switchboards and Panelboards

1.03 SUBMITTALS

- A. Shop Drawings.
- B. Product Data.
- C. Operation and Maintenance data.

PART 2 PRODUCTS

2.01 FUSES

- A. Provide 100,000 AIC, Current Limiting, UL, Time Delay Fuses.
- B. For Feeders 601 amps to 6000 amps: Class L, KRP-C()SP Time Delay.

- C. For Feeders 600 amps and less:
 - 1. Class RK-1, LPS-RK()SP for 600 Volt, Dual Element.
 - 2. Class RK-1, LPN-RK()SP for 250 Volt, Dual Element.
 - 3. Class J, LPJ()SP for 600 Volt & below, Dual Element.
- D. For Motor Circuits 600 Volts and Below: Class RK-1 and Class J Sized @ 125% FLC of Motor.
- E. Manufacturer: Bussmann System 300 Low-Peak, Littelfuse.

2.02 CIRCUIT BREAKERS

- A. Circuit breakers shall be molded case, thermal magnetic type. Breakers shall have short circuit capacity rating to withstand the maximum short circuit duty, which can be expected at the breaker location in the electrical system. Breakers mounted in branch panelboards shall be of the bolt-in type.
- B. Minimum short circuit rating for any circuit breaker: 10,000 A.I.C. for 120V and 208V breakers, 22,000 A.I.C. for 277V and 480V breakers. It is the responsibility of the electrical contractor to verify the fault current with the serving utility and provide the AIC rating required.
- C. Provide HACR circuit breakers in all panels for circuits serving mechanical equipment.
- D. Provide circuit breaker lock-on handle guards to prevent accidental shut-off of equipment for breakers supplying time clocks, refrigeration, fire alarm, unswitched egress lighting and like systems.
- E. Provide Type HID circuit breakers for all circuits feeding fluorescent and HID lighting.

2.03 SPARE FUSES AND SPARE FUSE CABINET

- A. Provide 10% spare fuses, but not less than (3) of any one size and type.
- B. Provide Bussmann spare fuse cabinet(s) #SFC as required for spare fuses. Install cabinet in electrical room.

2.04 SUBSTITUTION APPROVALS

- A. If the electrical contractor wishes to furnish materials other than those specified, a written request, along with a complete short circuit and selective coordination study, shall be submitted to the engineer for evaluation at least 10 days prior to bid date. If the engineer's evaluation indicates acceptance, a written addendum will be issued listing the other acceptable manufacturer.

PART 3 EXECUTION

3.01 FUSES

- A. Install fuses for motor protection to best protect the motor without nuisance tripping.
- B. Provide one complete set of spare fuses of each amperage used on this project. Store spare fuses in a metal, hinged door cabinet located adjacent to the Main Distribution Panel. Label cabinet.
- C. Provide pullers for fuses, stored with fuses in cabinet.

END OF SECTION

SECTION 26 28 16

ENCLOSED SWITCHES AND CIRCUIT BREAKERS

(This section not prepared by Mackenzie. This section is solely the product of System Design Consultants, Inc.)

PART 1 GENERAL

1.01 DESCRIPTION

- A. Work Included:
 - 1. Provide manual or magnetic motor starters of the proper characteristics for equipment as listed on the Drawings or not provided by Mechanical Division 23 00 00, i.e. overhead door operators.
 - 2. Provide switches of proper characteristics as disconnecting means.

1.02 QUALITY CONTROL

- A. All motor starters and disconnects shall be of the same manufacture as service equipment or panelboards.

1.03 RELATED WORK

- A. Section 26 00 00: General Provisions
- B. Section 26 05 00: Basic Materials and Methods
- C. Section 26 28 00: Circuit Protective Devices

1.04 SUBMITTALS

- A. Shop Drawings.
- B. Product Data.
- C. Operation Instruction and Maintenance Data.

PART 2 PRODUCTS

2.01 MOTOR STARTERS

- A. Manual starters, toggle type, quick-make, quick-break with thermal overload protection and suitable enclosures.
- B. Enclosures shall be NEMA 1 for indoor use and NEMA 3R where installed exposed to the weather or designated by the subscript "WP".

- C. Magnetic starters, full voltage across the line non-reversing type, 120 volt coils, overload relays in each leg, H-O-A selector switches, red running pilot lights, auxiliary contacts, 120V control transformers and suitable enclosures. The starters shall be combination type with fusible switches where shown adjacent to the disconnect switch.

2.02 DISCONNECTS

- A. Safety and disconnect switches shall be NEMA type HD (heavy duty), quick-make, quick-break, dual rated with electrical characteristics as required by the system voltage and the load served. Switches shall be equipped with a defeatable cover interlock.
- B. Enclosures shall be NEMA 1 for indoor use and NEMA 3R where installed exposed to the weather or designated by the subscript "WP".
- C. Disconnects shall be fusible or non-fusible as designated on Drawings and/or required by code.

PART 3 EXECUTION

3.01 CLEARANCES

- A. Maintain all code-required clearances under this work.

3.02 MOTOR STARTERS

- A. Provide the motor starting equipment as shown on the Drawings and coordinate all motor "overload" starter relays.
- B. Install the starters at the respective equipment unless shown otherwise.

3.03 DISCONNECT SWITCHES

- A. Provide all code required disconnect switches under this work whether specifically shown or not.
- B. Disconnect switches required when equipment is not in sight of the branch circuit panel or starter may be horsepower rated, toggle type in suitable enclosure, mounted at or on the equipment.

END OF SECTION

SECTION 26 50 00

LIGHTING FIXTURES AND LAMPS

(This section not prepared by Mackenzie. This section is solely the product of System Design Consultants, Inc.)

PART 1 GENERAL

1.01 DESCRIPTION

- A. Work Included:
 - 1. Provide all lighting outlets indicated on the Drawings with a fixture of type designated and appropriate for the location. Outlet symbols on the Drawings without a type designation shall have a fixture the same as those used in similar or like locations.
 - 2. Where a fixture type designation has been omitted and cannot be determined by the Contractor, request a clarification from the Architect and provide a suitable fixture type as directed at no additional cost.
 - 3. Coordinate installation of lighting fixtures with the ceiling installation and all other trades to provide a total system that is neat and orderly in appearance.
 - 4. Verify ceiling types with architectural specifications and drawings.
 - 5. Provide luminaires complete with lamps, ballasts, reflectors, diffusers, lenses, shielding, hangers, accessories and fittings.
 - 6. Store and handle so as not to subject materials to corrosion or mechanical damage from environment and/or construction.

1.02 RELATED WORK

- A. Section 26 00 00: General Provisions
- B. Section 26 05 00: Basic Materials and Methods
- C. Section 26 05 33: Conduits, Raceways, Boxes and Fittings

1.03 QUALITY ASSURANCE

- A. Luminaires shall be U.L. listed and be manufactured in accordance with appropriate U.L. and ANSI standards and shall bear U.L. label appropriate for intended use.

- B. The lighting designated for this project was based on fixture types and manufacturers as specified. If substitution of other than those specified is proposed for an alternate, provide the data and the operating fixtures both as specified and alleged equal. The Architect/Engineer reserves the right to request full photometric analysis of area affected by the proposed substitution prior to acceptance or denial.
- C. Equality shall be determined by comparisons of actual fixtures and the following fixture characteristics.
1. Performance:
 - a. Distribution
 - b. Utilization
 - c. Average brightness/maximum brightness
 - d. Spacing to mounting height ratio
 - e. Comfort probability
 - f. Energy life-cycle analysis.
 2. Construction:
 - a. Engineering
 - b. Workmanship
 - c. Rigidity
 - d. Permanence of materials and finishes; Durability
 3. Installation Ease:
 - a. Captive parts and captive hardware
 - b. Provision for leveling
 - c. Through-wiring ease
 4. Maintenance:
 - a. Relamping ease
 - b. Replacement of ballast and lamp sockets
 5. Appearance:
 - a. Light tightness
 - b. Neat, trim styling
 - c. Aesthetic architectural value
 6. Availability:
 - a. Lead time
 7. Sustainable Design Performance Indicators:
 - a. Environmental performance in manufacturing
 - b. Manufacturing sustainability policies
 - c. ISO 14001 certification or equivalent environmental management systems.
 - d. ISO 9001 certification for quality assurance
 - e. Annual environmental performance or sustainability reports.
 - f. Environmentally responsible materials and resources.
 - g. Regional availability of materials and resources.

- h. Regional production and manufacturing.

1.04 SUBMITTALS

- A. Shop Drawings.
- B. Product Data.
- C. Operation Instruction and Maintenance Data.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Recessed fixtures shall have trims which fit neatly and tightly to the surfaces in which they are installed without leaks or gaps. Contractor to verify ceiling types at all locations and provide appropriate trim kit for each fixture. Where necessary, install heat resistant non-rubber gaskets to prevent light leaks or moisture from entering between fixture trim and the surface to which they are mounted.
- B. Fixtures installed under canopies, roof or open porches, and similar damp or wet locations shall be UL listed and labeled as suitable for damp or wet locations.

2.02 LUMINAIRE REQUIREMENTS, GENERAL

- A. Recessed luminaires shall be IC-rated when installed at locations where insulation will come in direct contact with fixture. Contractor to verify ceiling assembly makeup at all fixture locations.

2.03 FLUORESCENT FIXTURES

- A. Prismatic diffusers shall be extruded of clear acrylic plastic, 0.125-inch overall thickness, No. 12 pattern as manufactured by KHS unless otherwise specified in the fixture schedule by catalog number or remarks.
- B. Finish shall be white baked enamel, unless otherwise specified with a minimum average reflectance of 85% on all exposed and light reflecting surfaces. Steel components shall be prepared for finishing with a 5-step zinc phosphating process.
- C. Provide fixtures of lengths as shown on drawings. For continuous fixtures, furnish joiner plates, end plates and all required fittings.

2.04 LAMPS

- A. Lamp each fixture with the suitable lamp cataloged for the specific fixture type and as indicated as manufactured by General Electric, Osram/Sylvania, Philips or approved equal.
- B. Fluorescent lamps, F32T8/TL835 for general use with other types as required by the fixture specified. CRI minimum 85, color 3500 K.

- C. Provide shop drawing documentation on all lamps being utilized on project. Information shall include but not limited to wattage, CRI, lamp life, color and manufacturer.

2.05 BALLASTS

- A. Fluorescent
 - 1. Electronic ballasts (<10% THD) shall be manufactured by Advance, GE, Osram / Sylvania or Universal. Provide documentation at time of shop drawings for all ballasts utilized on project.

2.06 FLUORESCENT BATTERY BACKUP BALLASTS

- A. Fluorescent Battery backups ballasts for luminaires with T8 or T5 lamps will have a minimum initial output of 1100 lumens. Lithonia PS1100, Bodine, Iota, or approved substitute.
- B. Fluorescent Battery backups ballasts for luminaires with compact fluorescent lamps will have a minimum initial output of 500 lumens. Lithonia PSDL series, Bodine, Iota, or approved substitute.

2.07 POLES AND BASES

- A. Each pole shall have adequate strength and rigidity to withstand wind rating at site, not less than 100 mph winds without damage to the poles and attached fixtures and lamps. Pole bases shall be equipped with handholes with matching covers, and base bolt covers.
- B. Anchor bolts shall be hot-dip galvanized after fabrication and threads cleared. Nuts, washers, and other hardware and fittings shall be corrosion resistant alloy material of adequate strength. Unless otherwise indicated, indicated pole heights are above the top of the concrete base.
- C. Provide reinforced concrete base for all poles and bollards as indicated on drawings. If not shown on drawings, submit detail indicating base. Provide unreinforced concrete base for ground-mounted/stanchion-mounted landscape or floodlight fixtures.

2.08 LIGHTING LUMINAIRE SCHEDULE

- A. See Drawings.

PART 3 GENERAL

3.01 INSTALLATION

- A. Determine ceiling types in each area and provide suitable mounting frames where required for recessed fixtures.

- B. Fixtures shall be left clean at the time of acceptance of the work with every lamp in operation. If fixtures are deemed dirty by the Architect at completion of the project, the Contractor shall clean them at no additional cost to the Owner.
- C. Fixtures shall be carefully aligned, leveled in straight lines, and located as shown on the architectural reflected ceiling plan. The final decision as to adequacy of support and alignment, shall be given by the Architect. The fixtures shall be supported by separate means from the building structure per applicable seismic requirements and not from the ceiling system, ductwork, piping or other systems.
- D. Fixtures shall be aimed or installed to provide the lighting pattern for which the fixture is designed.
- E. Fixtures recessed into fire-rated ceiling assemblies shall include system maintaining such rating around fixture.
- F. Fixtures located in Mechanical rooms and storage/utility rooms to be coordinated with duct work, piping and structural members. Adjust stems as required for proper illumination of the area.
- G. Set poles straight and plumb and grout around pole base as required.

3.02 WIRING

- A. Recessed fixtures served from a junction box above the ceiling may be connected with 3/8-inch flex, 2 No. 18. Provide 3 No. 18 wires where dual circuiting is called for. Provide ground continuity.

END OF SECTION

SECTION 27 05 28

PATHWAYS FOR COMMUNICATIONS SYSTEMS

(This section not prepared by Mackenzie. This section is solely the product of System Design Consultants, Inc.)

PART 1 GENERAL

1.01 DESCRIPTION

- A. Work included: Provide a concealed raceway system, including raceways, outlet boxes, pull boxes, backboards sleeves, power outlets as shown and specified for the following limited power or communication systems. Provide raceway from each outlet shown for the following systems to roof structure, or an accessible location above a removable ceiling. Cables will be run horizontal at roof structure. Devices, wiring and installation of equipment shall be "Furnished by Owner, Installed by Owner".
1. Telephone
 2. Data
 3. Telephone/Data
 4. Cable TV

1.02 RELATED WORK

- A. Section 26 00 00: General Provisions
- B. Section 26 05 00: Basic Materials and Methods
- C. Section 26 05 33: Conduits, Raceways, Boxes and Fittings

1.03 SUBMITTALS

- A. Product Data.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. OUTLET BOXES: Bowes, Raco.

2.02 MATERIALS

- A. Minimum raceway size shall be 1-1/4" unless otherwise noted. Raceways shall be EMT unless otherwise noted and shall be installed with a minimum of bends. Bends where used, shall have 12" minimum radius. Raceways exceeding 100 feet or having more than two right angle bends shall have a pullbox in an accessible location approximately in the center of the run.
- B. All free raceway ends shall have plastic bushings.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Outlets and finish plates to be installed plumb with building lines.
- B. Provide pull string in all raceways.
- C. Finish plates will not to be installed until final painting is complete. Scratched or splattered finish plates and devices will not be accepted.
- D. Wall mounted outlets shall be installed vertically at centerline height shown on the Drawings.
- E. Provide blank cover plates for all outlets not utilized, coordinate with system installer.

3.02 OUTLETS

- A. Provide minimum of 1 1/4-inch conduit or size as shown on drawings for combination data and telephone outlets. Provide with pull string, 4 square junction box, double gang mud ring and plate as required, plates to match receptacle plates in style and quality. Provide insulated bushing at end of conduits and route all raceways roof structure or to an accessible ceiling space, maintain 12-inch clearance from cable trays.

END OF SECTION

SECTION 31 10 00**SITE CLEARING****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Clearing and protection of vegetation.
- B. Removal of existing debris.

1.02 RELATED REQUIREMENTS

- A. Division 1 - General Requirements

PART 2 PRODUCTS -- NOT USED**PART 3 EXECUTION****3.01 SITE CLEARING**

- A. Minimize production of dust due to clearing operations; do not use water if that will result in ice, flooding, sedimentation of public waterways or storm sewers, or other pollution.

3.02 EXISTING UTILITIES AND BUILT ELEMENTS

- A. Coordinate work with University and utility companies; notify before starting work and comply with their requirements; obtain required permits.
- B. Protect existing utilities to remain from damage.
- C. Do not disrupt utilities without approvals from authority having jurisdiction.
- D. Protect existing surfaces, structures and other elements that are not to be removed.

3.03 VEGETATION

- A. Scope: Remove trees, shrubs, brush, and stumps in areas to be covered by building structure, paving, playing fields, lawns, and planting beds.
- B. Do not remove or damage vegetation beyond the limits indicated on drawings.
- C. Install substantial, highly visible fences at least 3 feet high to prevent inadvertent damage to vegetation to remain:
 - 1. At vegetation removal limits.
- D. Restoration: If vegetation outside removal limits or within specified protective fences is damaged or destroyed due to subsequent construction operations, replace at no cost to Owner.

3.04 DEBRIS

- A. Remove debris, junk, and trash from site.
- B. Leave site in clean condition, ready for subsequent work.
- C. Clean up spillage and wind-blown debris from public and private lands.

END OF SECTION

SECTION 31 22 00**GRADING****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Rough grading the site for site structures.
- B. Finish grading.

1.02 RELATED REQUIREMENTS

- A. Division 1 - General Requirements

PART 2 PRODUCTS - NOT USED**PART 3 EXECUTION****3.01 EXAMINATION**

- A. Verify that survey bench mark and intended elevations for the Work are as indicated.
- B. Verify the absence of standing or ponding water.

3.02 PREPARATION

- A. Identify required lines, levels, contours, and datum.
- B. Stake and flag locations of known utilities.
- C. Locate, identify, and protect from damage above- and below-grade utilities to remain.
- D. Provide temporary means and methods to remove all standing or ponding water from areas prior to grading.
- E. Protect site features to remain, including but not limited to bench marks, survey control points, existing structures, fences, sidewalks, paving, and curbs, from damage by grading equipment and vehicular traffic.

3.03 ROUGH GRADING

- A. Remove subsoil from areas to be further excavated, re-landscaped, or re-graded.
- B. Do not remove wet subsoil, unless it is subsequently processed to obtain optimum moisture content.
- C. When excavating through roots, perform work by hand and cut roots with sharp axe.
- D. Stability: Replace damaged or displaced subsoil to same requirements as for specified fill.
- E. Remove and replace soils deemed unsuitable by classification and which are excessively moist due to lack surface water control.

3.04 FINISH GRADING

- A. Before Finish Grading:
 - 1. Verify building and trench backfilling have been observed by Owner representative.
 - 2. Verify subgrade has been contoured and compacted.
- B. Remove debris, roots, branches, stones, in excess of 1/2 inch in size. Remove soil contaminated with petroleum products.
- C. In areas where vehicles or equipment have compacted soil outside any building footprint, scarify surface to depth of 3 inches.
- D. Fine grade topsoil to eliminate uneven areas and low spots. Maintain profiles and contour of subgrade.

- E. Maintain stability of topsoil during inclement weather. Replace topsoil in areas where surface water has eroded thickness below specifications.

3.05 REPAIR AND RESTORATION

- A. Existing Facilities, Utilities, and Site Features to Remain: If damaged due to this work, repair or replace to original condition.

3.06 CLEANING

- A. Remove unused stockpiled topsoil. Grade stockpile area to prevent standing water.
- B. Leave site clean and raked, ready to receive landscaping.

END OF SECTION

SECTION 32 11 23
AGGREGATE BASE COURSES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Paving aggregates.

1.02 RELATED REQUIREMENTS

- A. Section 31 22 00 - Grading: Preparation of site for base course.
- B. Division 1 - General Requirements

PART 2 PRODUCTS

2.01 MATERIALS

- A. Crushed Stone Filler, Bedding, Base and Subbase for Paving:
 - 1. Per geotechnical recommendations and stated standards within.

2.02 SOURCE QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements, for general requirements for testing and analysis of aggregate materials.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that survey bench marks and intended elevations for the work are as indicated.
- B. Verify substrate has been inspected, gradients and elevations are correct, and is dry.

3.02 PREPARATION

- A. Correct irregularities in substrate gradient and elevation by scarifying, reshaping, and re-compacting.
- B. Do not place aggregate on soft, muddy, or frozen surfaces.

3.03 INSTALLATION

- A. Place aggregate in maximum 4 inch layers and roller compact to specified density.
- B. Level and contour surfaces to elevations and gradients indicated.
- C. Add small quantities of fine aggregate to coarse aggregate as appropriate to assist compaction.
- D. Add water to assist compaction. If excess water is apparent, remove aggregate and aerate to reduce moisture content.
- E. Use mechanical tamping equipment in areas inaccessible to compaction equipment. Compact all areas equally within field, edges and corners to uniform density. Differential settling due to uneven, non-uniform compaction shall not be acceptable.

3.04 FIELD QUALITY CONTROL

- A. Compaction density testing will be performed on compacted aggregate base course by Contractor in accordance with ASTM D1556, ASTM D2167, or ASTM D6938.
- B. If tests indicate work does not meet specified requirements, remove work, replace and retest.

3.05 CLEANING

- A. Remove unused stockpiled materials, leave area in a clean and neat condition.

END OF SECTION

SECTION 32 13 13
CONCRETE PAVING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Concrete sidewalks and integral curbs.

1.02 RELATED REQUIREMENTS

- A. Section 03 30 00 - Cast-in-Place Concrete.
- B. Section 31 22 00 - Grading: Preparation of site for paving and base and preparation of subsoil at pavement perimeter for planting.
- C. Section 32 11 23 - Aggregate Base Courses: Concrete paving base rock.
- D. Division 1 - General Requirements

1.03 REFERENCE STANDARDS

- A. ACI 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete; 2000.
- B. ACI 305R - Hot Weather Concreting; 2010.
- C. ACI 306R - Cold Weather Concreting; 2010.
- D. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types); 2004 (Reapproved 2013).
- E. ASTM D1752 - Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction; 2004a (Reapproved 2013).

PART 2 PRODUCTS

2.01 PAVING ASSEMBLIES

- A. Concrete Sidewalks: 3,000 psi 28 day concrete, 4 inches thick, buff color Portland cement, exposed aggregate finish.

2.02 FORM MATERIALS

- A. Joint Filler: Preformed; non-extruding bituminous type (ASTM D1751) or sponge rubber or cork (ASTM D1752).

2.03 CONCRETE MATERIALS

- A. Concrete Materials: As specified in Section 03 30 00.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify compacted subgrade is acceptable and ready to support paving and imposed loads.
- B. Verify gradients and elevations of base are correct.

3.02 SUBBASE

- A. See Section 32 11 23 for construction of base course for work of this Section.

3.03 PREPARATION

- A. Moisten base to minimize absorption of water from fresh concrete.
- B. Notify Architect minimum 24 hours prior to commencement of concreting operations.

3.04 FORMING

- A. Place and secure forms to correct location, dimension, profile, and gradient.

3.05 COLD AND HOT WEATHER CONCRETING

- A. Follow recommendations of ACI 305R when concreting during hot weather.
- B. Follow recommendations of ACI 306R when concreting during cold weather.
- C. Do not place concrete when base surface temperature is less than 40 degrees F, or surface is wet or frozen.

3.06 PLACING CONCRETE

- A. Place concrete in accordance with ACI 304R.
- B. Place concrete continuously over the full width of the panel and between predetermined construction joints. Do not break or interrupt successive pours such that cold joints occur.

3.07 JOINTS

- A. Place 3/8 inch wide expansion joints at 20 foot intervals and to separate paving from vertical surfaces and other components and in pattern indicated.
 - 1. Secure to resist movement by wet concrete.
- B. Provide scored joints.
 - 1. At 6 feet intervals.
- C. Saw cut contraction joints 3/8 inch wide at an optimum time after finishing. Cut 1/4 into depth of slab.

3.08 FINISHING

- A. Sidewalk Paving: Light broom, texture perpendicular to direction of travel with troweled and radiused edge 1/4 inch radius.

3.09 TOLERANCES

- A. Maximum Variation of Surface Flatness: 1/4 inch in 10 ft.

3.10 PROTECTION

- A. Immediately after placement, protect pavement from premature drying, excessive hot or cold temperatures, and mechanical injury.
- B. Do not permit pedestrian traffic over pavement for 7 days minimum after finishing.

END OF SECTION

SECTION 32 31 13
CHAIN LINK FENCES AND GATES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Posts, rails, and frames.
- B. Wire fabric.
- C. Concrete.
- D. Manual gates with related hardware.
- E. Accessories.

1.02 RELATED REQUIREMENTS

- A. Section 03 30 00 - Cast-in-Place Concrete: Concrete anchorage for posts.

1.03 REFERENCE STANDARDS

- A. ASTM A428/A428M - Standard Test Method for Weight (Mass) of Coating on Aluminum-Coated Iron or Steel Articles; 2010 (Reapproved 2014).
- B. ASTM F567 - Standard Practice for Installation of Chain-Link Fence; 2011.
- C. CLFMI CLF-FIG0111 - Field Inspection Guide; 2014.
- D. CLFMI CLF-PM0610 - Product Manual; 2017.

1.04 SUBMITTALS

- A. Product Data: Provide data on fabric, posts, accessories, fittings and hardware.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Chain Link Fences and Gates:
 - 1. Master-Halco, Inc; _____: www.masterhalco.com/#sle.
 - 2. Merchants Metals; _____: www.merchantsmetals.com/#sle.
 - 3. Substitutions: See Section 01 25 00

2.02 COMPONENTS

- A. Line Posts: 1.9 inch diameter.
- B. Corner and Terminal Posts: 2.38 inch diameter.
- C. Gate Posts: 3-1/2 inch diameter.
- D. Gate Frame: 1.66 inch diameter for welded fabrication.
- E. Fabric: 2 inch diamond mesh interwoven wire, 6 gage, 0.1920 inch thick, top selvage knuckle end closed, bottom selvage twisted tight.

2.03 MANUAL GATES AND RELATED HARDWARE

- A. Hardware for Single Swinging Gates: 180 degree hinges, 2 for gates up to 60 inches high, 3 for taller gates; fork latch with gravity drop and padlock hasp; keeper to hold gate in fully open position.
- B. Hinges: Finished to match fence components.

- C. Latches: Finished to match fence components.

2.04 FINISHES

- A. Components (Other than Fabric): Aluminum coated at 0.40 ounces per square foot, when measured in accordance with ASTM A428/A428M.
- B. Accessories: Same finish as framing.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install framework, fabric, accessories and gates in accordance with ASTM F567.
- B. Place fabric on outside of posts and rails, fabric facing field of play.
- C. Line Post Footing Depth Below Finish Grade: ASTM F567.
- D. Corner, Gate and Terminal Post Footing Depth Below Finish Grade: ASTM F567.
- E. Provide top rail through line post tops and splice with 6 inch long rail sleeves.
- F. Do not stretch fabric until concrete foundation has cured 28 days.
- G. Stretch fabric between terminal posts or at intervals of 100 feet maximum, whichever is less.
- H. Position bottom of fabric 2 inches above finished grade.
- I. Fasten fabric to top rail, line posts, braces, and bottom tension wire with tie wire at maximum 15 inches on centers.
- J. Attach fabric to end, corner, and gate posts with tension bars and tension bar clips.

3.02 FIELD QUALITY CONTROL

- A. Layout: Verify that fence installation markings are accurate to design, paying attention to gate locations, underground utilities, and property lines.
- B. Gates: Inspect for level, plumb, and alignment.
- C. Workmanship: Verify neat installation free of defects. See CLFMI CLF-FIG0111 for field inspection guidance.

3.03 CLEANING

- A. Clean jobsite of excess materials; scatter excess material from post hole excavations uniformly away from posts. Remove excess material if required.
- B. Clean fence with mild household detergent and clean water rinse well.
- C. Touch up scratched surfaces using materials recommended by manufacturer. Match touched-up paint color to factory-applied finish.

END OF SECTION

SECTION 33 31 13
SITE SANITARY SEWERAGE GRAVITY PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Sanitary sewerage drainage piping, fittings, and accessories.
- B. Connection of building sanitary drainage system to municipal sewers.

1.02 RELATED REQUIREMENTS

- A. Section 31 23 16 - Excavation: Excavating of trenches.

1.03 REFERENCE STANDARDS

- A. ASTM D1785 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120; 2015.
- B. ASTM D2321 - Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications; 2014.
- C. ASTM D3034 - Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings; 2015.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

PART 2 PRODUCTS

2.01 SEWER PIPE MATERIALS

- A. Provide products that comply with applicable code(s).
- B. Plastic Pipe: ASTM D3034, Type PSM, Poly(Vinyl Chloride) (PVC) material; inside nominal diameter of ____ inches, bell and spigot style solvent sealed joint end.
- C. Fittings: Same material as pipe molded or formed to suit pipe size and end design, in required tee, bends, elbows, cleanouts, reducers, traps and other configurations required.

2.02 PIPE ACCESSORIES

- A. Trace Wire: Magnetic detectable conductor, clear plastic covering, imprinted with "Sewer Service" in large letters.

2.03 CLEANOUT MANHOLE

- A. Lid and Frame: Cast iron construction, hinged lid.

2.04 BEDDING AND COVER MATERIALS

- A. Pipe Bedding Material: As specified in Section 31 23 23.
- B. Pipe Cover Material: As specified in Section 31 23 23.

PART 3 EXECUTION

3.01 GENERAL

- A. Perform work in accordance with applicable code(s).

3.02 TRENCHING

- A. See Section 31 23 16.13 for additional requirements.
- B. Hand trim excavation for accurate placement of pipe to elevations indicated.
- C. Backfill around sides and to top of pipe with cover fill, tamp in place and compact, then complete backfilling.

3.03 INSTALLATION - PIPE

- A. Install pipe, fittings, and accessories in accordance with manufacturer's instructions. Seal watertight.
 - 1. Plastic Pipe: Also comply with ASTM D2321.
- B. Lay pipe to slope gradients noted on layout drawings; with maximum variation from true slope of 1/8 inch in 10 feet.
- C. Connect to building sanitary sewer outlet and municipal sewer system, through installed sleeves.
- D. Install trace wire 6 inches above top of pipe; coordinate with Section 31 23 16.13.

3.04 INSTALLATION - CLEANOUTS

- A. Form bottom of excavation clean and smooth to correct elevation.
- B. Form and place cast-in-place concrete base pad, with provision for sanitary sewer pipe end sections.
- C. Establish elevations and pipe inverts for inlets and outlets as indicated.
- D. Mount lid and frame level in grout, secured to top cone section to elevation indicated.

3.05 PROTECTION

- A. Protect pipe and bedding cover from damage or displacement until backfilling operation is in progress.

END OF SECTION

SECTION 33 42 11
STORMWATER GRAVITY PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Storm drainage piping, fittings, and accessories.

1.02 RELATED REQUIREMENTS

- A. Section 31 23 16 - Excavation: Excavating of trenches.

1.03 DEFINITIONS

- A. Bedding: Fill placed under, beside and directly over pipe, prior to subsequent backfill operations.

1.04 REFERENCE STANDARDS

- A. ASTM D1785 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120; 2015.
- B. ASTM D3034 - Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings; 2015.

PART 2 PRODUCTS

2.01 REGULATORY REQUIREMENTS

- A. Conform to applicable code for materials and installation of the Work of this section.

2.02 SEWER PIPE MATERIALS

- A. Provide products that comply with applicable code(s).

2.03 PIPE ACCESSORIES

- A. Fittings: Same material as pipe molded or formed to suit pipe size and end design, in required tee, bends, elbows, cleanouts, reducers, traps and other configurations required.
- B. Trace Wire: Magnetic detectable conductor, clear plastic covering, imprinted with "Storm Sewer Service " in large letters.

PART 3 EXECUTION

3.01 TRENCHING

- A. See Section 31 23 16.13 - Trenching for additional requirements.
- B. Backfill around sides and to top of pipe with cover fill, tamp in place and compact, then complete backfilling.

3.02 INSTALLATION - PIPE

- A. Verify that trench cut is ready to receive work and excavations, dimensions, and elevations are as indicated on layout drawings.
- B. Install pipe, fittings, and accessories in accordance with manufacturer's instructions. Seal watertight.
- C. Lay pipe to slope gradients noted on layout drawings; with maximum variation from true slope of 1/8 inch in 10 feet.

- D. Connect to building storm drainage system, foundation drainage system, and utility/municipal sewer system.
- E. Install continuous trace wire 6 inches above top of pipe; coordinate with Section 31 23 16.13.

3.03 FIELD QUALITY CONTROL

- A. Perform field inspection in accordance with Section 01 40 00 - Quality Requirements.

3.04 PROTECTION

- A. Protect pipe and bedding cover from damage or displacement until backfilling operation is in progress.

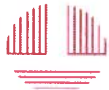
END OF SECTION

EXHIBIT H

Plans are available at the following link:

<https://oregonstate.box.com/s/vh608qznhc8wcve4z7f56jw5ngwbp6x>

EXHIBIT I



Date: February 21, 2018
To: Rick Freeman
OSU Capital Planning and Development
Oregon State University
From: William L. Nickels, Jr., P.E., G.E.
Tony Rikli, P.E.
Subject: Geotechnical Investigation
Project: OSU Softball Complex – Field Lighting
Project 2181011



Foundation Engineering, Inc. has completed the required geotechnical services for the addition of field lighting to the existing softball complex on the Oregon State University (OSU) Campus in Corvallis, Oregon. A discussion of the analysis and design, and construction recommendations are provided below.

BACKGROUND

OSU plans to install six light piles at the OSU Softball Complex in Corvallis. The light poles will be supported on 36-inch diameter drilled shaft foundations. The project location is shown on the Vicinity Map (Figure 1A, Appendix A).

OSU is the project owner and Musco Lighting is the lighting consultant. Foundation Engineering, Inc. was retained by OSU as the geotechnical consultant. Details of our scope of work were provided in a proposal dated January 30, 2018, and authorized by Supplement No. OSU-254-P-17-25, dated February 7, 2018.

DISCUSSION OF EXISTING SUBSURFACE CONDITIONS

Existing Subsurface Information

Due to the fast-track project schedule, drilling could not be integrated into the geotechnical work in a timely manner. Therefore, we have relied on subsurface information from the Whyte Track and Field Center – Phase 2 project, completed in 2015. In addition, we reviewed a boring completed by others for the adjacent Hilton Garden Inn Hotel.

Foundation Engineering Boring BH-8B completed for the track and field project was located just across the softball outfield fence. A boring completed for the adjacent hotel was located at the north end of the hotel. The subsurface information reported in the hotel boring is consistent with the information encountered in BH-8B. Therefore, BH-8B was used to represent the soil profile for the new light poles. A brief discussion of the conditions encountered in BH-8B is provide below. The boring log is provided in Appendix B.

Subsurface Conditions

A general discussion of the soil units encountered in the boring is provided below. Additional boring details are provided on the appended log.

Topsoil. Topsoil/fill consisting of soft to medium stiff, medium plasticity silt and clay extends below the ground surface to a depth of ± 4 feet.

Fine-Grained Alluvium. Fine-grained alluvium consisting of silt, clay and sandy silt extends below the fill to a depth of ± 16 feet. The silt and clay are predominately medium stiff to stiff and have medium to high plasticity. The sandy silt has low plasticity and is very soft.

Coarse-Grained Alluvium. Coarse-grained alluvium consisting of loose silty sand extends to ± 23 feet, followed by medium dense sand and very dense sandy gravel to 26.5 feet, the limits of the exploration.

Ground Water

BH-8B was completed using a solid-stem auger, thus allowing an estimate of the ground water level in the boring at the time of drilling. The water level was reported a depth of 5 feet on February 19, 2015.

LIGHT POLE FOUNDATIONS

New light poles are planned behind left field, right field, first and third baseline bullpens and behind each dugout. The light pole type, location, and base reactions provided by Musco Lighting are provided in Table 1.

Table 1. Light Pole Type, Location and Base Reactions

Pole Location	Field Location	Axial (kips)	Shear (kips)	Moment (kip-ft)
A1	Behind Third Base Dugout	3.5	2.4	128
A2	Behind First Base Dugout	3.5	2.4	128
B1	Behind Third Base Bull Pen	4.6	3.1	171
B2	Behind First Base Bull Pen	4.6	3.1	171
C1	Behind Left Field Fence	3.6	2.3	108
C2	Behind Right Field Fence	3.4	2.2	98.9

Note: Maximum base reactions are unfactored and provided by Musco Lighting.

Lateral Analysis. LPile was selected to verify the deflection at the top of the drilled shaft. The design criteria uses a maximum deflection of 0.5 inches, when subjected to the base reactions in Table 1. The soil profile of BH-8B was used for the analysis of the new pole foundations. The estimated top and base deflections, and the corresponding shaft lengths for the light poles are summarized in Table 2.

Table 2. LPile Deflection Summary

Pole Location	Drilled Shaft Diameter (inches) ¹	Drilled Shaft Length (feet)	Top Deflection (inches)	Base Deflection (inches)
A1	36	15.0	0.10	-0.03
A2	36	15.0	0.10	-0.03
B1	36	15.0	0.30	-0.09
B2	36	15.0	0.30	-0.09
C1	36	15.0	0.07	-0.02
C2	36	15.0	0.05	-0.01

Note: Negative base deflection indicates deflection opposite the top deflection.

Axial Capacity. Foundation analysis and design for drilled shafts were completed in general accordance with the design methods presented in Drilled Shafts: Construction Procedures and LRFD Design Methods prepared by Federal Highway Administration (FHWA) (2010). The following assumptions and design criteria were applied to the drilled shaft analysis:

- Borehole completion and drilled shaft construction will follow construction techniques and procedures outlined by FHWA (2010) and the Oregon Department of Transportation (ODOT) Standard Specifications for Construction (2018).
- A temporary casing may be required at some locations to maintain the stability of the excavation. Permanent casing shall not be allowed.
- No axial capacity was accounted for in the upper 5 feet of the soil profile.
- Static water table at 4 feet below the ground surface.
- The concrete will have an 8½-inch slump ($\pm 1\frac{1}{2}$ in.).

The axial resistance provided by the soil must be sufficient to resist the axial loads in Table 1 and the weight of the drilled shaft (± 16 kips). Using the soil profile from BH-8B, our analysis indicated the soils will provide the required axial resistance with a factor of safety greater than 2.5.

CONSTRUCTION RECOMMENDATIONS

All specifications pertaining to drilled shaft construction for the light poles refer to the ODOT Standard Specifications for Construction (2018).

Individual shafts for light pole supports should be monitored throughout construction by a representative of Foundation Engineering to provide QA/QC during drilling and concrete placement. The specifications for drilled shaft construction should follow the requirements of ODOT's Section 00963, supplemented by Section 00512 and the FHWA (2010) manual for Construction Procedures and LRFD Design Methods for Drilled Shafts. The two referenced ODOT sections are available in Portable Document Format (PDF) on-line at:

http://www.oregon.gov/ODOT/Business/Documents/2018_STANDARD_SPECIFICATIONS.pdf

Additional specifications, as referenced from ODOT (2018) Section 00963 and ODOT (2018) Section 00512 may also be found and printed from the above-referenced address.

General Recommendations.

The shafts should be constructed using the above-referenced specifications. Several key specifications and additional information are highlighted below:

1. Personnel Qualifications and a Drilled Shaft Installation Plan are required as part of the contractor submittals (Section 00963.30 and Section 00963.40).
2. Crosshole Sonic Logging (CSL) tubes are not required.
3. A temporary casing may be installed as required to maintain sidewall stability during construction. However, permanent casing will not be allowed.
4. Drilling slurries meeting the requirements of Section 00512.14 may be used, if required to maintain sidewall stability.
5. Wet shaft concrete placement should be anticipated.
6. For wet concrete placement, casing removal must be in a manner that will not decrease the minimum 5 feet of concrete head above the tip of the tremie or breach the tremie from the concrete. The free fall of concrete through water will result in a rejected shaft until a mitigation plan is proposed and successfully implemented.
7. Tremie and coupler diameter for placement of concrete below water should pass freely between the rebar cage and precast mandrel.
8. Tolerances for horizontal position of the pole foundations should be provided by Musco.

9. The drilled shaft excavation shall be approved by a Foundation Engineering Representative prior to the placement of rebar and concrete.

DESIGN REVIEW/CONSTRUCTION OBSERVATION/TESTING

We should be provided the opportunity to review all drawings and specifications that pertain to drilled shaft construction. Foundation excavation for the light poles will require field confirmation of the subsurface conditions in accordance with recommendations provided herein. We recommend that we be retained to provide the necessary construction observations.

VARIATION OF SUBSURFACE CONDITIONS, USE OF THIS REPORT, AND WARRANTY

The analyses, conclusions and recommendations contained herein are based on the assumption that the soil information from the Whyte Track and Field – Phase 2 project are representative of the overall site conditions at the softball complex. The above recommendations assume that we will have the opportunity to review final drawings and be present during construction to confirm the assumed foundation conditions. No changes in the enclosed recommendations should be made without our approval. We will assume no responsibility or liability for any engineering judgment, inspection or testing performed by others.

This report was prepared for the exclusive use of Oregon State University (Capital Planning and Development) and their design consultants for the Softball Complex Lighting project in Corvallis, Oregon. Information contained herein should not be used for other sites or for unanticipated construction without our written consent. This report is intended for planning and design purposes. Contractors using this information to estimate construction quantities or costs do so at their own risk. Our services do not include any survey or assessment of potential surface contamination or contamination of the soil or ground water by hazardous or toxic materials. We assume that those services, if needed, have been completed by others.

Our work was done in accordance with generally accepted soil and foundation engineering practices. No other warranty, expressed or implied, is made.

REFERENCES

FHWA, 2010, Drilled Shafts: Construction Procedures and LRFD Design Methods, 2010 Publication No. FHWA-NHI-10-016.

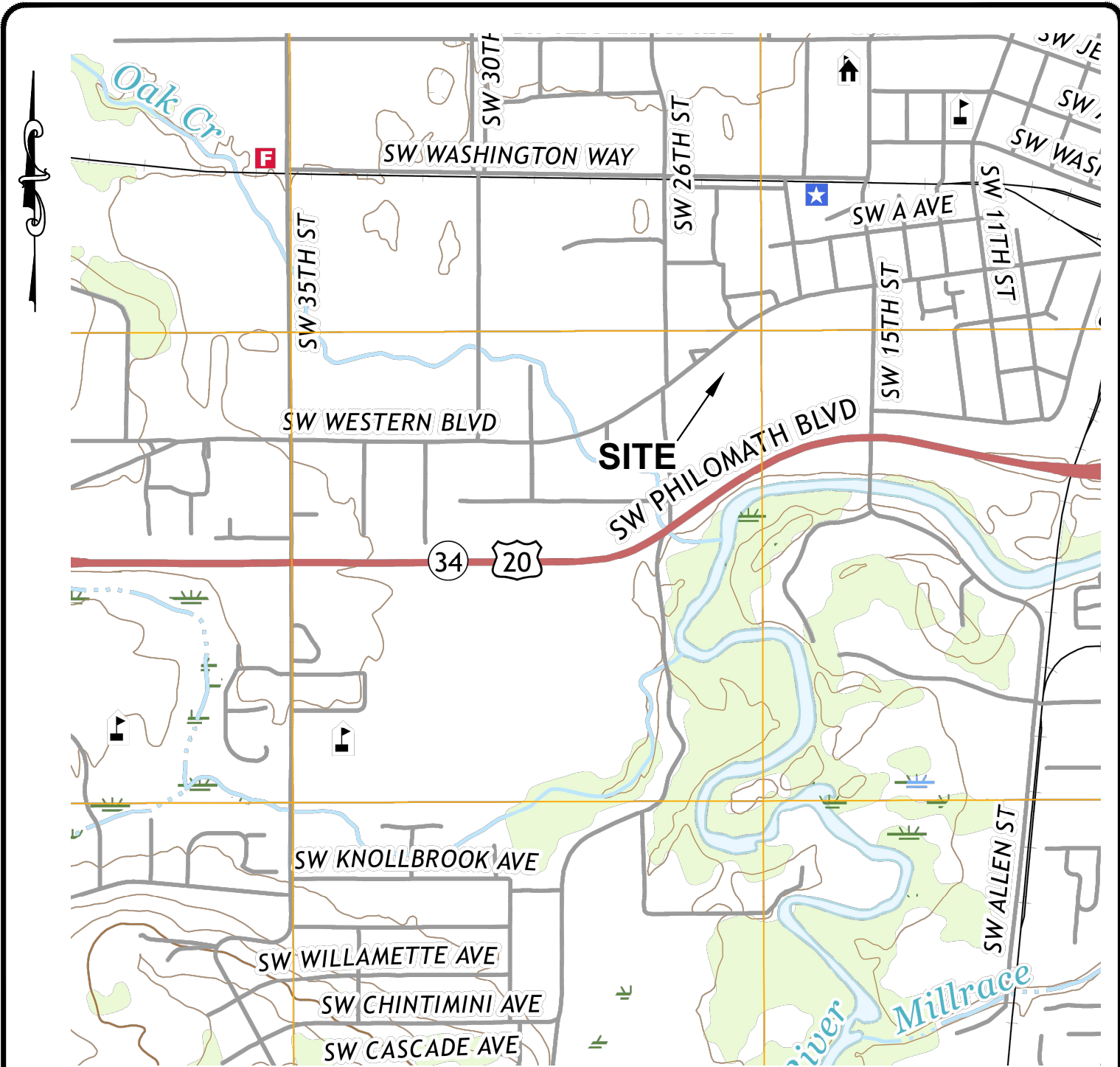
Foundation Engineering, Inc. 2015, Whyte Track and Field Center – Phase 2, Corvallis, Oregon. Provided to Oregon State University.

ODOT, 2018, Oregon Standard Specifications for Construction, 2018, Oregon Department of Transportation (ODOT).

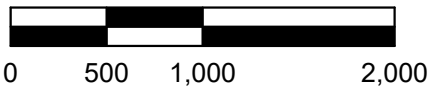


Appendix A

Figure



SCALE IN FEET



DATE FEB. 2018
 DWN. mlm
 APPR. _____
 REVIS. _____
 PROJECT NO.
 2181011

FOUNDATION ENGINEERING INC.
 PROFESSIONAL GEOTECHNICAL SERVICES

820 NW CORNELL AVENUE
 CORVALLIS, OR 97330-4517
 BUS. (541) 757-7845 FAX (541) 757-7850

VICINITY MAP

OSU SOFTBALL COMPLEX LIGHTING
 CORVALLIS, OREGON

FIGURE NO.
1A



Appendix B

Boring Log

DISTINCTION BETWEEN FIELD LOGS AND FINAL LOGS

A field log is prepared for each boring or test pit by our field representative. The log contains information concerning sampling depths and the presence of various materials such as gravel, cobbles, and fill, and observations of ground water. It also contains our interpretation of the soil conditions between samples. The final logs presented in this report represent our interpretation of the contents of the field logs and the results of the sample examinations and laboratory test results. Our recommendations are based on the contents of the final logs and the information contained therein and not on the field logs.

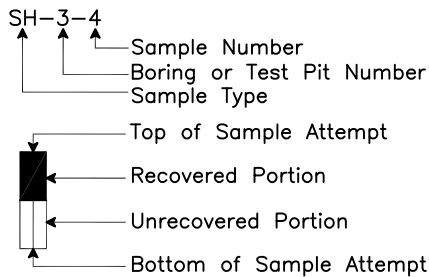
VARIATION IN SOILS BETWEEN TEST PITS AND BORINGS

The final log and related information depict subsurface conditions only at the specific location and on the date indicated. Those using the information contained herein should be aware that soil conditions at other locations or on other dates may differ. Actual foundation or subgrade conditions should be confirmed by us during construction.

TRANSITION BETWEEN SOIL OR ROCK TYPES

The lines designating the interface between soil, fill or rock on the final logs and on subsurface profiles presented in the report are determined by interpolation and are therefore approximate. The transition between the materials may be abrupt or gradual. Only at boring or test pit locations should profiles be considered as reasonably accurate and then only to the degree implied by the notes thereon.

SAMPLE OR TEST SYMBOLS



- S - Grab Sample
- SS - Standard Penetration Test Sample (split-spoon)
- SH - Thin-walled Shelby Tube Sample
- C - Pavement Core Sample
- CS - Rock Core Sample

- ▲ Standard Penetration Test Resistance equals the number of blows a 140 lb. weight falling 30 in. is required to drive a standard split-spoon sampler 1 ft. Practical refusal is equal to 50 or more blows per 6 in. of sampler penetration.
- Water Content (%).

UNIFIED SOIL CLASSIFICATION SYMBOLS

- | | |
|------------|---------------------|
| G - Gravel | W - Well Graded |
| S - Sand | P - Poorly Graded |
| M - Silt | L - Low Plasticity |
| C - Clay | H - High Plasticity |
| Pt - Peat | O - Organic |

FIELD SHEAR STRENGTH TEST

Shear strength measurements on test pit side walls, blocks of soil or Shelby tube samples are typically made with Torvane or Field Vane shear devices.

TYPICAL SOIL/ROCK SYMBOLS

- | | | |
|----------|--------|-----------|
| Concrete | Sand | Basalt |
| Organics | Gravel | Sandstone |
| Clay | Silt | Siltstone |

WATER TABLE

- ▼ Water Table Location
(1/31/16) Date of Measurement

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SYMBOL KEY BORING AND TEST PIT LOGS

Explanation of Common Terms Used in Soil Descriptions

Field Identification	Cohesive Soils			Granular Soils	
	SPT*	S _u ** (tsf)	Term	SPT*	Term
Easily penetrated several inches by fist.	0 – 2	< 0.125	Very Soft	0 – 4	Very Loose
Easily penetrated several inches by thumb.	2 – 4	0.125–0.25	Soft	4 – 10	Loose
Can be penetrated several inches by thumb with moderate effort.	4 – 8	0.25 – 0.50	Medium Stiff	10 – 30	Medium Dense
Readily indented by thumb but penetrated only with great effort.	8 – 15	0.50 – 1.0	Stiff	30 – 50	Dense
Readily indented by thumbnail.	15 – 30	1.0 – 2.0	Very Stiff	> 50	Very Dense
Indented with difficulty by thumbnail.	>30	> 2.0	Hard		

* SPT N-value in blows per foot (bpf)

** Undrained shear strength

Term	Soil Moisture Field Description
Dry	Absence of moisture. Dusty. Dry to the touch.
Damp	Soil has moisture. Cohesive soils are below plastic limit and usually moldable.
Moist	Grains appear darkened, but no visible water. Silt/clay will clump. Sand will bulk. Soils are often at or near plastic limit.
Wet	Visible water on larger grain surfaces. Sand and cohesionless silt exhibit dilatancy. Cohesive soil can be readily remolded. Soil leaves wetness on the hand when squeezed. Soil is wetter than the optimum moisture content and above the plastic limit.

Term	PI	Plasticity Field Test
Non-plastic	0 – 3	Cannot be rolled into a thread at any moisture.
Low Plasticity	3 – 15	Can be rolled into a thread with some difficulty.
Medium Plasticity	15 – 30	Easily rolled into thread.
High Plasticity	> 30	Easily rolled and re-rolled into thread.

Term	Soil Structure Criteria
Stratified	Alternating layers at least ¼ inch thick.
Laminated	Alternating layers less than ¼ inch thick.
Fissured	Contains shears and partings along planes of weakness.
Slickensided	Partings appear glossy or striated.
Blocky	Breaks into small lumps that resist further breakdown.
Lensed	Contains pockets of different soils.

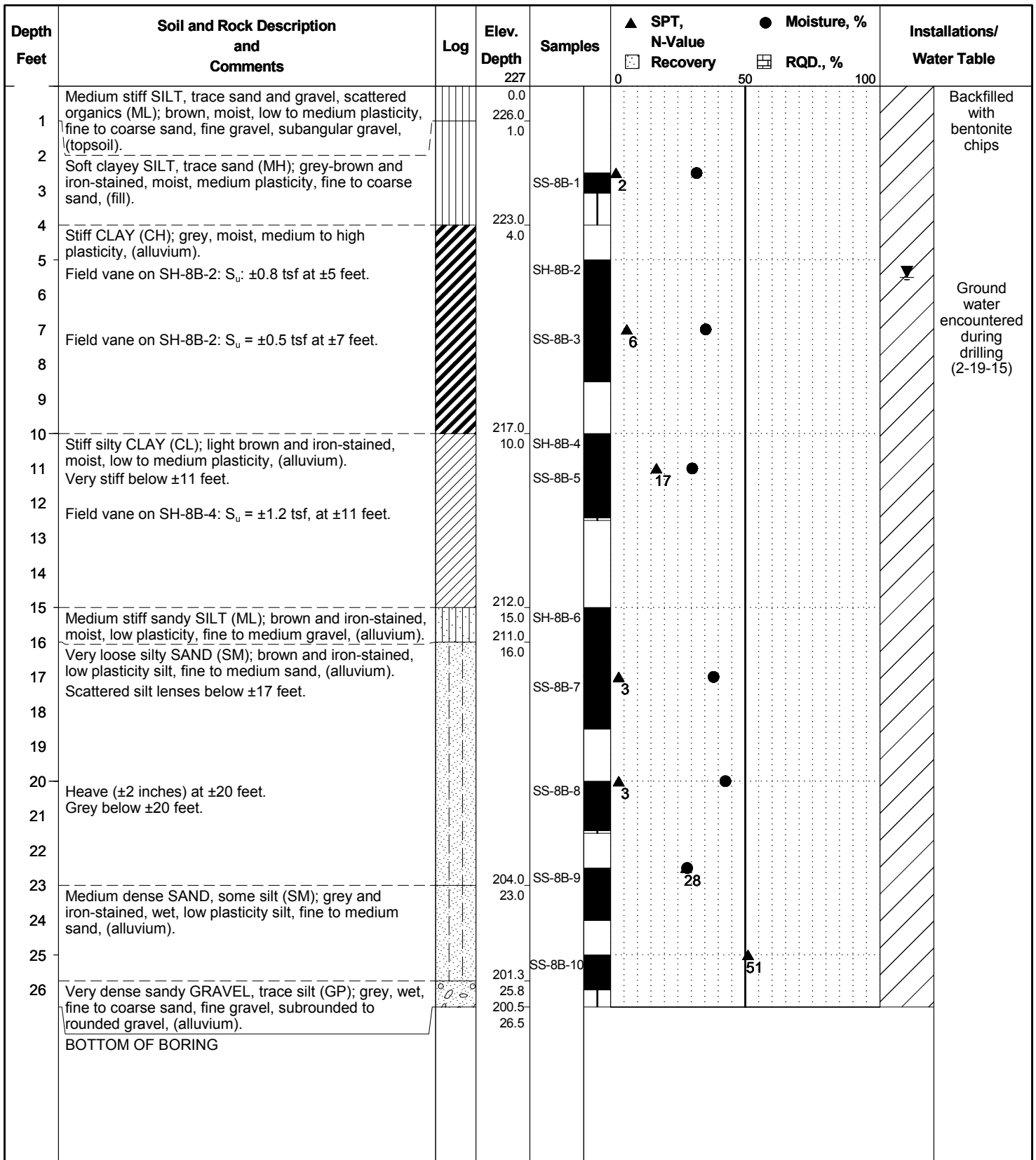
Term	Soil Cementation Criteria
Weak	Breaks under light finger pressure.
Moderate	Breaks under hard finger pressure.
Strong	Will not break with finger pressure.



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COMMON TERMS
SOIL DESCRIPTIONS



Project No.: 2151010

Surface Elevation: 227.0 feet (Approx.)

Date of Boring: February 19, 2015

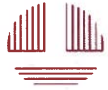
Boring Log: BH- 8B

Whyte Track and Field Center-Phase 2

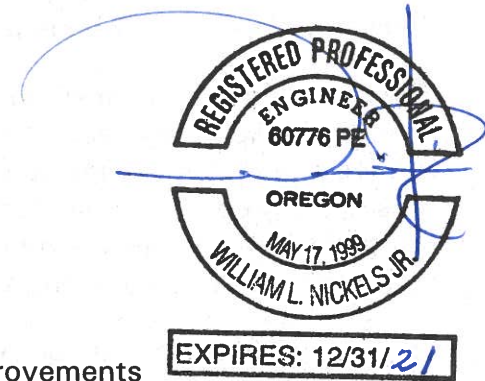
Corvallis, Oregon



Foundation Engineering, Inc.



Date: February 12, 2020
To: Dustin Sievers – Project Manager
Oregon State University
Capital Planning and Development
From: William L. Nickels, Jr., P.E., G.E.
Erin Gillaspie, P.E.
Subject: Geotechnical Investigation
Project: OSU Lorenz Soccer Field Bleacher Improvements
Project No.: 2191149



Foundation Engineering, Inc. has completed the required geotechnical services for the replacement of the existing Lorenz Soccer Field bleachers on the Oregon State University (OSU) Campus in Corvallis, Oregon. A discussion of the analysis and design and construction recommendations are provided below.

BACKGROUND

OSU plans to construct new bleachers and a press box on the west side of the existing soccer field, immediately east of the softball field. The project location is shown on the Vicinity Map (Figure 1A, Appendix A).

We understand the bleachers will be 8 to 10 rows deep and the structure will be supported on spread footings. We also understand that the area beneath the bleachers may be finished off for equipment storage. Therefore, recommendations for building pad construction and a slab-on-grade are provided.

OSU is the project owner. Foundation Engineering, Inc. was retained by OSU as the geotechnical consultant. Details of our scope of work were provided in a proposal dated November 8, 2019, and authorized by Supplement No. OSU-254-P-19-82, dated November 13, 2019.

FIELD EXPLORATION

We drilled two exploratory borings (BH-1 and BH-2) at the site to characterize the subsurface conditions within the planned building footprint. The borings were drilled at the approximate locations shown on Figure 2A (Appendix A).

The borings were completed using a Big Beaver tow-behind, trailer-mounted drill rig with solid-stem augers. We began the drilling for BH-1 on December 27, 2019, but the boring was discontinued at a depth of ± 7 feet due to equipment breakdown. Therefore, we returned to the site on January 6, 2020, to complete BH-1 and drill BH-2. Both borings extended to a maximum depth of ± 21.5 feet.

Continuous samples were obtained to a depth of ± 12.5 feet in BH-1 and to ± 5.5 feet in BH-2. Samples were then obtained at ± 2.5 -foot samples to the maximum depth of the borings.

The sampling was completed using a split-spoon sampler in conjunction with the Standard Penetration Test (SPT). The SPT, which is performed each time the sampler is driven, provides an indication of the relative stiffness or density of the foundation soils. Five relatively undisturbed samples of fine-grained soil were also obtained using thin-walled Shelby tubes. Upon completion of drilling, the borings were backfilled with bentonite chips.

The borings were continuously logged during drilling. The final logs (Appendix B) were prepared based on a review of the field logs, the laboratory test results, and an examination of the soil samples in our office. The sampling depths and SPT data for each boring are summarized on the appended logs.

DISCUSSION OF SITE CONDITIONS

Site Topography and Surface Conditions

The new bleachers will be located where several sets of smaller bleachers are located on the west side of the existing soccer field. The remainder of the flat site is covered with crushed gravel.

Subsurface Conditions

Boring surface elevations were not available at the time this memorandum was prepared.

A general discussion of the soil units encountered in the borings is presented below. A more detailed description of the subsurface conditions is provided on the appended logs.

Crushed Gravel (fill). Dense, $\frac{3}{4}$ -inch minus crushed gravel extends from the ground surface to a depth of ± 3 inches at both boring locations.

Clayey Silt (fill). Grey to grey-brown, medium plasticity clayey silt extends beneath the crushed gravel in both borings to a depth of ± 1.5 feet in BH-2 and to ± 3 feet in BH-1. The fill also contains a trace to some sand and gravel and was moist to wet and medium stiff to stiff at the time of the explorations.

Clay, Silty Clay and Clayey SILT (alluvium). Medium plasticity, moist to wet clay, silty clay and clayey was encountered below the fill to a depth of ± 21.5 feet, the limits of the exploration, in BH-1 and ± 16.5 feet in BH-2.

Sandy SILT to silty SAND (alluvium). Brown, low plasticity, wet, medium stiff sandy silt extends below the clayey silt in BH-2 to ± 19.5 feet. Blue-grey, wet, loose silty sand extends below the sandy silt to ± 21.5 feet, the limits of the exploration.

Ground Water

The borings were completed using solid-stem augers. Therefore, we were able to estimate of the ground water level in the borings at the time of drilling.

Ground water was encountered at a depth of 2 feet in BH-2 on January 6, 2020. Ground water was encountered at a depth of ± 5.5 feet in BH-1 on December 27, 2019. The borehole was then left open to equilibrate for approximately 30 minutes. During that time, the ground water level rose to a static depth of ± 3.5 feet.

LABORATORY AND FIELD TESTING

Laboratory testing included moisture contents (ASTM D2216), percent fines (ASTM D1140), and Atterberg limits tests (ASTM D4318) on selected samples to help classify the soils according to the Unified Soil Classification System (USCS) and estimate their overall engineering properties. The test results are summarized in Table 1C (Appendix C). The natural water contents are also shown on the boring logs (Appendix B).

Two bulk density tests were completed on Shelby Tube samples obtained in the upper ± 10 feet of the soil profile to determine the typical moist and dry unit weights of the respective samples. The unit weights were ± 109 lb/ft³ (pcf) and 114 pcf, typical for fine-grained soils encountered across campus. The bulk density test results are summarized in Table 2C (Appendix C).

Vane Shear Tests (ASTM D 2573-94) were also performed on Shelby tube samples obtained in the borings to estimate the undrained shear strength of the fine-grained soils at various depths. Recorded undrained shear strength (S_u) values ranged from ± 0.9 kips/ft² (ksf) to greater than 1.9 ksf. The recorded strength values are summarized in Table 3C (Appendix C) and on the appended boring logs (Appendix B).

SEISMIC CONSIDERATIONS

Seismic Response Spectrum

We assume the bleachers will be designed using the OSSC 2019, which is based on IBC 2018 and ASCE 7-16. We developed a design spectral acceleration response spectrum for the site in accordance with the Oregon Structural Specialty Code (OSSC 2019), which is based on Section 1613 of the International Building Code (IBC 2018). The design maximum considered earthquake ground motion maps in the IBC (2018) are based on modified USGS (2014) maps with a 2% probability of exceedance in 50 years (i.e., a $\pm 2,475$ -year return period).

Based on soil conditions encountered in our borings and on our previous explorations in the project vicinity, we have concluded a Site Class D (stiff soil) is appropriate for the site. When developing the design response spectrum for a Site Class D, ASCE 7-16 Section 11.4.8 requires a ground motion hazard analysis be performed in accordance with ASCE 7-16 Section 21.2 at sites where the 1.0 second spectral acceleration on rock (S_1) is greater than or equal to 0.2g. However, an exception in Section 11.4.8 stipulates a ground motion hazard analysis is not required when the seismic response coefficient C_s is calculated based on Eq. 12.8-2 for values of $T \leq 1.5T_s$ and taken as equal to 1.5 times the value computed using either Eq. 12.8-3 for $T > 1.5T_s$ or Eq. 12.8-4 for $T \geq 1.5T_L$ (where $T_s = S_{D1}/S_{Ds}$ and T_L is the long-period transition period shown on Figure 22-14 in Chapter 22). The T_L value for Oregon is 16 seconds.

The adjustment in the C_s value is intended to better model long-period spectral accelerations for softer soils coupled with strong ground motions. However, the adjustment applies only to the design of long-period structures (i.e., typically structures with a height of five stories or greater). For the current project, we anticipate the period of interest for the structure will be less than $1.5T_s$. Consequently, there is no C_s adjustment necessary when using the exception in Section 11.4.8. Therefore, we developed the site response spectrum shown on Figure 3A (Appendix A) using the mapped risk-targeted maximum considered earthquake (MCE_R) ground motions and the general procedure in Section 11.4.6 with F_a selected based on Table 11.4-1 and F_v selected based on Table 11.4-2. The risk-targeted maximum considered earthquake (MCE_R) ground motions were obtained from modified USGS 2014 maps with a 2% probability of exceedance in 50 years (i.e., a $\pm 2,475$ -year return period). The modifications include factors to adjust the spectral accelerations to account for directivity and risk.

Liquefaction

Liquefiable soils typically consist of loose sands and non-plastic to low plasticity silt below the water table. The soils encountered to the maximum depth of BH-1 (i.e., ± 21.5 feet) and to ± 19.5 feet in BH-2 consist of predominantly medium stiff to stiff, medium plasticity clay, and silt. This stratum is not expected to liquefy under earthquake loading based on the stiffness and plasticity of the soil. The silty sand below ± 19.5 feet in BH-2 is loose and susceptible to liquefaction. However, we believe the risk of significant damage due to liquefaction-induced settlement is low, due to the depth and anticipated modest extent of potentially liquefiable soil.

DISCUSSION OF GEOTECHNICAL CONSIDERATIONS

A general discussion of geotechnical considerations is provided in this section. Specific construction recommendations for these items are provided in the recommendations section.

Seasonal Issues

Fine-grained soil will be present at the foundation level and at the subgrade elevation beneath the new bleachers. These soils will be moisture-sensitive and will soften considerably when wet and disturbed by construction traffic.

The near-surface ground water level will be highest during the wet winter months, which will likely require dewatering the foundation excavations. Therefore, if practical, we recommend completing the site grading and foundation construction during the dry summer months (typically mid-June through mid-October). If wet weather construction is planned, it should be anticipated that a thickened granular pad will be required beneath the new bleachers to support construction traffic and reduce the risk of subgrade disturbance. We should be contacted to revise the recommendations contained herein, if construction will occur during wet weather.

Undocumented Fill

Fill encountered within 3 feet of the ground surface consisted of medium stiff to stiff, medium plasticity clayey silt with varying amounts of sand and gravel. The fill may be suitable to support foundations in its current state. However, field confirmation of the suitability of the fill should be made at the time of construction. If unsuitable fill is observed in the footing excavations, mitigation will require overexcavation and replacement.

Site Grading

We understand the surface beneath the new bleachers may consist of a concrete slab-on-grade for equipment storage. Therefore, a building pad will be required to support the new slab. If a slab is not planned, then the pad may be reduced in thickness as required for the intended use.

For the slab-on-grade option, the pad thickness will depend on the time of year the project goes to construction. If the work is completed during dry weather, the building pad should consist of 12 inches of compacted Select Fill (i.e., crushed gravel or crushed rock as defined in the Recommendations section). If wet weather construction is planned, the pad thickness should be increased to 24 inches.

For foundations, 12 inches of Select Fill (i.e., compacted crushed gravel or crushed rock as defined in the Recommendations section below) will be required beneath the footings. The intent of the thicker rock section is to remove a portion of the site fill. This fill thickness may need to be increased if unsuitable fill is exposed at the foundation subgrade elevation as determined by a Foundation Engineering representative.

ENGINEERING ANALYSIS AND DESIGN

Bearing Capacity

Foundation loads were not available at the time this memorandum was prepared. However, we understand isolated spread footings or strip footings will be used to support the new bleachers and press box.

The new footings will bear on predominantly medium stiff to stiff, medium plasticity fill (if approved) or alluvium. For the bearing capacity analysis, we used an undrained shear strength value determined from the vane shear tests of 1,100 psf. We also assumed footing dimensions of up to 10x10 feet for isolated column footings and widths of 2 to 4 feet for continuous wall footings. Our analysis indicates an allowable bearing pressure of 2,500 psf would be appropriate for design of continuous footings and an allowable bearing pressure of 3,000 psf for column footings, using a factor of safety of 3. This value assumes the footings will be underlain by at least 12 inches of Select Fill extending at least 6 inches beyond the footing edges. The bearing pressures may be increased by one-third for transient (seismic and wind) loads.

Settlement

No formal settlement analysis was completed based on the relatively light structure and our analysis experience with other OSU campus projects. Based on the stiffness of the foundation soils and the recommended bearing pressure, we anticipate the total foundation settlement will be less than $\pm \frac{1}{2}$ inch, if the foundation preparation is completed as recommended herein. Differential settlement between adjacent footings may be assumed to be approximately half of the total settlement, or $\pm \frac{1}{4}$ inch.

Sliding Coefficient and Passive Resistance for Footings

A coefficient of friction of 0.5 between the base of the footings and the Select Fill may be used for sliding analysis. An equivalent fluid density of ± 145 pcf may be used to represent the potential passive resistance against the vertical face of the footings. This assumes limited horizontal movement (i.e., less than 1 inch) for service-level design. This allowable value assumes all footings will be backfilled with compacted Select Fill extending at least 6 inches beyond the footing edges.

Slab on Grade

The building pad will consist of a minimum of 12 inches of compacted Select Fill underlain by predominately stiff, fine-grained fill. Therefore, a modulus of subgrade reaction of 150 pci is appropriate for design.

CONSTRUCTION RECOMMENDATIONS

General Earthwork and Materials Specifications

1. Select Fill as defined in this report should consist of 1-inch minus, clean, well-graded, crushed gravel or rock. We should be provided a sample of the intended fill or a gradation curve for approval prior to delivery to the site.
2. Compact the Select Fill and fine-grained subgrade to 95% relative compaction. The maximum dry density of ASTM D 698 should be used as the standard for estimating the relative compaction. Efficient compaction of granular fills will require a smooth drum, vibratory roller. Compaction of the fine-grained subgrade should be completed with a padfoot roller. Walk-behind plate compactors or hoe-mounted compactors will be required for smaller foundation excavations where access with self-propelled equipment is not feasible.

Field density tests should be run frequently to confirm adequate compaction of the Select Fill. The fine-grained subgrade as discussed above is likely too variable for density testing and should be proof-rolled using a loaded 10-yd³ dump truck or other approved vehicle. Compaction verification with proof-rolling should be evaluated by a Foundation Engineering representative. Areas of pumping or deflection observed beneath the truck wheels may be reworked, or overexcavated and replaced with compacted Select Fill and proof-rolled again.

Subgrade compaction is only required if a slab-on-grade is planned and will only be permitted during dry weather (typically mid-July to mid-October). Otherwise, do not compact the subgrade and increase the building pad thickness to 24 inches.

3. Separation Geotextile as defined in this report should be a woven geotextile with Mean Average Roll Value (MARV) strength properties meeting the requirements of an AASHTO M 288-17 Class 2 geotextile. The geotextile shall have MARV hydraulic properties meeting the requirements of AASHTO M 288-17 with a minimum permittivity of 0.05 sec.⁻¹ (for dry weather construction only) and an Apparent Opening Size (AOS) less than 0.6 mm (max average roll value). We should be provided a specification sheet on the selected geotextile for approval prior to delivery to the site.
4. Shoring should be provided in trenches according to OR-OSHA Standards to protect workers from sloughing or caving soils. Shoring and worker safety are the sole responsibility of the contractor.
5. Inform contractors that utility construction and footing excavations may require dewatering for excavations completed during the winter months.

Foundation Design and Construction

6. Design the footings using an allowable bearing pressure of 2,500 psf for continuous footings and 3,000 psf for column footings. Assume a total settlement of ½-inch for footings designed and built as specified herein.
7. Use a coefficient of friction against sliding of 0.5 for new footings bearing on Select Fill.
8. Use an allowable passive resistance of 145 pcf if the footings are backfilled with compacted Select Fill.
9. Use a modulus of subgrade reaction of 150 pci for new slabs-on-grade supported on a minimum of 12 inches of Select Fill.
10. Design the structure using the response spectrum, Site Class and seismic parameters summarized in Figure 3A.

Foundation Construction

Site preparation for new slabs-on-grade (if applicable) and preparation for new foundations should be completed during dry weather as follows:

11. Remove all existing concrete and landscaping from the bleacher area. Haul all debris from the site.
12. Excavate for the building pad to the required grades that will accommodate a minimum 12-inch thick building pad. Complete the final excavation using a hoe equipped with a smooth bucket to minimize subgrade disturbance. The excavator should operate from outside of the excavation or from a thickened rock section extending into the pad area.
13. Overexcavate all unsuitable fill and any disturbed, wet, soft, organic, or highly plastic soils from beneath the pad. The need for and depth of overexcavation should be confirmed by a Foundation Engineering representative during construction. If overexcavation is needed, replace the excavated material with compacted Select Fill. We recommend the bid documents include a unit cost for overexcavation and replacement.
14. Compact the subgrade as specified above. Subgrade compaction is not required if a slab-on-grade is not planned or if construction occurs during wet weather.

15. Place a Separation Geotextile on the approved subgrade prior to backfilling. The geotextile should be laid smooth, without wrinkles or folds, in the direction of construction traffic. Overlap adjacent rolls a minimum of 2 feet. Pin fabric overlaps or place the fill in a manner that will not separate the overlap during construction. Seams that have separated will require removal of the base rock to establish the required overlap.
16. Construct the building pad using 12 inches of Select Fill. The fill should be end-dumped from outside the bleacher area and pushed over the subgrade and Separation Geotextile in a minimum 12-inch thick lift using a low ground-pressure dozer.
17. Excavate for footings using a hoe equipped with a smooth bucket. The excavation should extend a minimum of 6 inches beyond the outside edge of the foundation, or as required for formwork. Provide a minimum of 12 inches of compacted Select Fill beneath the footings. Select Fill should extend at least 6 inches beyond the edge of footings.
18. Install temporary sumps and collection pipes, as required, to dewater the foundation excavations prior to placing Select Fill.
19. Backfill around the footing edges with compacted Select Fill. The Select Fill should be density tested to confirm adequate compaction.

DESIGN REVIEW/CONSTRUCTION OBSERVATION/TESTING

We should be provided the opportunity to review all drawings and specifications that pertain to site preparation and foundation construction. All excavations will require field confirmation of the subsurface conditions in accordance with recommendations provided herein. We recommend that we be retained to provide the necessary construction observations.

VARIATION OF SUBSURFACE CONDITIONS, USE OF THIS REPORT, AND WARRANTY

The analyses, conclusions, and recommendations contained herein assume that the soil conditions encountered in the borings are representative of the overall site conditions. The above recommendations assume that we will have the opportunity to review final drawings and be present during construction to confirm the assumed subgrade and foundation conditions. No changes in the enclosed recommendations should be made without our approval. We will assume no responsibility or liability for any engineering judgment, inspection, or testing performed by others.

This report was prepared for the exclusive use of Oregon State University (Capital Planning and Development) and their design consultants for the Loren Soccer Field Bleacher Improvements project in Corvallis, Oregon. Information contained herein should not be used for other sites or for unanticipated construction without our written consent. This report is intended for planning and design purposes. Contractors using this information to estimate construction quantities or costs do so at their own risk. Our services do not include any survey or assessment of potential surface contamination or contamination of the soil or ground water by hazardous or toxic materials. We assume that those services, if needed, have been completed by others.

Our work was done in accordance with generally accepted soil and foundation engineering practices. No other warranty, expressed or implied, is made.

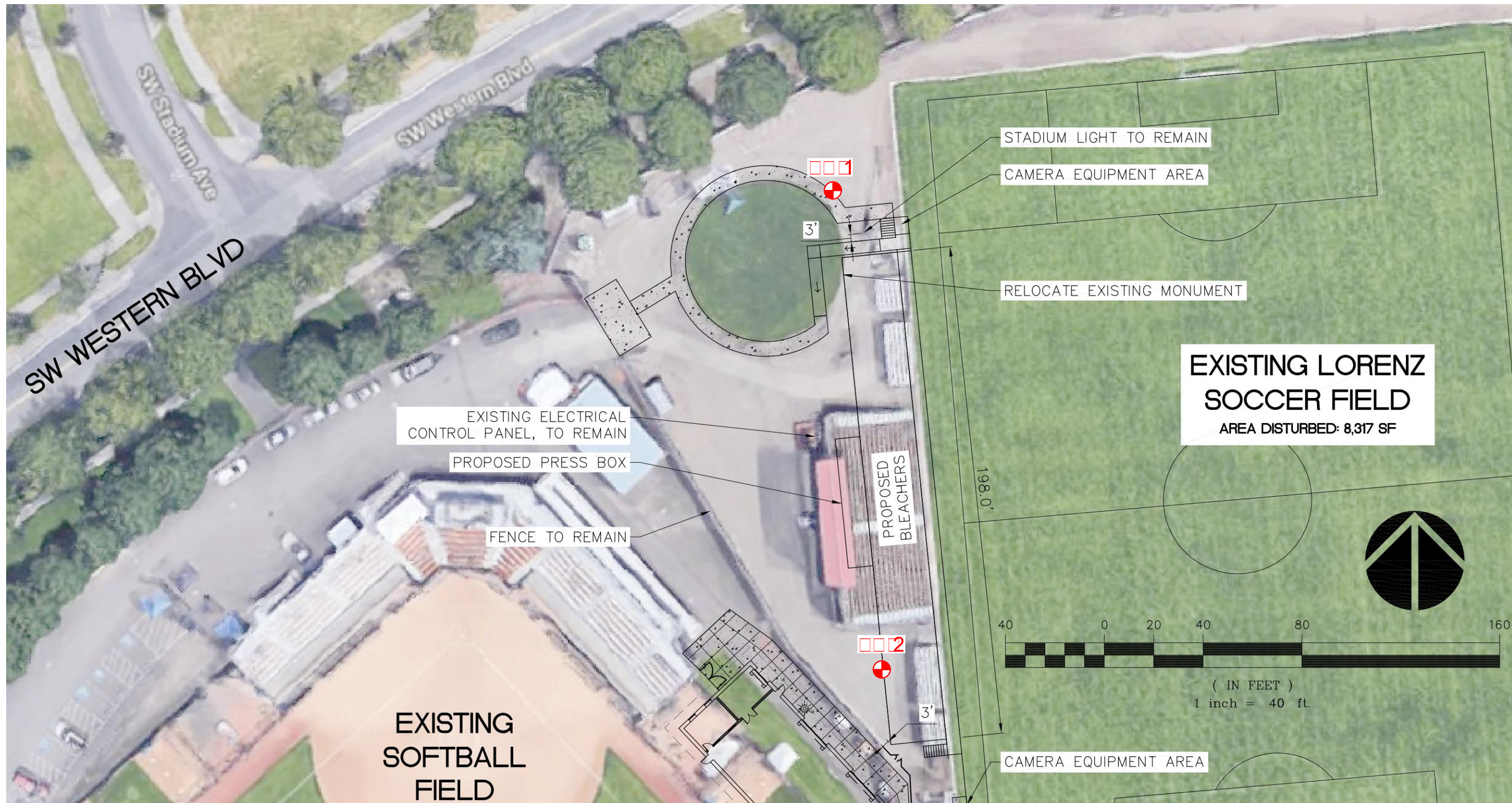
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- ASTM, 2017; *Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils*: American Society of Testing and Materials (ASTM) International, ASTM Standard D4318, DOI: 10.1520/D1140.
- IBC, 2018, *International Building Code*: International Code Council, Inc., Sections 1613 and 1803.
- OR-OSHA, 2011, *Oregon Administrative Rules, Chapter 437, Division 3 - Construction, Subdivision P – Excavations*: Oregon Occupational Safety and Health Division (OR-OSHA).
- OSSC, 2019; Oregon Structural Specialty Code (OSSC): Based on the International Code Council, Inc., 2018 IBC.



Appendix A

Figures



**EXISTING LORENZ
SOCCER FIELD**
AREA DISTURBED: 8,317 SF

**EXISTING
SOFTBALL
FIELD**

LE \square END

\oplus $\square\square$ 1 $\square\square$ RIN \square N \square M \square ER AND L \square CATION

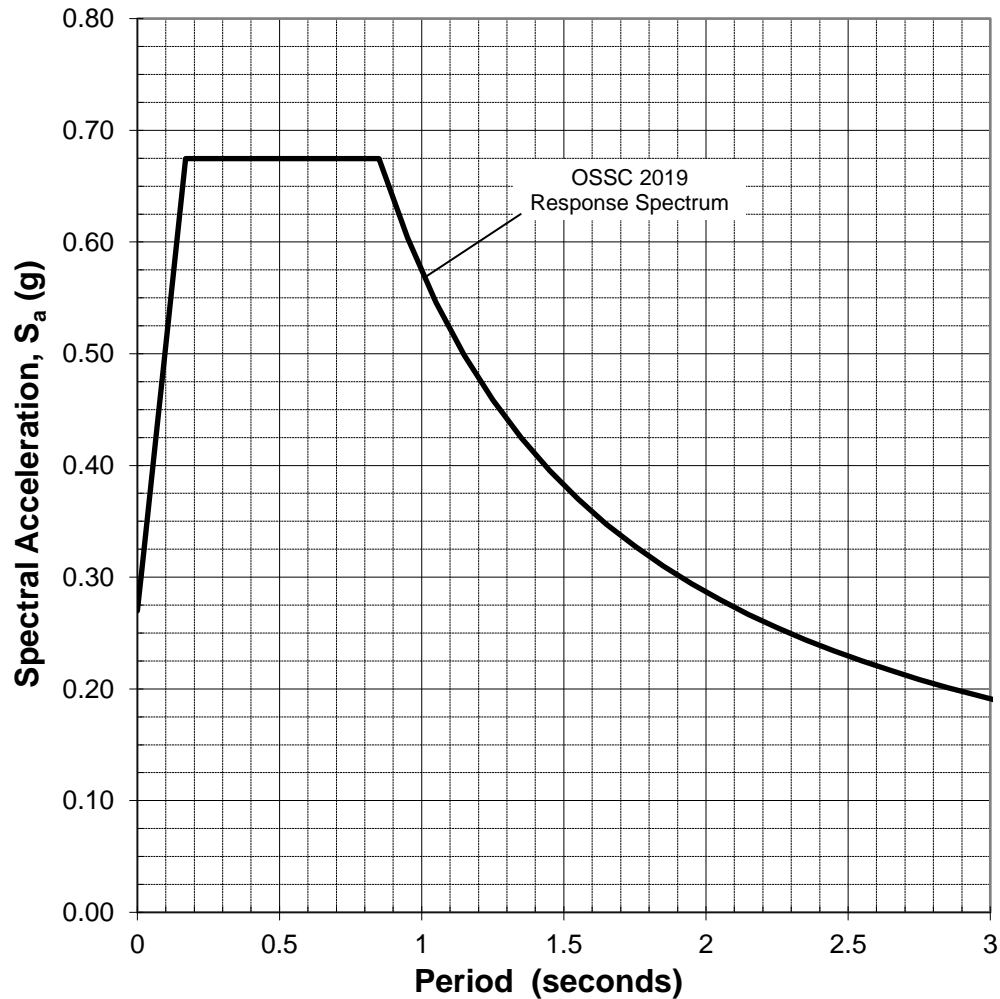
- NOTES:
1. BORING LOCATIONS WERE ESTABLISHED WITH A METAL TAPE AND ARE APPROXIMATE.
 2. BASE MAP PROVIDED BY MACKENZIE.
 3. SEE REPORT FOR A DISCUSSION OF SUBSURFACE CONDITIONS.

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DATE NOV 2019
DWN. EJG
APPR. _____
REVIS. _____
PROJECT NO. _____
21 \square 11 \square

SITE LAYOUT AND TEST PIT LOCATIONS
OSU LORENZ SOCCER FIELD BLEACHER IMPROVEMENTS
CORVALLIS, OREGON

FIGURE NO.
2A



Notes:

1. The Design Response Spectrum is based on OSSC 2019 Section 1613.2 which is based on ASCE 7-16 Section 11.4.
2. The following parameters are based on the modified USGS 2014 maps provided in OSSC 2019:

Site Class= D	Damping = 5%		
$S_S = 0.88$	$F_a = 1.15$	$S_{MS} = 1.01$	$S_{DS} = 0.67$
$S_1 = 0.47$	$F_v = 1.83$	$S_{M1} = 0.86$	$S_{D1} = 0.57$
3. S_S and S_1 values indicated in Note 2 are the mapped, risk-targeted maximum considered earthquake spectral accelerations for 2% probability of exceedence in 50 years.
4. F_a and F_v were established based on OSSC 2019 Tables 1613.2.3(1) and 1613.2.3(2) using the selected S_S and S_1 values. S_{DS} and S_{D1} values include a 2/3 reduction on S_{MS} and S_{M1} as discussed in OSSC 2019 Section 1613.2.3.
5. Site location is: Latitude 44.5588, Longitude -123.2767.

FIGURE 3A
OSSC 2019 SITE RESPONSE SPECTRUM
OSU Lorenz Soccer Field bleacher Improvements
Corvallis, Oregon
Project No.: 2191149



Appendix B

Boring Logs

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DISTINCTION BETWEEN FIELD LOGS AND FINAL LOGS

A field log is prepared for each boring or test pit by our field representative. The log contains information concerning sampling depths and the presence of various materials such as gravel, cobbles, and fill, and observations of ground water. It also contains our interpretation of the soil conditions between samples. The final logs presented in this report represent our interpretation of the contents of the field logs and the results of the sample examinations and laboratory test results. Our recommendations are based on the contents of the final logs and the information contained therein and not on the field logs.

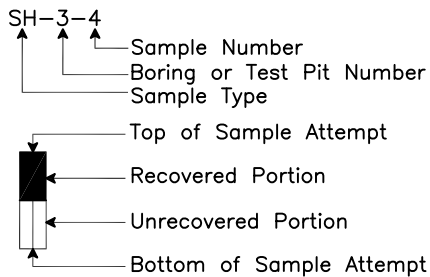
VARIATION IN SOILS BETWEEN TEST PITS AND BORINGS

The final log and related information depict subsurface conditions only at the specific location and on the date indicated. Those using the information contained herein should be aware that soil conditions at other locations or on other dates may differ. Actual foundation or subgrade conditions should be confirmed by us during construction.

TRANSITION BETWEEN SOIL OR ROCK TYPES

The lines designating the interface between soil, fill or rock on the final logs and on subsurface profiles presented in the report are determined by interpolation and are therefore approximate. The transition between the materials may be abrupt or gradual. Only at boring or test pit locations should profiles be considered as reasonably accurate and then only to the degree implied by the notes thereon.

SAMPLE OR TEST SYMBOLS



- S – Grab Sample
- SS – Standard Penetration Test Sample (split-spoon)
- SH – Thin-walled Shelby Tube Sample
- C – Pavement Core Sample
- CS – Rock Core Sample

- ▲ Standard Penetration Test Resistance equals the number of blows a 140 lb. weight falling 30 in. is required to drive a standard split-spoon sampler 1 ft. Practical refusal is equal to 50 or more blows per 6 in. of sampler penetration.
- Water Content (%).

UNIFIED SOIL CLASSIFICATION SYMBOLS

- | | |
|------------|---------------------|
| G – Gravel | W – Well Graded |
| S – Sand | P – Poorly Graded |
| M – Silt | L – Low Plasticity |
| C – Clay | H – High Plasticity |
| Pt – Peat | O – Organic |

FIELD SHEAR STRENGTH TEST

Shear strength measurements on test pit side walls, blocks of soil or Shelby tube samples are typically made with Torvane or Field Vane shear devices.

TYPICAL SOIL/ROCK SYMBOLS

- | | | |
|----------|--------|-----------|
| Concrete | Sand | Basalt |
| Organics | Gravel | Sandstone |
| Clay | Silt | Siltstone |

WATER TABLE

- Water Table Location
 (1/31/16) Date of Measurement



820 NW Cornell Avenue 7857 SW CIRRUS DRIVE, BUILDING 24
 Corvallis, OR 97330 BEAVERTON, OR 97008
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SYMBOL KEY BORING AND TEST PIT LOGS

Explanation of Common Terms Used in Soil Descriptions

Field Identification	Cohesive Soils			Granular Soils	
	SPT*	S _u ** (tsf)	Term	SPT*	Term
Easily penetrated several inches by fist.	0 – 2	< 0.125	Very Soft	0 – 4	Very Loose
Easily penetrated several inches by thumb.	2 – 4	0.125–0.25	Soft	4 – 10	Loose
Can be penetrated several inches by thumb with moderate effort.	4 – 8	0.25 – 0.50	Medium Stiff	10 – 30	Medium Dense
Readily indented by thumb but penetrated only with great effort.	8 – 15	0.50 – 1.0	Stiff	30 – 50	Dense
Readily indented by thumbnail.	15 – 30	1.0 – 2.0	Very Stiff	> 50	Very Dense
Indented with difficulty by thumbnail.	>30	> 2.0	Hard		

* SPT N-value in blows per foot (bpf)

** Undrained shear strength

Term	Soil Moisture Field Description
Dry	Absence of moisture. Dusty. Dry to the touch.
Damp	Soil has moisture. Cohesive soils are below plastic limit and usually moldable.
Moist	Grains appear darkened, but no visible water. Silt/clay will clump. Sand will bulk. Soils are often at or near plastic limit.
Wet	Visible water on larger grain surfaces. Sand and cohesionless silt exhibit dilatancy. Cohesive soil can be readily remolded. Soil leaves wetness on the hand when squeezed. Soil is wetter than the optimum moisture content and above the plastic limit.

Term	PI	Plasticity Field Test
Non-plastic	0 – 3	Cannot be rolled into a thread at any moisture.
Low Plasticity	3 – 15	Can be rolled into a thread with some difficulty.
Medium Plasticity	15 – 30	Easily rolled into thread.
High Plasticity	> 30	Easily rolled and re-rolled into thread.

Term	Soil Structure Criteria
Stratified	Alternating layers at least ¼ inch thick.
Laminated	Alternating layers less than ¼ inch thick.
Fissured	Contains shears and partings along planes of weakness.
Slickensided	Partings appear glossy or striated.
Blocky	Breaks into small lumps that resist further breakdown.
Lensed	Contains pockets of different soils.

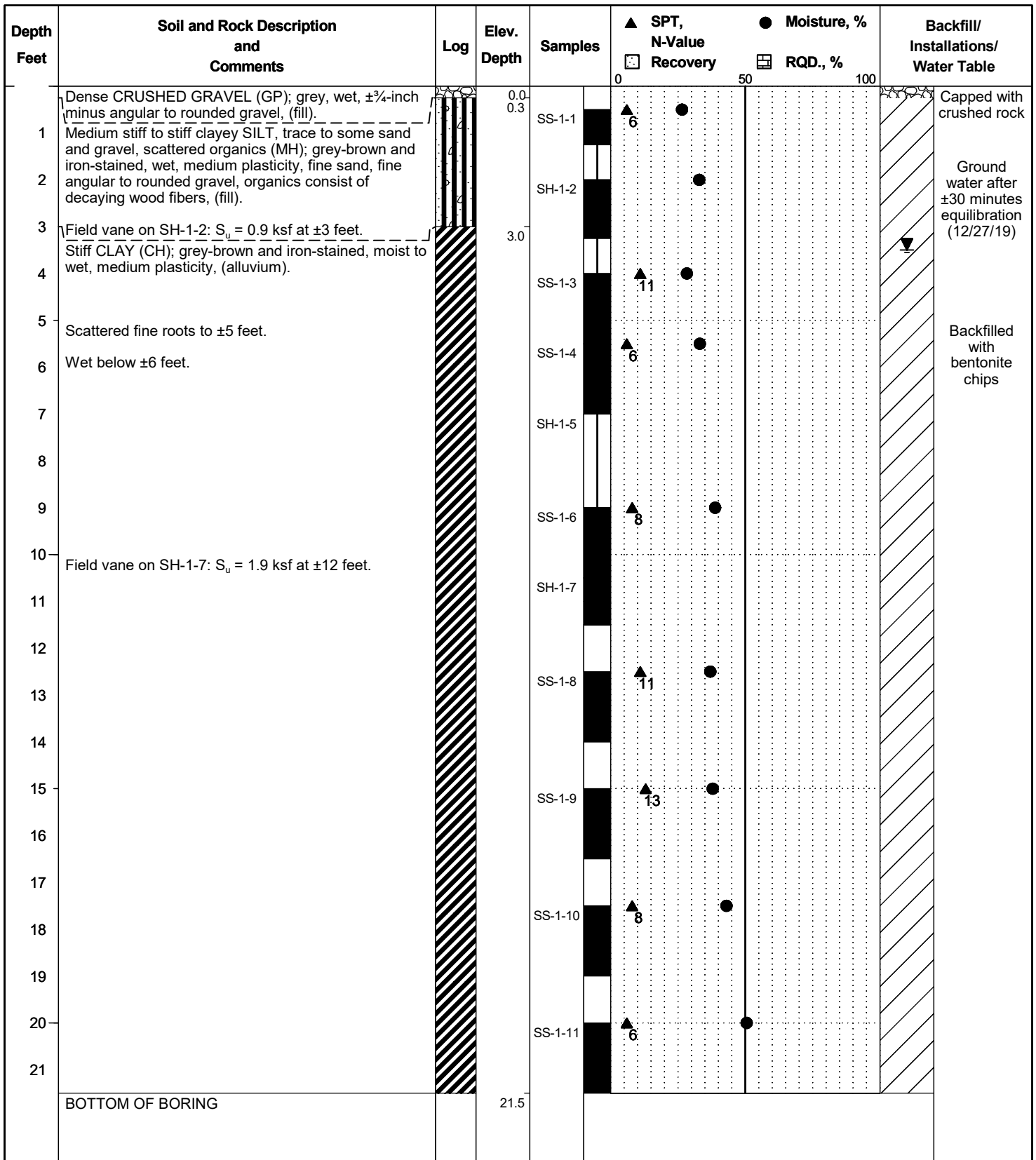
Term	Soil Cementation Criteria
Weak	Breaks under light finger pressure.
Moderate	Breaks under hard finger pressure.
Strong	Will not break with finger pressure.



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COMMON TERMS
SOIL DESCRIPTIONS



Project No.: 2191149

Surface Elevation: N/A

Date of Boring: January 6, 2020

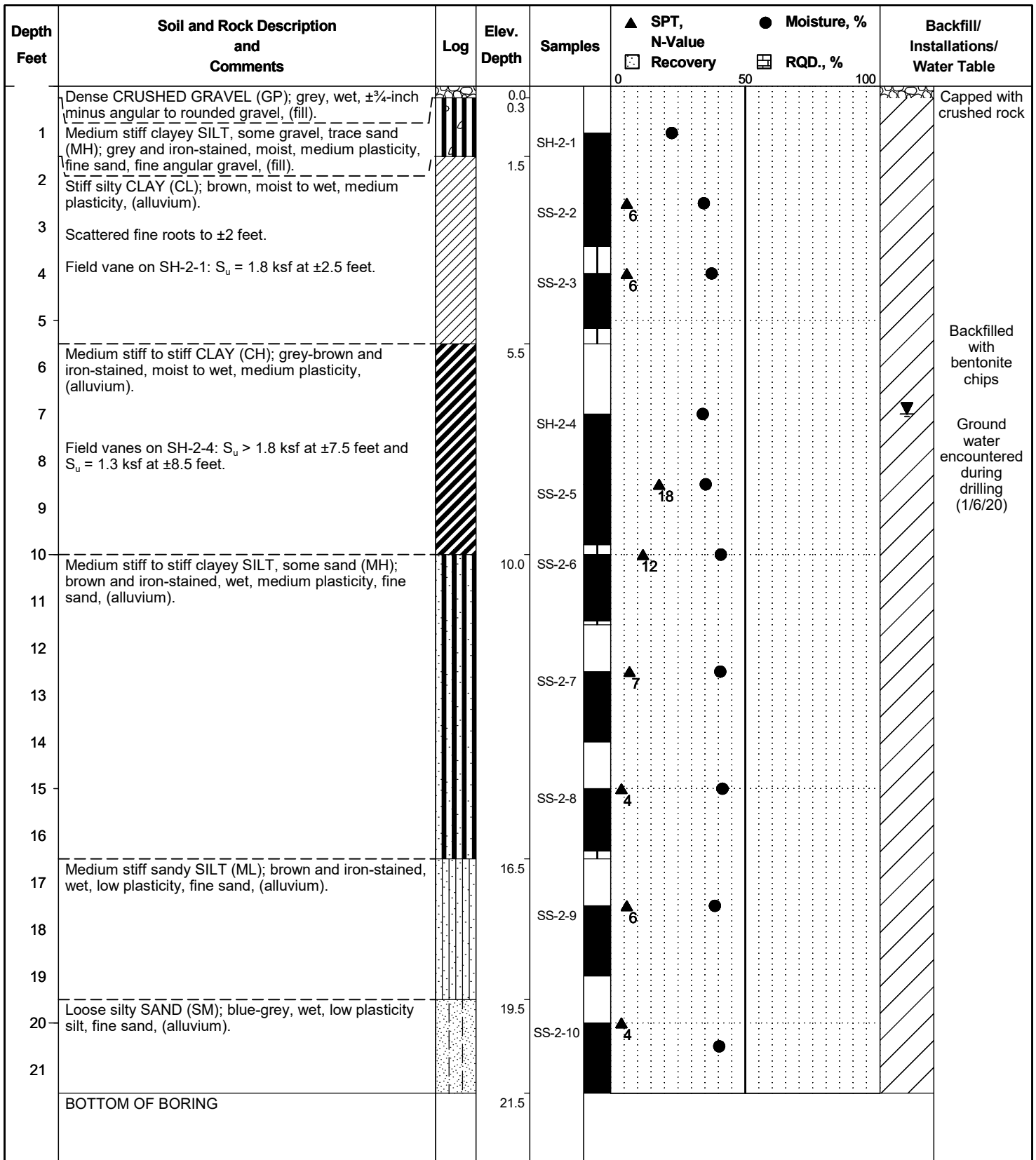
Boring Log: BH-1

OSU Lorenz Soccer Field Bleacher Improvements

Corvallis, Oregon



Foundation Engineering, Inc.



Project No.: 2191149

Surface Elevation: N/A

Date of Boring: January 6, 2020

Boring Log: BH-2

OSU Lorenz Soccer Field Bleacher Improvements

Corvallis, Oregon



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Appendix C

Field and Laboratory Test Results

Table 1C. Moisture Content (ASTM D2216), Percent Fines (ASTM D1140) & Atterberg Limits (ASTM D4318)

Sample Number	Sample Depth (ft)	Moisture Content (percent)	Percent Fines	Atterberg Limits			USCS Classification
				LL	PL	PI	
SS-1-1	0.5 – 2.0	26.5					
SH-1-2	2.0 – 4.0	32.9					
SS-1-3	4.0 – 5.5	28.3		52	27	25	CH
SS-1-4	5.5 – 7.0	33.1					
SS-1-6	9.0 – 10.5	38.8					
SS-1-8	12.5 – 14.0	37.0					
SS-1-9	15.0 – 16.5	37.9					
SS-1-10	17.5 – 19.0	43.0					
SS-1-11	20.0 – 21.5	50.5					
SH-2-1	1.0 – 2.5	22.7					
SS-2-2	2.5 – 4.0	34.6		47	26	21	CL
SS-2-3	4.0 – 5.5	37.5					
SH-2-4	7.0 – 8.5	34.2					
SS-2-5	8.5 – 10.0	35.3					
SS-2-6	10.0 – 11.5	40.9					
SS-2-7	12.5 – 14.0	40.7	73.0				
SS-2-8	15.0 – 16.5	41.5					
SS-2-9	17.5 – 19.0	38.7					
SS-2-10	20.5 – 21.5	40.3	40.9				

Table 2C. Bulk Density (ASTM D2937)

Sample Number	Sample Depth (ft)	Moisture Content (percent)	Moist Bulk Density (pcf)	Dry Density (pcf)
SH-1-2	2.0 – 4.0	32.9	109.0	82.0
SH-2-4	7.0 – 8.5	34.2	113.7	84.7

Table 3C. Vane Shear Test Results

Sample Number	Sample Depth (feet)	Measurement Depth (feet)	Undrained Shear Strength (ksf)
SH-1-2	2.0 - 4.0	3.0	0.9
SH-1-7	10.5 – 12.0	12.0	1.9
SH-2-1	1.0 – 2.5	2.5	1.8
SH-2-4	7.0 – 8.5	7.5	>1.8
SH-2-4	7.0 – 8.5	8.5	1.3

EXHIBIT J - ADDENDA